360 environmental

Minilya Exmouth and Burkett Road Widening and Material Sources

Biological Survey

Prepared for:

Main Roads Western Australia

March 2019

people • planet • professional

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Abbreviations

ABBREVIATION	DEFINITION
360 Environmental	360 Environmental Pty Ltd
BAM Act	*Biodiversity and Agriculture Management Act 2007* (state)
BC Act	*Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
DPIRD	Department of Primary Industries and Regional Development (formerly DAFWA [Department of Agriculture and Food Western Australia]))
DBCA	Department of Biodiversity, Conservation and Attractions (formerly DPaW [Department of Parks and Wildlife])
DEE	Department of the Environment and Energy
EPA	Environmental Protection Authority (state)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ESA	Environmentally Sensitive Area
ha	Hectare
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometres
Main Roads	Main Roads Western Australia
m	Metres
mm	Millimetres
MNES	Matters of National Environmental Significance
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
TEC	Threatened Ecological Community
TPFL	Threatened and Priority Flora Database
TP List	Threatened and Priority Flora List
WAH	Western Australian Herbarium
WAOL	Western Australian Organism List
WoNS	Weeds of National Significance

Executive Summary

Main Roads Western Australia commissioned 360 Environmental Pty Ltd to undertake a biological survey in September 2018 for the Minilya Exmouth and Burkett Road widening and material sources extraction project. The survey delineated key flora, fauna, soil, groundwater and surface water values (wetlands) and potential sensitivities along sections of the Minilya Exmouth Road (113 to132 (Straight Line Kilometre) SLK), Burkett Road (45.92 to 78.51 SLK), and within ten material pit locations, within the Shire of Meekatharra (Survey Area) (Figure 1).

Key Findings from the Detailed Flora and Vegetation Survey

A total of 175 vascular flora species representing 42 families and 102 genera were recorded within the Survey Area. The most represented families were Fabaceae (33 taxa), Poaceae (16 taxa) and Malvaceae (15 taxa). The most frequently recorded genera were *Acacia*, *Ptilotus* and *Eremophila*.

No Threatened flora species pursuant to the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or gazetted as Threatened/ Declared Rare Flora pursuant to the *Biodiversity Conservation Act 2016* were recorded during the survey. Two Priority species were recorded in the Survey Area:

- *Sclerolaena stylosa* (P1); an estimated population of < 250 individuals were recorded across the Survey Area, within Burkett Road SLK 45 - 78; and
- *Acacia startii* (P3) an estimated population of > 6,300 individuals were recorded across the Survey Area, within Burkett Road SLK 45-78.

Based on the post field survey likelihood of occurrence assessment, one species, *Eremophila youngii* subsp. *lepidota* (P4), is considered to have a high likelihood of occurrence within the Survey Area based on known distribution and habitat preference.

Eight weed species were recorded during the survey, none of which represent a Declared Pest or Weed of National Significance.

Nine vegetation types were mapped within the Survey Area; none are analogous to a Threatened or Priority Ecological Community. The vegetation types recorded during the survey are considered typical of the Carnarvon bioregion, with mixed *Acacia* species over *Triodia* grasslands. The most common vegetation type was *Melaleuca cardiophylla, Acacia coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *Acacia sclerosperma, Thryptomene dampieri, Acacia gregorii* low isolated shrubs over *Triodia* epactia tall closed grassland (McTdTe), encompassing 450 hectares or 23% of the Survey Area.

Vegetation condition ranged from Very Good to Degraded. Weed diversity was considered low across the Survey Area with eight species recorded (4.5 % of total taxa), however, weed abundance was considered to be high, with the presence of **Cenchrus ciliaris* and **Vachellia* farnesiana at highest densities within vegetation types AcVfCc and AxAcCc.

Other disturbances in the Survey Area include tracks, litter, cattle impacts, fire and historical clearing.

Key Findings from the Fauna Survey

A total of 74 terrestrial vertebrate species from 38 families were recorded with:

- No amphibians recorded;
- 18 reptiles from four families;
- 47 birds from 27 families; and
- Nine mammals from seven families.

No Threatened, Priority or Migratory fauna species were recorded within the Survey Area as listed on the State DBCA Threatened Fauna species list. Based on the post field survey likelihood of occurrence assessment, three species are considered to have a high likelihood of occurrence based on known distribution and habitat preference:

- Ningaloo Worm Lizard, *Aprasia rostrata* (P3);
- Brush-tailed Mulgara, *Dasycercus blythi* (P4); and
- Short-tailed Mouse, *Leggadina lakedownensis* (P4).

Three species are considered to have a medium likelihood of occurrence within the Survey Area based on known distribution and habitat preference.

A total of five introduced species were recorded during the survey, *Felis catus* (Cat), *Bos Taurus* (European Cattle), *Capra hircus* (Goat), *Equus Caballus* (Horse) and *Vulpes Vulpes* (Red Fox).

A total of 37 fauna habitat assessments were undertaken during the survey with five broad fauna habitats identified and mapped, which included:

- Acacia shrubland;
- Dune;
- Grassland;
- Major Drainage; and
- Minor Drainage.

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1 Introduction

1.1 The Project

Main Roads Western Australia (Main Roads) commissioned 360 Environmental Pty Ltd (360 Environmental) to undertake a biological survey for a Main Roads Project (the Project) along sections of Minilya Exmouth Road (113 to 132 Straight Line Kilometre (SLK)), Burkett Road (45.92 to 78.51 SLK), within the Shire of Meekatharra (herein referred to as the Survey Area). The survey consisted of 10 material pits that covered approximately 1,937 hectares (ha) at the following chainage locations (Figure 1):

- Minilya Exmouth Road 123.9 SLK
- Burkett Road 18.5 SLK
- Burkett Road 31.2 SLK
- Burkett Road 33.7 SLK
- Burkett Road 37.8 SLK
- Burkett Road 44 right hand side (RHS) SLK
- Burkett Road 44 left hand side (LHS) SLK
- Burkett Road 58 SLK
- Burkett Road 61.16 SLK
- Burkett Road 66 SLK

The Project involves the widening of pavement to achieve 2 x 3.5 metre (m) lane width, 2 x 1 m seal shoulder and install audible edge lines along the road length, using material from the pits to complete the Project.

1.2 Objectives and Scope

The objective of the survey was to assess the biological aspects of the predetermined locations with the key findings presented in this report. The results of the survey will be used to inform the environmental assessment approvals process for the preparation of a Clearing Impact Assessment, Vegetation Management Plan and State or Commonwealth referral documentation.

The scope for the biological survey includes:

- Desktop assessment;
- Single season detailed flora and vegetation survey; and
- Level 1 terrestrial vertebrate fauna survey.

Legend

- Survey Area
- State Road
- Local Road

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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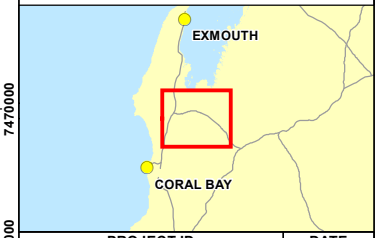
LOCALITY MAP



PROJECT ID	DATE
2891	9/10/2018

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 1 Survey Area

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F1 Survey Area.mxd

2 Background

2.1 Protection of Flora, Vegetation and Fauna

Western Australian flora and fauna is protected formally and informally by legislative and non-legislative measures, which are as follows:

Legislative measures:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Western Australia (WA) *Biodiversity Conservation Act 2016* (BC Act);
- WA *Environmental Protection Act 1986* (EP Act); and
- WA *Biosecurity and Agriculture Management Act 2007* (BAM Act).

Non-legislative measures:

- WA Department of Biodiversity Conservation and Attractions (DBCA) Priority lists for fauna, flora and ecological communities;
- Weeds of National Significance (WoNS); and
- Recognition of locally significant populations by DBCA.

A short description of each is provided in Appendix A. Other definitions, including species conservation categories are presented in Appendix B, conservation categories for Ecological Communities are provided in Appendix C, and Environmental Weeds and Declared Plant Categories are provided in Appendix D.

2.2 Biophysical Environment

2.2.1 Climate

The closest long-term Bureau of Meteorology (BoM) weather station with a complete dataset is the Learmonth Airport (station 5007), located approximately 50 kilometres (km) north of the Survey Area.

The long term mean minimum temperature for Learmonth Airport ranges from 11.4°C (July) to 24.1°C (February) and the long term mean maximum temperature ranges from 24.3°C (July) to 37.9°C (January) (1945 to 2018) (BoM, 2018).The long term annual average rainfall is 256.7 millimetres (mm) (1945 to 2018) (BoM, 2018).

Learmonth Airport recorded 179.2 mm of rainfall in the 12 months prior to the survey (September 2017 to August 2018), which is 77.5 mm below the long term average of 256.7 mm (BoM, 2018). In the three months prior to the survey (June 2018 to August 2018), 98.0 mm of rainfall was recorded, 21.4 mm above the long term average of 76.6 mm for

the same time period (1945 to 2018) (BoM, 2018). The most significant rainfall event was recorded on 19th of June 2018, with 72.2 mm of rainfall recorded (BoM, 2018) (Figure 2).

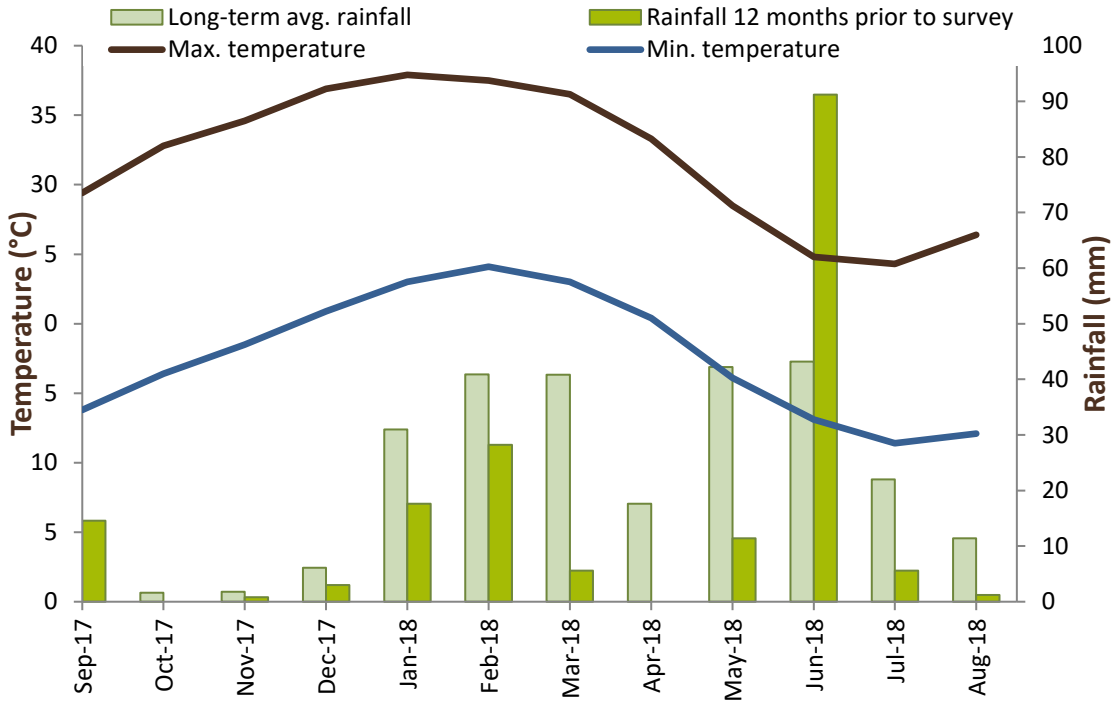


Figure 2: Long term and Monthly Total Rainfall, Maximum and Minimum Temperatures for Learmonth Airport (5007) (BoM, 2018).

2.2.2 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological, geographical and geological attributes. These bioregions are subdivided into 419 subregions as part of a refinement of the IBRA framework (DEE, 2016). The Survey Area occurs within the Cape Range subregion of the Carnarvon bioregion (Figure 3).

The Cape Range (CAR01) subregion forms the northern part of Carnarvon Basin and is described as rugged tertiary limestone ranges and extensive areas of red aeolian dunefield, quaternary coastal beach dunes and mud flats. Dominant communities for this region have been described as (Graham, 2001):

- *Acacia* shrublands over *Triodia* on limestone (*Acacia stuartii* or *A. bivenosa*) and red dunefields;
- *Triodia* hummock grasslands with sparse *Eucalyptus* trees and shrubs on the Cape Range;
- Extensive hummock grasslands (*Triodia*) on the Cape Range and eastern dune-fields;

- Tidal mudflats of sheltered embayments of Exmouth Gulf support extensive mangroves;
- Beach dunes with *Spinifex* communities;
- Extensive mosaic of saline alluvial plains with samphire and saltbush low shrublands along the eastern hinterland of Exmouth Gulf; and
- Islands of the Muiron, Barrow, Lowendal and Montebello groups are limestone-based.

2.2.3 Soil-Land Systems and Surface Geology

Soil-landscape system mapping of Western Australia describes broad soil and landscape characteristics from regional to local scales, and has been captured at scales ranging from 1:20,000 to 1:250,000 (DPIRD, 2018b). The Survey Area expands across five land systems, with the Donovan System (204Dn) being the most dominant land system (Figure 4), (Table 1).

The 1: 5,000,000 surface geology mapping indicates the majority of the Survey Area falls within the upper cretaceous carbonate rocks, greater Carnarvon basin 14290 surface geology unit, which is characterised by Chalky calcilutite, calcisiltite, calcarenite and marble (DMIRS, 2016).

Table 1: Land Systems within the Survey Area

Soil-Land system	Description	Total Area within Western Australia (ha)	Proportion Occurring within the Survey Area	
			(ha)	(% of total area)
204Ca: Cardabia System	Undulating sandy plains with linear dunes, minor limestone plains and low rises, supporting mainly soft spinifex hummock grasslands with scattered acacias and other shrubs.	251,331	660	0.26
204Dn: Donovan System	Gently sloping outwash plains and minor stony plains with alkaline loamy and clayey soils supporting tall shrublands of snakewood and other acacias and low shrublands of bluebush.	125,948	721	0.57
204Fi: Firecracker System	Undulating limestone uplands and plains with friable soils, supporting low shrublands of Gascoyne bluebush.	30,897	112	0.36
203Gi: Girala System	Sandy plains with linear dunes and broad sandy swales supporting hummock grasslands of hard and soft spinifex with scattered acacia shrubs.	329,683	275	0.08

Soil-Land system	Description	Total Area within Western Australia (ha)	Proportion Occurring within the Survey Area (ha)	(% of total area)
204Ju: Jubilee2 System	Limestone hills and stony plains supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs.	74,155	168	0.22
Total Area		**812,014**	**1936**	**1.49**

2.3 Biological Environment

2.3.1 Broad Vegetation associations

Mapping of pre-European broad vegetation within Western Australia was completed on a broad scale (1:1,000,000) by Beard, (1975). These vegetation associations were later re-assessed by Shepherd, Beeston and Hopkins, (2002) with some larger vegetation units divided into smaller units. Together, this pre-European database contains a total of 819 vegetation associations within Western Australia.

There are six broad vegetation associations mapped over the Survey Area (Figure 5), the Shepherd et. al. (2002) Vegetation associations are described below, and their representation in the subregion, region and state is shown in Table 2.

- **Coastal Dunes 662:** (663.7 ha) Hummock grassland; shrub steppe; mixed *Acacia* scrub & dwarf scrub with soft spinifex & *Triodia basedowii*;
- **Giralia Anticline 151:** (64.2 ha) Rivergum, coolibah over mixed sedges *Eucalyptus camaldulensis*, *E. microtheca, E. victrix*;
- **Giralia Anticline 658:** (794.2 ha) Wattle, teatree & other species *Acacia* species (spp.) *Melaleuca* spp.;
- **Giralia Anticline 680:** (151.1ha) Hummock grassland with scattered shrubs or mallee *Triodia* spp. *Acacia* spp., *Grevillea* spp. *Eucalyptus* spp.;
- **Giralia Anticline 267:** (93.3 ha) Mulga, other wattle *Atriplex* spp., *Maireana* spp. with *Acacia aneura* & other *Acacia* spp.; and
- **Cape Yannare Coastal Plain 2675:** (170.8 ha) Hummock grassland with scattered eucalypts over wattle scrub or mallee *Triodia* spp., *Acacia* spp., *Corymbia dichromophloia, Eucalyptus leucophloia, E. youngiana*.

Table 2: Broad Vegetation Association Extents at the State, Region and Subregion Levels (Government of Western Australia, 2018)

Vegetation Type	Pre-European Extent (ha)	Current Extent (ha)	Remaining (%)	Current Extent Managed in DBCA Lands (%)
Vegetation Associations in WA				
Coastal Dunes 662	284,795.92	282,125.59	99.06	7.58
Giralia Anticline 151	154,352.88	154,269.11	99.95	-
Giralia Anticline 267	32,196.68	32,196.68	100	9.41
Giralia Anticline 658	200,281.99	200,281.99	100	22.05
Giralia Anticline 680	90,328.09	90,328.09	100	30.37
Cape Yannare Coastal Plain 2675	351,230.61	351,230.6	100	38.29
Vegetation Associations in the Carnarvon bioregion				
Coastal Dunes 662	282,709.68	281,679.33	99.64	7.44
Giralia Anticline 151	2,890.72	2,890.72	100	0
Giralia Anticline 267	16,529.90	16,529.90	100	18.33
Giralia Anticline 658	200,281.99	200,281.99	100	22.05
Giralia Anticline 680	90,328.09	90,328.09	100	30.37
Cape Yannare Coastal Plain 2675	351,166.04	351,166.04	100	38.30
Vegetation Associations in the Cape Range subregion				
Coastal Dunes 662	282,709.68	281,679.33	99.64	7.44
Giralia Anticline 151	2,890.72	2,890.72	100	-
Giralia Anticline 267	3,084.36	3,840.36	100	98.21
Giralia Anticline 658	133,266.87	133,266.87	100	33.14
Giralia Anticline 680	90,328.09	90,328.09	100	30.37
Cape Yannare Coastal Plain 2675	350,959.96	350,959.96	100	38.32

2.3.2 Environmentally Sensitive Areas

Environmentally Sensitive Areas (ESAs) are declared to prevent degradation of important environmental values such as Threatened flora, Threatened Ecological Communities (TECs) or significant wetlands.

There are no mapped ESAs occurring within the Survey Area; the nearest ESA is Ningaloo Reef/Cape Range Peninsula World Heritage property located approximately 33 km northwest of the Survey Area, displayed in Figure 6 (DWER, 2018).

2.3.3 Hydrology and Wetlands

A review of the Department of Water and Environmental Regulation (DWER) Geographic Information System (GIS) data sets indicates that multiple minor watercourses surround the Survey Area, and two minor watercourses intersecting the Survey Area (Figure 7). The closest major watercourse is located approximately 29 km south of the Survey Area and the Exmouth Gulf is located approximated 15 km north of the Survey Area.

The Survey Area falls within the buffer of a Nationally Important Wetland - the Exmouth Gulf East, however, this wetland, and no other wetlands were recorded as occurring within the Survey Area.

2.3.4 Conservation Areas

There are no conservation areas within the Survey Area, and two conservations areas near to the Survey Area (Figure 6). The nearest conservation areas are (DBCA, 2017a):

- Cape Range National Park, approximately 34 km north west of the Survey Area; and
- Ningaloo Marine Park, approximately 17 km west of the Survey Area and extends both north and south along the coast.

Legend

- Survey Area
- State Road
- Local Road

IBRA Subregions

- Ashburton
- Cape Range
- Hamersley
- Roebourne
- Wooramel

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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- IBRA SOURCED DOEE 2018
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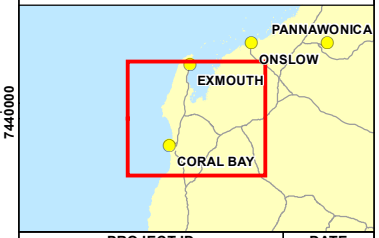

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GDA 1994 MGA Zone 50

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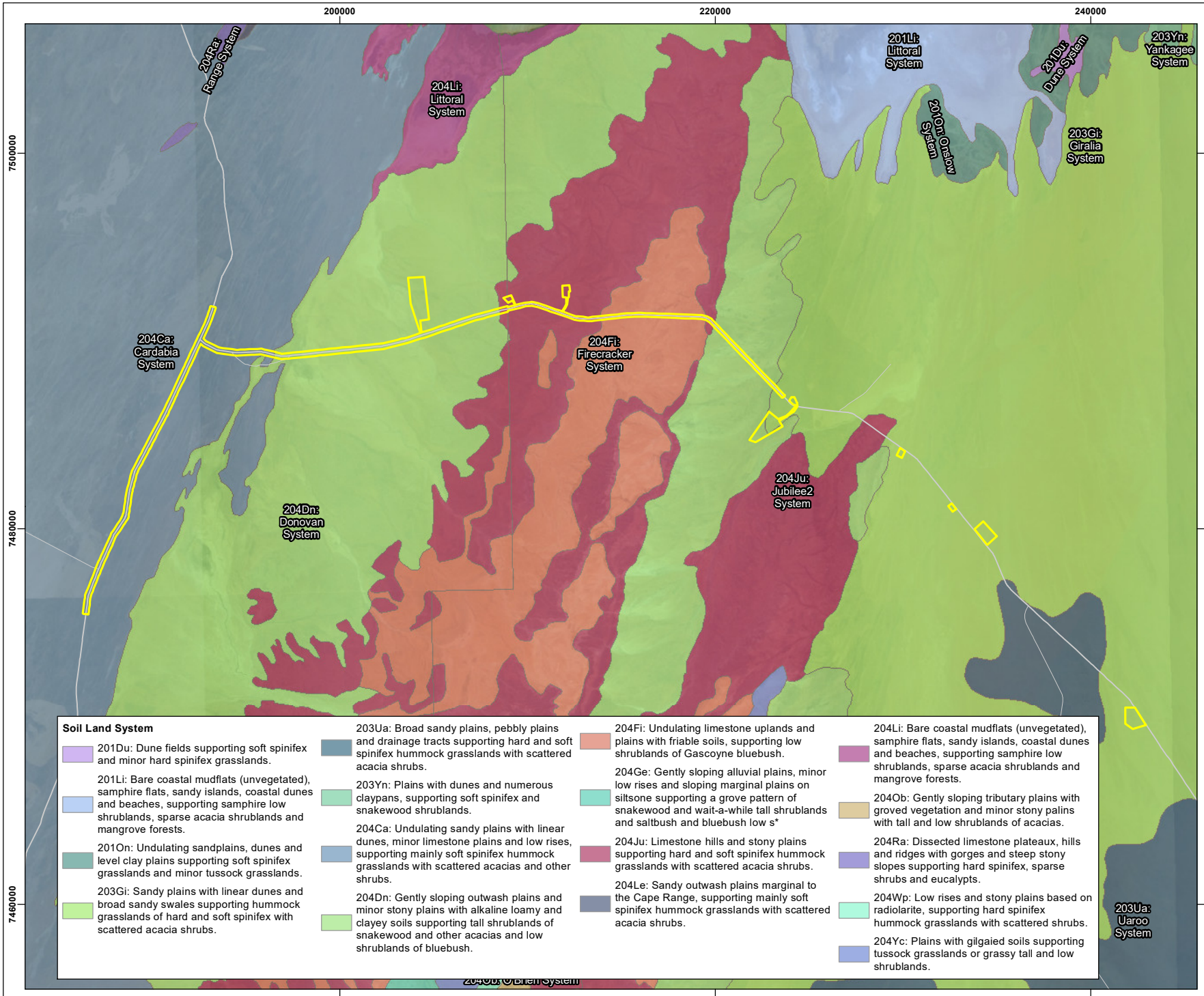
Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 3 IBRA Bioregion



Soil Land System

- 201Du: Dune fields supporting soft spinifex and minor hard spinifex grasslands.
- 201Li: Bare coastal mudflats (unvegetated), samphire flats, sandy islands, coastal dunes and beaches, supporting samphire low shrublands, sparse acacia shrublands and mangrove forests.
- 201On: Undulating sandplains, dunes and level clay plains supporting soft spinifex grasslands and minor tussock grasslands.
- 203Gi: Sandy plains with linear dunes and broad sandy swales supporting hummock grasslands of hard and soft spinifex with scattered acacia shrubs.
- 203Ua: Broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs.
- 203Yn: Plains with dunes and numerous claypans, supporting soft spinifex and snakewood shrublands.
- 204Ca: Undulating sandy plains with linear dunes, minor limestone plains and low rises, supporting mainly soft spinifex hummock grasslands with scattered acacias and other shrubs.
- 204Dn: Gently sloping outwash plains and minor stony plains with alkaline loamy and clayey soils supporting tall shrublands of snakewood and other acacias and low shrublands of bluebush.
- 204Fi: Undulating limestone uplands and plains with friable soils, supporting low shrublands of Gascoyne bluebush.
- 204Ge: Gently sloping alluvial plains, minor low rises and sloping marginal plains on siltsone supporting a grove pattern of snakewood and wait-a-while tall shrublands and saltbush and bluebush low s*
- 204Ju: Limestone hills and stony plains supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs.
- 204Le: Sandy outwash plains marginal to the Cape Range, supporting mainly soft spinifex hummock grasslands with scattered acacia shrubs.
- 204Li: Bare coastal mudflats (unvegetated), samphire flats, sandy islands, coastal dunes and beaches, supporting samphire low shrublands, sparse acacia shrublands and mangrove forests.
- 204Ob: Gently sloping tributary plains with groved vegetation and minor stony palins with tall and low shrublands of acacias.
- 204Ra: Dissected limestone plateaux, hills and ridges with gorges and steep stony slopes supporting hard spinifex, sparse shrubs and eucalypts.
- 204Wp: Low rises and stony plains based on radiolarite, supporting hard spinifex hummock grasslands with scattered shrubs.
- 204Yc: Plains with gilgaied soils supporting tussock grasslands or grassy tall and low shrublands.

Legend

- Survey Area
- State Road
- Local Road

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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- SOILS LAND SYSMTEMS SOURCED DAFWA 2018
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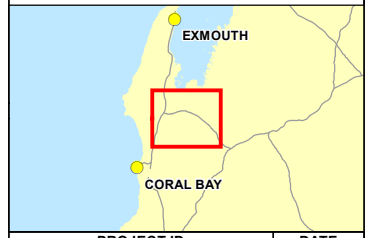

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CREATED	CHECKED	APPROVED	REVISION
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Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 4
Soils and Land Systems

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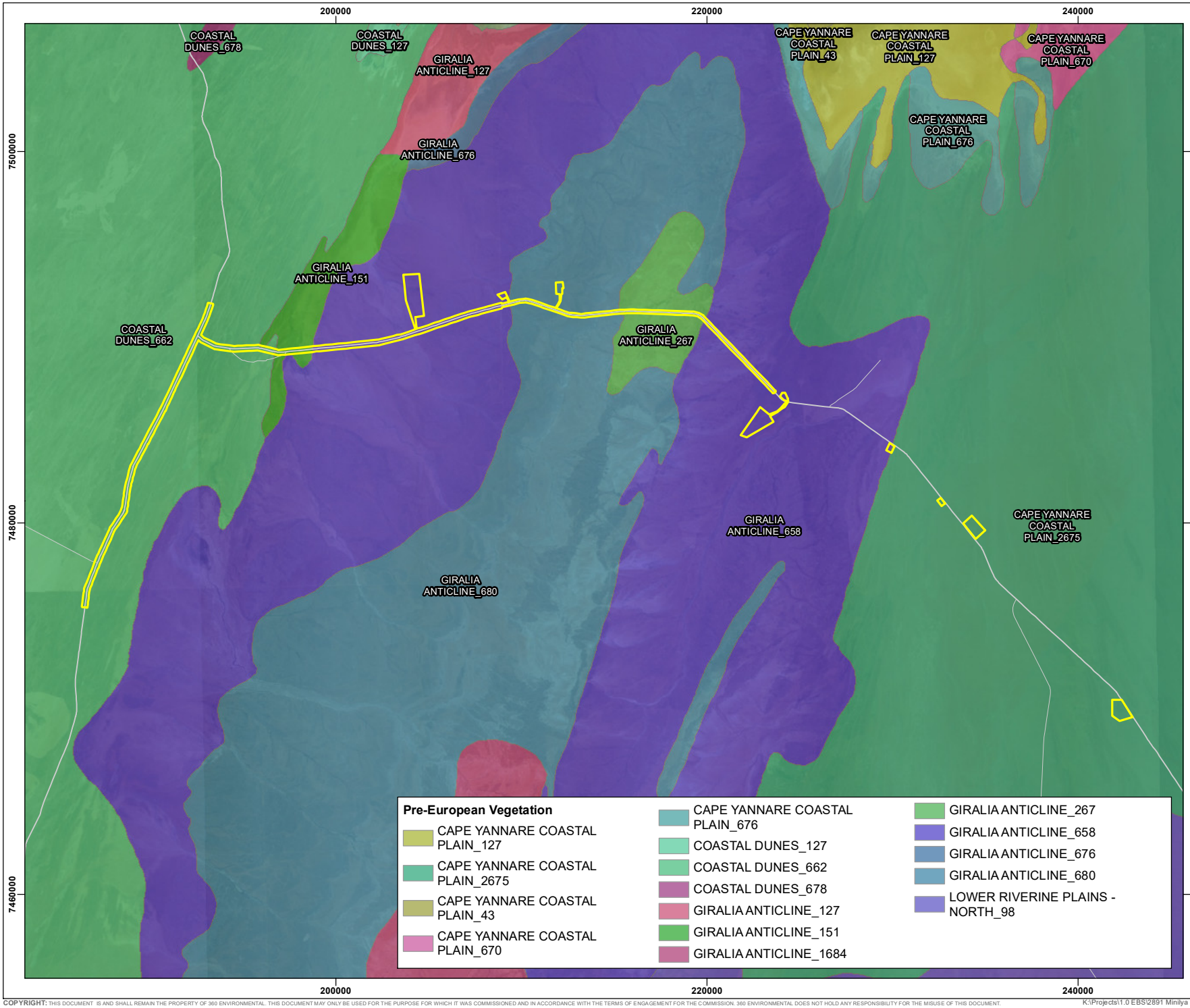

Legend

- Survey Area
- State Road
- Local Road

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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- VEGETATION SOURCED DBCA 2018
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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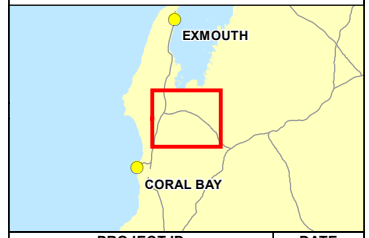

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Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 5
Beard Pre-European Vegetation

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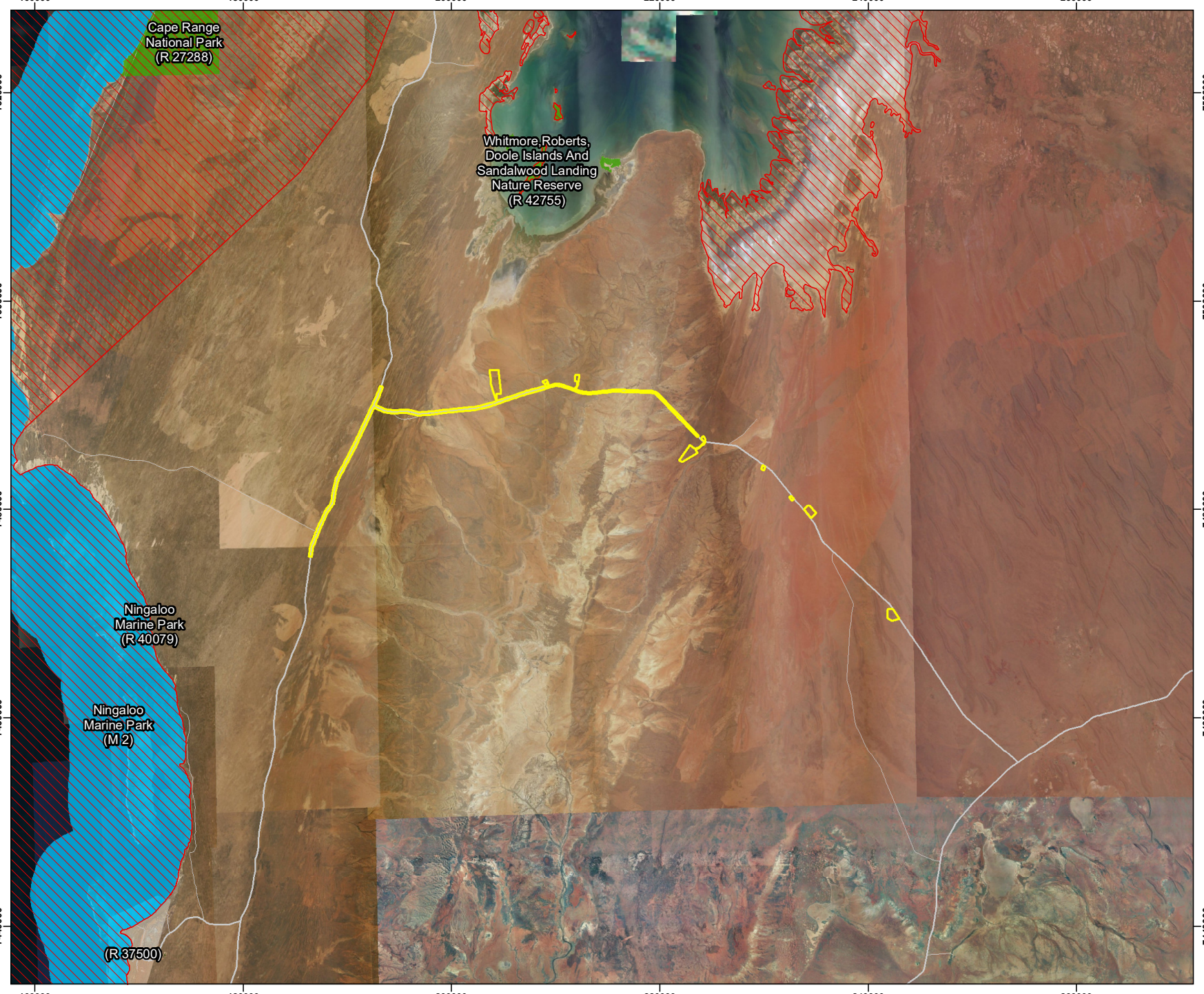

Legend

- Survey Area
- State Road
- Local Road
- Environmentally Sensitive Areas
- DBCA Managed Land
- DBCA Managed Marine

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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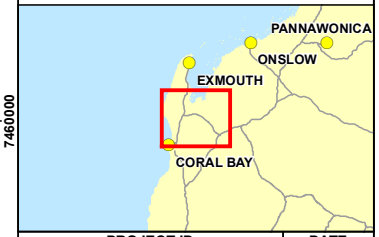
LOCALITY MAP



PROJECT ID	DATE
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SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 6
Environmentally Sensitive Areas

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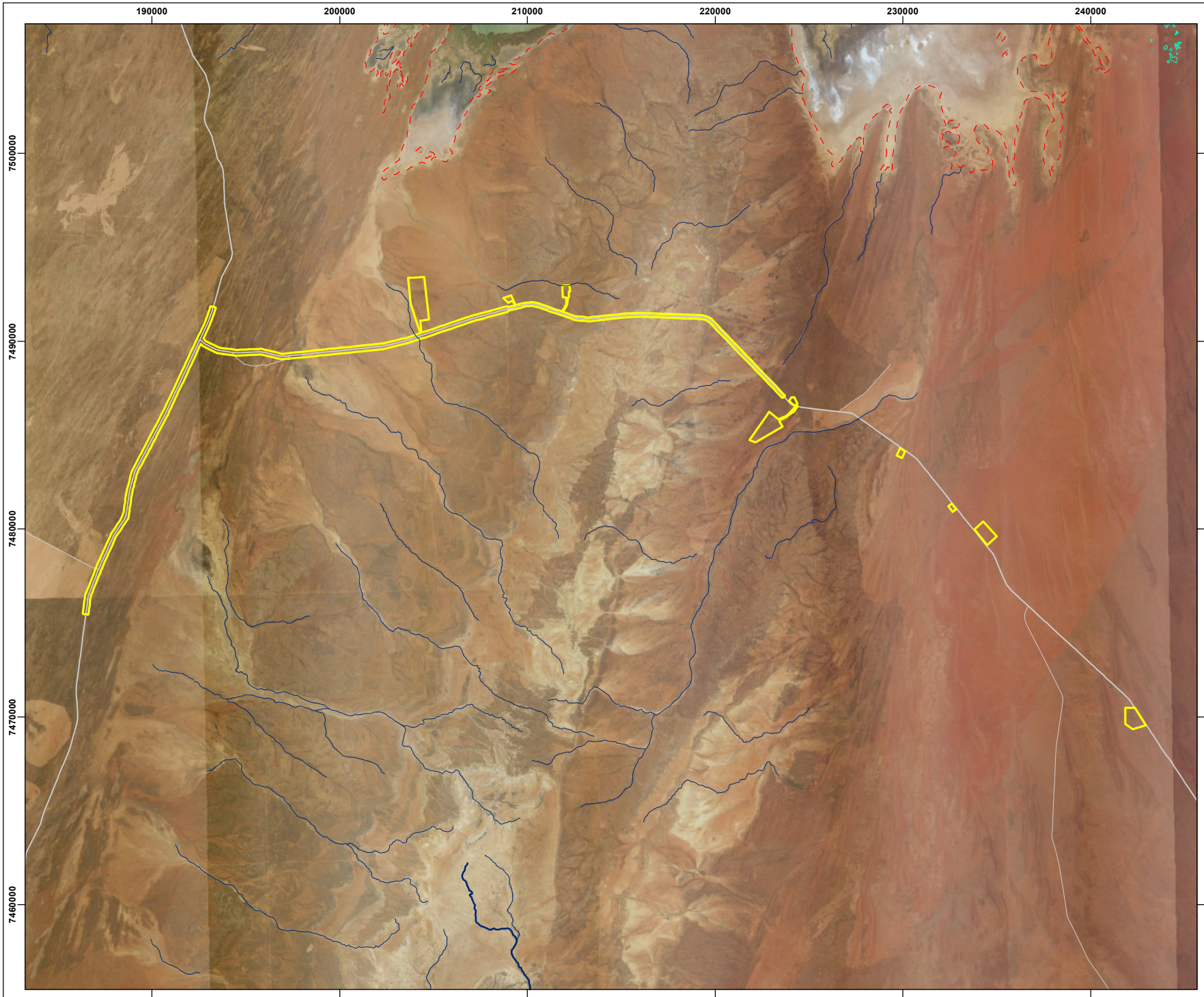

Legend

- Survey Area
- State Road
- Local Road

Hydrography

- Watercourse - major
- Watercourse - minor
- Lake
- Area Subject to Inundation

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- HYDROGRAPHY SOURCED DWER 2018
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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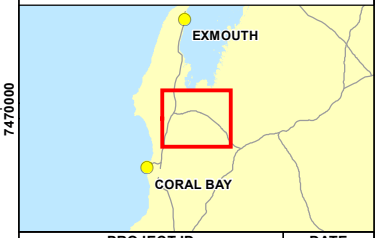

PROJECT ID	DATE
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Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 7 Hydrology

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3 Methods

3.1 Requirements for Flora and Fauna Surveys

This survey has been carried out as per the Environmental Protection Authority (EPA) requirements for environmental surveying and reporting of flora and fauna surveys in Western Australia where relevant, and as documented in:

Western Australia

- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016a);
- Technical Guidance – Sampling Methods for Terrestrial Vertebrate Fauna (EPA, 2016b); and
- Technical Guidance – Terrestrial Fauna Surveys (EPA, 2016c).

Federal

- Matters of National Environmental Significance Significant impact guidelines 1.1 *Environment Protection and Biodiversity Conservation Act 1999* (Department of the Environment, 2013);
- Survey guidelines for Australia's threatened mammals (DSEWPaC, 2011); and
- Survey guidelines for Australia's threatened birds, guidelines for detecting birds listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (DEWHA, 2010).

3.2 Desktop Assessment

3.2.1 Database Searches

Database searches were undertaken to identify potential conservation significant flora and fauna taxa and ecological communities within a 20 to 50 km buffer of the Survey Area (hereon referred to as the Study Area). Database search particulars are outlined in Table 3 and results are presented in Appendix E.

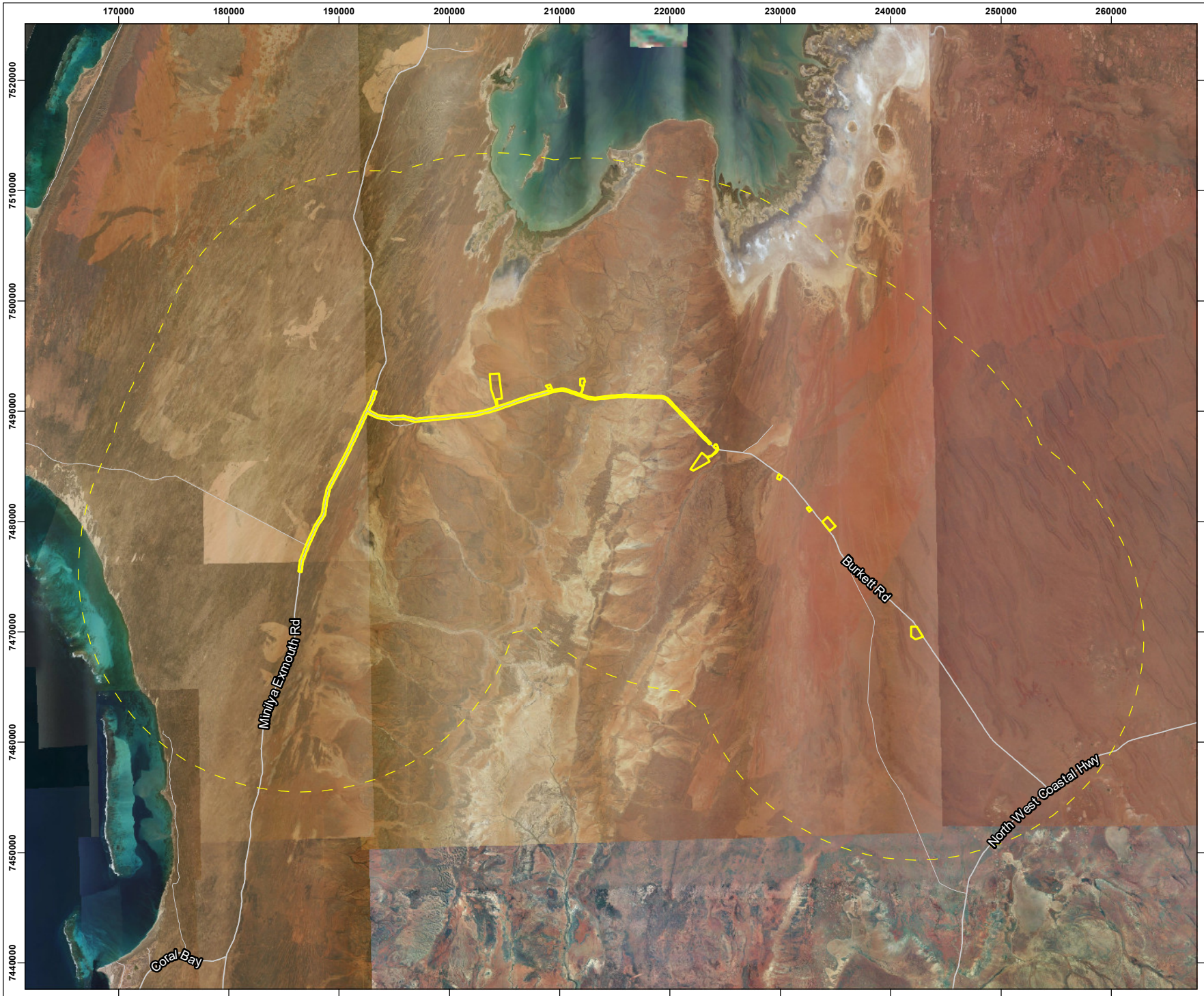
Priority Ecological Communities (PEC) and TECs within the Carnarvon bioregion were examined to determine if any may occur within the Study Area. In addition, an EPBC Protected Matters Search (PMST) was undertaken to identify the potential for Matters of National Environmental Significance (MNES) to occur within the Study Area (DEE, 2018).

The list of fauna species provided by the database search invariably includes some species that do not occur in the Survey Area, due to the fact that some fauna species have a limited or patchy distribution, or a high level of habitat specificity e.g. marine mammals, wading birds and shorebirds. Some fauna may also have become locally extinct on the mainland

(e.g. Burrowing Bettong on the mainland) or were erroneously identified in previous surveys, which have been excluded from the list (Figure 8).

Table 3: Database Searches of the Study Area

DATABASE NAME	DATE RECEIVED	SEARCH TARGET	SEARCH AREA
Threatened and Priority Ecological Communities database (DBCA, 2018b)	Provided by Main Roads 18 Sep 2018	Listed TECs and PECs	50 km radial search around Survey Area centre point
Threatened and Priority Flora Database (TPFL) (DBCA, 2018c)		Threatened and priority flora	20 km radial search around Survey Area centre point
DBCA Threatened and Priority Flora Species List (TP list) (DBCA, 2018c)			20 km radial search around Survey Area centre point
Western Australian Herbarium flora (DBCA, 2017b)			20 km radial search around Survey Area centre point
NatureMap (DBCA, 2018a)	6 Sep 2018	Threatened and priority flora and fauna	20 km radial search around Survey Area centre point
Protected Matters Search Tool (DEE, 2018)	20 Aug 2018		20 km radial search around Survey Area centre point



Legend

- Survey Area Desktop
- Assessment Study Area
- State Road
- Local Road

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
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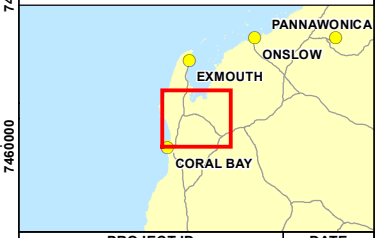
LOCALITY MAP



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Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 8 Desktop Study Area

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3.2.2 Likelihood of Occurrence

Conservation significant flora and fauna species identified from the database and desktop assessment were further examined to determine a likelihood of occurrence both prior and post field survey. The assessment was completed based on the following likelihood of occurrence criteria:

Recorded:

- Flora and fauna species recorded within the Survey Area during the field survey.

High Likelihood of Occurrence:

- **Flora** - Previously recorded within Survey Area; or within 10 km and suitable habitat potentially occurs in the Survey Area; and
- **Fauna** - Preferred habitat is present in the Survey Area and known species distribution has been recorded on more than one occasion within 20 km of the Survey Area in the last 15 years.

Medium Likelihood of Occurrence:

- **Flora** - Previously recorded within 10 to 20 km of the Survey Area; and/or suitable habitat potentially occurs in the Survey Area; and
- **Fauna** - The species has been recorded on more than one occasion within 20 km of the Survey Area in the last 15 years, but limited appropriate habitat occurs in the Survey Area; or the high likelihood of occurrence criteria has not been met, however the species is known from the general area and has good dispersal abilities; or preferred habitat for the species occurs in the Survey Area but the species has not been recorded within 20 km in the last 15 years.

Low Likelihood of Occurrence:

- **Flora** - No suitable habitat appears to be present in the Survey Area; and/or the Study Area is outside the species known distribution; and
- **Fauna** - No suitable habitat is present within the Survey Area; or outside the species known distribution; or the species is known from the general area but has poor dispersal abilities.

Only species either recorded within the Survey Area or considered as having a high or medium likelihood of occurrence will be discussed in detail. Species classified as having a low likelihood of occurrence based on the above criteria will not be discussed unless a justification for this classification is required.

3.2.3 Literature Review

Reports from previous surveys undertaken nearby to the Survey Area were reviewed to assist with understanding the key biological findings. The following reports were reviewed:

- *Biogeography and composition of the flora of the Cape Range peninsula*, Western Australia (Keighery and Gibson, 1993);
- *Priority Flora Survey, Cape Range National Park* (DEC, 2010);
- *Level 1 Flora and Vegetation Assessment of Truscott Crescent, Exmouth* (360 Environmental Pty Ltd, 2015);
- *Detailed Flora and Vegetation Assessment* (GHD, 2016); and
- *Detailed Fauna, Flora and Vegetation Assessment* (360 Environmental Pty Ltd, 2017).

3.3 Flora and Vegetation

3.3.1 Field Survey

A detailed single season flora and vegetation survey was undertaken by qualified field botanists Sophie Fox (flora licence SL012192 and Declared Rare Flora Permit 74-1718) and Catherine Krens (flora licence SL012203) from the 10th to the 18th of September 2018. The field survey included an assessment of 32 quadrats, one relevé, mapping notes, vegetation condition notes, opportunistic flora collections and observations and a targeted priority flora search. The quadrat locations are illustrated in Figure 15a – 15f.

A minimum of three quadrats of 30 x 30 m (900 m^2) were installed in representative vegetation types. Each quadrat was accurately measured using measuring tapes, and the northwest corner was permanently demarcated with a steel fence dropper and pink flagging tape. At the northwest corner of each quadrat, the location was recorded using a handheld Garmin GPS unit, and photographs were captured using the Fulcrum mobile data collection device.

At each quadrat, the following data was recorded:

- Site code – a unique identifier allocated to each quadrat;
- Date and recorder – a record of the date of quadrat sample and a list of the personnel involved in sampling the quadrat;
- Location – GPS coordinates (MGA94) measured from the northwest corner of the quadrat;
- Dimensions – the size and shape of the quadrat;
- Topography – a description of the landform and soil;
- Additional site descriptors – location information that might be useful in vegetation classification including, slope, aspect, litter cover, bare ground cover and fire history;
- Species list – a comprehensive vascular flora species list;

- Foliar cover – the estimated total percentage of foliar cover for each species recorded;
- Height – the average height (in metres) of each species recorded;
- Vegetation description – a description of the vegetation according to the National Vegetation Information System, Level 5. According to this level, vegetation is classified to 'association', where the dominant growth form, height, cover and species (three species) for the three traditional strata (upper, mid and ground) are described;
- Vegetation condition – assessed according to the vegetation condition scale (EPA, 2016a) (Appendix F); and
- Photographs – a photograph from the northwest corner looking toward the south east corner was taken.

3.3.2 Flora of Conservation Significance

A targeted flora survey was completed for flora of conservation significance with a high or medium likelihood of occurrence within the Survey Area.

Areas were traversed on foot to search for flora of conservation significance, and a track log was recorded via GPS (Figures 13a-13f).

For each new population of conservation significant flora recorded during the survey, the population boundary was recorded, and population number were estimated. Where this was not possible due to the large size of the population, the population boundary was extrapolated based on aerial photography. Conservation significant flora specimens were collected for identification and lodgement at the Western Australian Herbarium (WAH) and a Threatened Flora Report form completed (Appendix G).

3.3.3 Vegetation Mapping and Condition

Vegetation type and condition mapping was completed within the Survey Area using aerial imagery and data collected in the field through quadrats and traverses. Vegetation mapping was completed within the Survey Area and extrapolated within a 500 m buffer either side of the Survey Area, as recommended within the Technical Guide (EPA, 2016a). The Technical Guide recommends that a 500 m – 1000 m buffer be added onto a linear survey area, with vegetation types extrapolated within this area using aerial imagery. The 500 m buffer was not extended beyond the linear Survey Area, therefore is not included around the pit areas.

3.3.4 Taxonomy and Nomenclature

Where field identification of plant taxa was not possible, specimens were collected systematically for later identification using resources of the WAH. Taxonomy was completed by experienced taxonomist Frank Obbens, with assistance from taxonomist specialists at the WAH.

The finalised species list was checked against FloraBase (DBCA , 2017b) to determine the species' conservation status and known distribution. Introduced species were compared against the BAM Act Declared Plants list and the WoNS list to determine their status (Thorp and Lynch, 2000).

3.3.5 Statistical Analyses

All statistics were carried out using Primer-E version 6.1.5 (Clarke and Gorley, 2006). Quadrats were classified on the basis of similarity in species composition. Using the results of the observations made in the field, boundaries of the vegetation types were finalised on aerial photographs, at a scale of 1:55,000, with the aid of GPS coordinates taken during the field survey. The vegetation types were digitised and produced as electronic mapping data using GIS software.

In order to assess the adequacy of the field survey, a species accumulation curve was generated. The species accumulation curve analysed accumulation rates of species identified from the survey. This statistical test can determine if the area has been adequately surveyed (species accumulation curves can be useful in estimating total species richness). The accumulation curve was based on presence absence data and the sample order being random with a maximum of 999 permutations with four estimator curves (Chao 2, Jacknife 1, Jacknife 2 and Bootstrap) (Clarke and Gorley, 2006). These estimator curves help predict the true total number of species that would be observed as the number of sites tends to infinity.

A dendrogram was also generated to illustrate and group quadrat information based on cluster analysis using a Bray-Curtis similarity matrix. Quadrat species presence-absence data was transformed (square root) and then tested for similarity, with outcomes presented in a dendrogram graph (Appendix H).

3.4 Vertebrate Fauna

3.4.1 Field Survey

A level 1 vertebrate fauna survey was undertaken from the 10th to the 18th of September 2018 by Senior Zoologist Andrew Hide. The purpose of the field survey was to verify the accuracy of the desktop assessment and to further delineate and characterise the fauna assemblages and fauna habitat in the Survey Area. The field survey consisted primarily of fauna habitat assessments, systematic bird searches and opportunistic fauna observations.

3.4.2 Fauna Habitat Assessment

Vegetation types and distinctive landforms were used to identify the broad faunal habitats in the Survey Area. These fauna habitats were then assessed for their potential to support species of conservation significance and the quality of habitat they provide to a wider suite of fauna.

Each broad habitat type description includes information on:

- Location of the broad habitat type within the Survey Area (GPS coordinate) and its relative percentage;
- Habitat condition at each assessment site using the vegetation condition scale presented in EPA (2016b) (Appendix F);
- Dominant vegetation and structure (e.g. number of vegetation strata);
- Hollow-bearing trees and dead stags (e.g. average size and abundance of hollows);
- Description of any rock and rocky outcrops;
- Logs (e.g. abundance and size);
- Substrate (e.g. leaf litter);
- Wetlands, creeks, rivers, dams and other water bodies;
- Description of any observed nests and roosts (if present);
- Subterranean roosts (e.g. caves, disused mineshafts and/or adits);
- Associated fauna species observed for each habitat type;
- Disturbance (e.g. cattle grazing, fire); and
- Photo showing a typical example of the broad fauna habitat type.

3.4.3 Systematic Bird Survey

Systematic bird surveys were undertaken within the Survey Area for 20 minutes in a 2 ha quadrat (EPA, 2016c) at each fauna habitat assessment location (at a minimum). Where practicable, this was undertaken during typical peak periods of activity when birds are calling and moving about, which is typically in the 3 to 4 hours of sunrise, particularly during warmer periods.

3.4.4 Opportunistic Observation

Fauna were opportunistically observed and recorded within the Survey Area. Opportunistic observations involved targeted searches of habitats in the Survey Area that potentially support fauna of conservation significance as well as systematic searches which included looking through leaf litter, overturning rocks, looking under decorticating bark and searches for scats, tracks, burrows and other traces of animals. If conservation significant species were located, the coordinates were geospatially recorded with the Fulcrum mobile application providing accurate GPS locations for each record.

In addition, opportunistic records of fauna species encountered while traversing throughout the Survey Area were documented. Opportunistic data comprises records of fauna species by location and coordinates were taken through the use of the Fulcrum mobile application.

3.4.5 Taxonomy

Where there was doubt on species names identified in the desktop assessment (through subsequent name changes or taxonomic reviews), an effort was made to determine the current scientific name for each taxon. Taxonomy and nomenclature in this report follows the WA Museum checklist (WAM, 2018) where relevant.

3.5 Limitations and Constraints

Limitations and constraints of the flora, vegetation and fauna survey are detailed in Table 4.

Table 4: Limitations and Constraints Associated with the Survey

VARIABLE	DEGREE OF LIMITATION	POTENTIAL CONSTRAINTS ON SURVEY OUTCOMES
Access	Low limitation	The Survey Area was accessed either by vehicle or on foot. Some locations outside of the Survey Area were also traversed to assess the population boundaries of *Acacia startii* (P3) populations. The size and length of the Survey Area meant that it was not possible to traverse the entire length on foot in search of *Acacia startii*, or other flora of conservation significance. Focus was given to areas expected to be impacted and vegetation types that may contain species of conservation significance.
Experience	No limitation	The personnel who executed the survey were practitioners suitably qualified in their respective fields: ● Field staff: Sophie Fox (Botanist, nine years' experience), Catherine Krens (Senior Botanist, 12 years' experience), Andrew Hide (Senior Zoologist, 11 years' experience); ● Flora taxonomy: Frank Obbens (25 years' experience); ● Data interpretation and reporting: Sophie Fox and Andrew Hide; ● Technical review: Narelle Whittington (Principal Botanist, 19 years' experience); and ● Report review: Scott Walker (Principle Ecologist/Group Leader, 20 years' experience).
Timing, weather, season	Moderate limitation	The EPA guidelines recommend that flora surveys within the Eremaean region are completed 6-8 weeks post wet season (March – June, or 6-8 weeks after significant rainfall events), and that supplementary surveys be completed during the dry season (after winter rainfall is available). Flora composition changes with time, particularly seasonally as a result of changes in conditions such as rainfall. Therefore, botanical surveys completed at different times of the year will often produce varying results.

VARIABLE	DEGREE OF LIMITATION	POTENTIAL CONSTRAINTS ON SURVEY OUTCOMES
		The survey was completed in September which is outside of the recommended survey period for the Eremaean region, however, higher than average rainfall had been experienced within the three months preceding the survey, the most significant rainfall event was recorded on the 19th of June 2018, with 72.2 mm of rainfall received. Annual species were present, and many species were flowering.
Life forms sampled	Low limitation	Quadrats, relevés and opportunistic collections were used to collect data on the species present within the Survey Area. Many flora species were flowering and fruiting and annual species present. A total of 174 flora taxa were recorded, including one Priority 1 species, *Sclerolaena stylosa*, one Priority 3 species, *Acacia startii*. Five species could not be fully identified due to lack of fruiting material, however none were considered to represent species of conservation significance. As a level 1 vertebrate fauna survey was carried out, many species that occur in the Survey Area would not have been observed, particularly small ground-dwelling fauna that are normally captured by methods such as trapping. All conservation significant species previously recorded in the area have been considered. Based on the fauna habitat present, those species deemed to have a high or medium likelihood of occurrence within the Survey Area have been addressed in this report.
Completeness	Low limitation	A detailed single season flora, vegetation and level 1 fauna survey was completed. A total of 32 flora quadrats, one flora relevé and 37 fauna habitat assessments were completed. Vegetation types were adequately surveyed, with a minimum of three quadrats per vegetation type completed within the Survey Area as per the EPA requirements. Excluding one vegetation type, (AxAcCc, which comprised only two quadrats due to one quadrat being re-allocated to a different vegetation type post field survey and post statistical analysis), three quadrats per vegetation type were completed in the field. The Survey Area was well traversed for the purpose of delineating conservation significant population boundaries and estimated population sizes during the targeted survey for flora of conservation significance.

VARIABLE	DEGREE OF LIMITATION	POTENTIAL CONSTRAINTS ON SURVEY OUTCOMES
Disturbance / Current land use	Low limitation	Parts of the Survey Area are utilised as cattle grazing stations. This has resulted in some areas experiencing heavy grazing and soil disturbance. Some areas have a high weed density of **Cenchrus ciliaris* and **Vachellia farnesiana*, with other areas having been impacted by vehicle tracks damaging vegetation and historical clearing.

3.6 Literature Review

The following relevant biological surveys that have been undertaken in the Cape Range peninsula region by DBCA and biological consulting companies are summarised below.

Biogeography and composition of the flora of the Cape Range peninsula, Western Australia (Keighery and Gibson, 1993).

A survey of the limestone hills, ranges and calcarenite outcrops was undertaken by Keighery and Gibson (1993). The survey covered an area from the Cape Range National Park, south to Gnargoo Range and east to the Giralia Range - which is located within the Survey Area. A total of 209 taxa were recorded from 30 quadrats (each 100 m^2) during the survey with the species richness ranging from 12 to 44 species per quadrat. Within the quadrats completed within the Giralia Range, *Acacia startii* (P3) was recorded as being a dominant species. The Cape Range topography contains steep mountainous ranges and gorges.

Priority Flora Survey, Cape Range National Park (DEC, 2010)

The DBCA, formerly known as the Department of Environment and Conservation (DEC), priority search was conducted in September and October of 2009 in the Cape Range National Park, approximately 40 km from the Survey Area. Five priority listed species were recorded in this survey, *Brachychiton obtusilobus* (Priority 4), *Grevillea calcicola* (Priority 3), *Eremophila forrestii* subsp. *capensis* (Priority 3), *Corchorus congener* (Priority 3) and *Tinospora esiangkara* (Priority 2). The Cape Range topography contains steep mountainous ranges and gorges.

Level 1 Flora and Vegetation Assessment of Truscott Crescent, Exmouth (360 Environmental Pty Ltd, 2015)

360 Environmental conducted a level 1 flora and vegetation assessment on Truscott Crescent, Exmouth in February 2015. The site is approximately 23.1 ha in size and located in the Cape Range biogeographic region of WA, approximately 80 km from the Survey Area. A total of 69 flora taxa were identified during the survey, with the most commonly occurring families being Fabaceae, Poaceae and Asteraceae. No Threatened flora species listed under the EPBC Act or gazetted as Declared Rare Flora (DRF/T) pursuant to the BC Act, or Priority flora species were recorded during the survey. No Federal TECs or

DBCA listed PECs were recorded during the survey. Three fauna of conservation significance were recorded during the survey, Osprey (*Pandion cristatus*) (MiMa/IA), the Rainbow Bee-eater (*Merops ornatus*) (Ma/IA) and the Star Finch (*Neochima ruficauda*) (EN)(360 Environmental Pty Ltd, 2015).

Minilya/Exmouth Road Biological Survey for Main Roads Western Australia (GHD, 2016)

GHD was commissioned by Main Roads to conduct a fauna, flora and vegetation assessment in the Minilya – Exmouth region of WA, for a potential upgrade to the Minilya – Exmouth Road. The site encompassed ten SLK sections along the Minilya – Exmouth Road, ranging from Exmouth (SLK 211) south to Gnargoo Range (SLK 0), and included two sections (SLK 130-135, and SLK128.5) which occur within the Survey Area.

Sixteen natural vegetation communities were mapped within the site, none of which represent a TEC or PEC. The survey recorded 343 flora taxa, including three Priority taxa; *Acacia alexandri* (Priority 3), *Corchorus congener* (Priority 3) and *Owenia acidula* (Priority 3). Two Migratory EPBC Act listed conservation significant fauna species were recorded, including the Osprey (*Pandion haliaetus*) (MiMa/IA) and the Rainbow Bee-eater (*Merops ornatus*) (Ma/IA). Two EPBC Act listed fauna (Hermite Island Worm-Lizard [VU] and the Common Greenshank [MiMa/IA]) were considered likely to occur within the site based on the post-field likelihood of occurrence assessment.

Fauna, Flora and Vegetation Assessment within Shark Bay and Exmouth-Minilya (360 Environmental Pty Ltd, 2018)

A detailed flora and vegetation survey, and level 1 fauna survey was completed within Shark Bay and Exmouth-Minilya. Within Exmouth-Minilya, the site was located in SLK 136, approximately 5 km from the Survey Area. Two vegetation types were recorded within the site; neither represent a TEC or PEC. *Corchorus congener* (P3) was recorded at multiple locations within the site. Two general fauna habitats were recorded with one species, the Ningaloo Worm-Lizard (P3), considered to have a high likelihood of occurrence within the site.

4 Results

4.1 Flora and Vegetation

4.1.1 Desktop Assessment

No Threatened flora and four priority flora were identified as occurring within a 20 km buffer of the Survey Area including:

- *Sclerolaena stylosa* (P1);
- *Crinum flaccidum* (P2);
- *Acacia startii* (P3); and
- *Eremophila youngii* subsp. *lepidota* (P4).

Priority flora within the study area are presented in Figure 9.

No TECs have been recorded within the Study Area. The Priority 1 Ecological Community, Tussock grasslands or grassy tall or low shrublands of the Yarcowie Land System (Carnarvon Basin), occurs within the Study Area (Figure 10) and is typified as a:

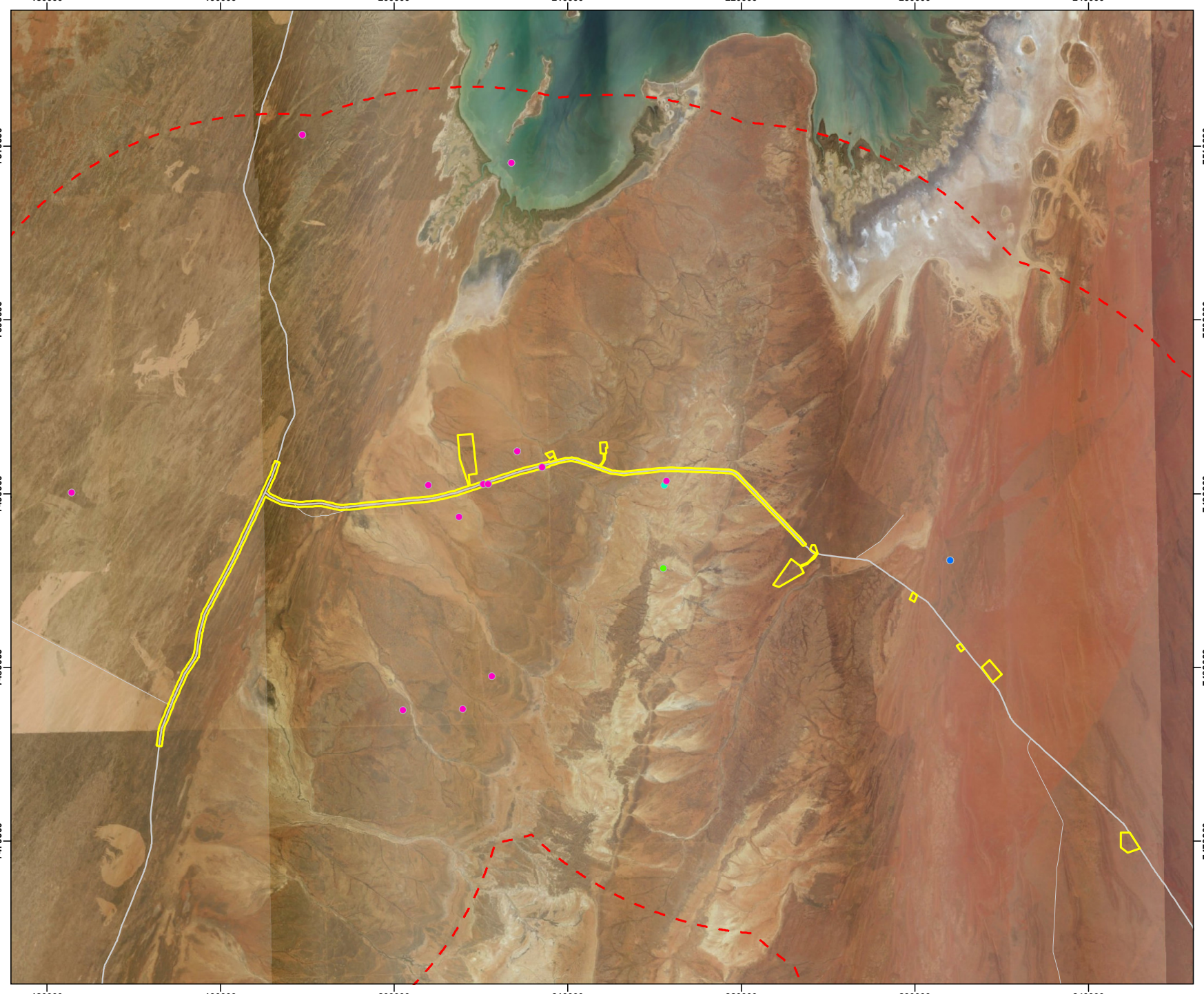
> *Gilgaied soils derived from lower cretaceous benthonitic siltstone on nearly flat plains that support tussock grasslands or grassy tall or low shrublands. This Land System has a very restricted distribution* (DBCA, 2017).

Gilgai is an ephemeral lake with expanding and shrinking clay soils. Gilgai lakes are found in cracking clay soils and are distinguished by the formation of mounds and depressions formed by repeated cycles of swelling wet clay and subsequent shrinking dry clay (Schaetzl and Anderson, 2007).

4.1.1.1 Likelihood of Occurrence

Four conservation significant flora species were assessed for their likelihood of occurrence within the Survey Area prior to the survey. The likelihood of occurrence of these species was then reassessed post-field survey and identified only one species, *Eremophila youngii* subsp. *lepidota* (P4), as having a high likelihood of occurrence (Appendix I).

Eremophila youngii subsp. *lepidota* (P4) has previously been recorded with 5 km of the Survey Area and suitable habitat was identified within the Survey Area, however, it was not recorded during the survey. The optimal flowering time for this species coincided with the timing of the field survey and is therefore not considered a limitation. The Survey Area was well traversed for the purposes of a targeted survey, and it is considered to be likely that, if *E. youngii* subsp. *lepidota* occurred within the Survey Area it would have been recorded.



Legend

- Survey Area
- State Road
- Study Area
- Local Road

DBCA Flora Records

- *Sclerolaena stylosa*, Priority 1
- *Crinum flaccidum*, Priority 2
- *Acacia startii*, Priority 3
- *Eremophila youngii* subsp. *lepidota*, Priority 4

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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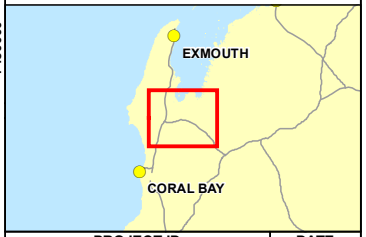

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Biological Survey

Figure 9 DBCA Threatened and Priority Flora Records

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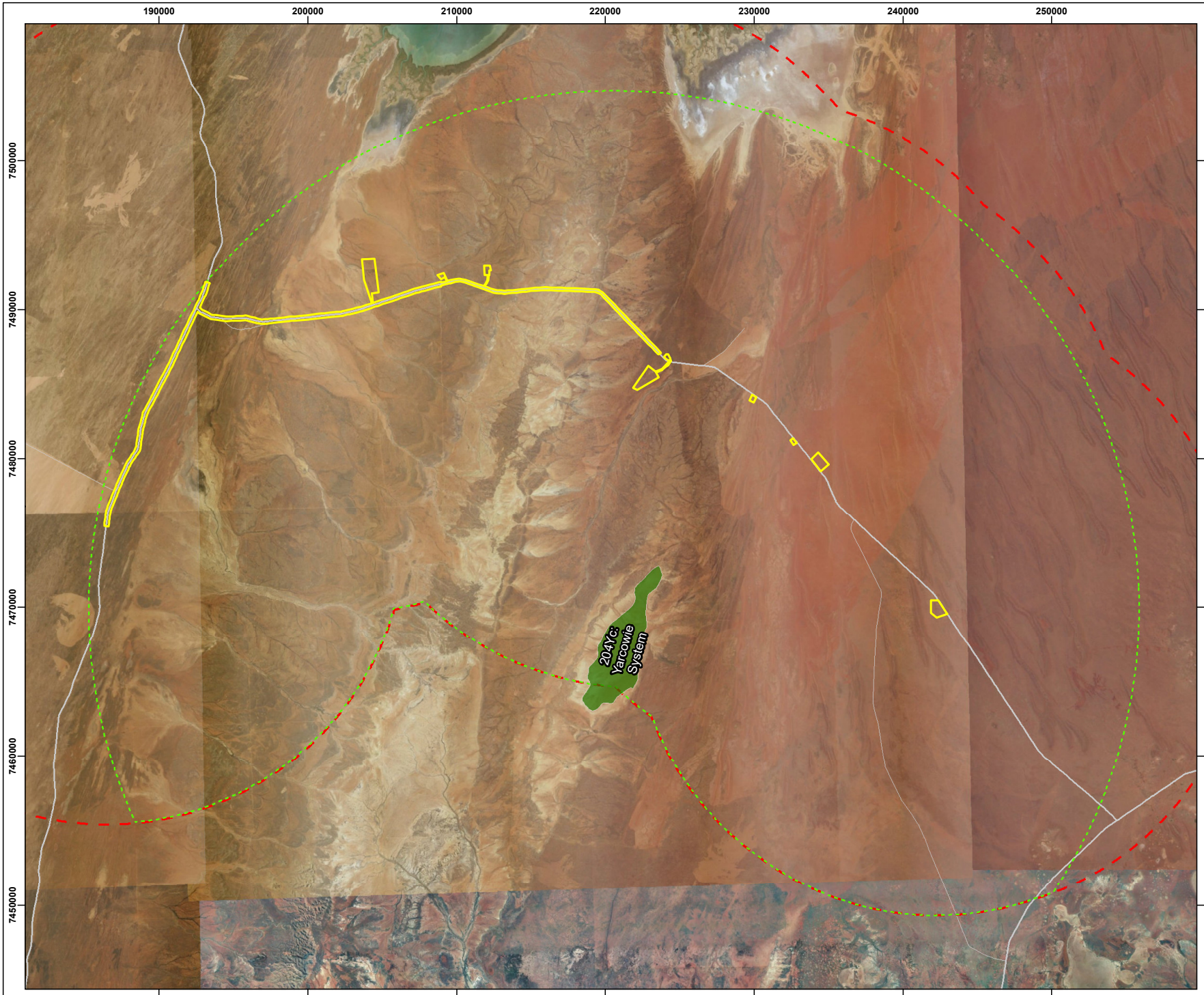

Legend

- Survey Area
- State Road
- Local Road
- Study Area
- 204Yc: Yarcowie System
- Yarcowie System Buffer (Priority 1)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- TEC PEC SOURCED DBCA 2018
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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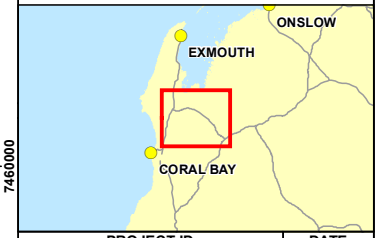
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	AH	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 10
Priority Ecological Community

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F11 Priority Ecological Community.mxd

4.1.2 Flora

A total of 175 flora species (including species, subspecies, varieties and forms) from 42 families and 102 genera were identified within the Survey Area. The most commonly occurring families were Fabaceae (33 taxa), Poaceae (16 taxa) and Malvaceae (15 taxa). The most frequently recorded genus was *Acacia, Ptilotus* and *Eremophila*.

A total of five species could not be fully identified to species level due to insufficient identifiable material such as fruiting or flowering material, (*Atriplex* ?*bunburyana*, *Acacia* ?*citrinoviridis*, *Corchorus* ?*elachocarpus*, *Abutilon* sp., and *Tribulus* sp.) After careful review of these specimens available features, none have features that are considered to represent a species of conservation significance or introduced weed species.

A species accumulation curve was generated using quadrat floristic data showing diversity of actual species collected (Sobs) and estimated floristic diversity based on the four estimator tests in Chao 2 (155), Jacknife 1 (148), Jacknife 2 (170) and Bootstrap (127) (Clarke and Gorley, 2006). A total of 174 taxa were recorded from 32 quadrats, while the four species extrapolator curves gave an estimated range of 164 to 230 taxa for the Survey Area.

The site verses species matrix can be viewed in Appendix J, a systematic flora species list is presented in Appendix K and site data is presented in Appendix L.

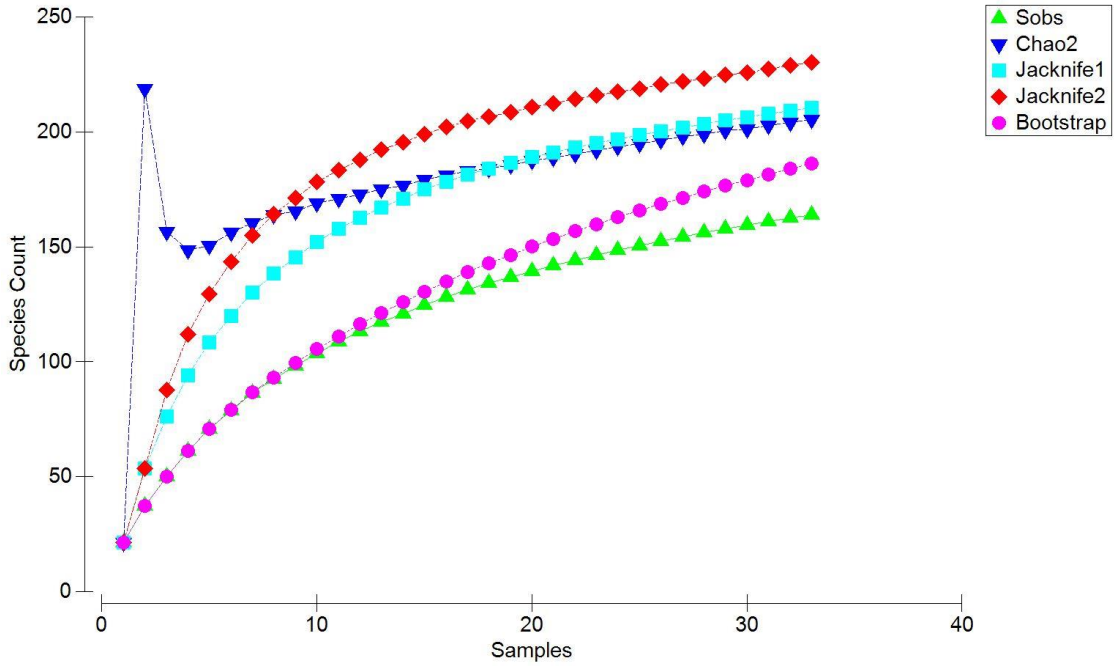


Figure 11: Species Accumulation Curve for Species Richness within the Survey Area

4.1.3 Flora of Conservation Significance

No Threatened species listed under the EPBC Act or gazetted as Declared Rare Flora (Threatened) pursuant to the BC Act were recorded in the Survey Area. Two Priority

species as listed by DBCA were recorded within the Survey Area, *Sclerolaena stylosa* (P1) and *Acacia startii* (P3).

These taxa, together with their corresponding Priority status and extent within the Survey Area are presented in Table 5, Figure 14a –b and Appendix M.

Table 5: Conservation Significant Flora Locations in Survey Area

TAXA	CONSERVATION STATUS	LOCATION	ESTIMATED POPULATION WITHIN SURVEY AREA
Sclerolaena stylosa	P1	Burkett Road SLK 45-78	Total estimated population of < 250 individuals
		Quadrat EMQ11	~ 200
		Quadrat EMQ15	< 20
		Quadrat EMQ16	< 20
Acacia startii	P3	Burkett Road SKL 45-78	Total estimated population of 6341

Sclerolaena stylosa (P1)

S. stylosa is a low rounded shrub which grows to 0.5 m in height (DBCA, 2017b). There are only four records of *S. stylosa* at the WA Herbarium (DBCA, 2019). Three of the records are located near Shark Bay within the Yalgoo (YAL01) and Carnarvon (CAR02) bioregion, and only one record is located near to the Survey Area in the Carnarvon (CAR01) bioregion. Two of the records had no information on site description. None of the records detailed population sizes. One of the records states that population was recorded occurring within light orange sandy clay of limestone origin, on low undulating hills in the Firecracker Land System, and one record states that the population was located within Hamelin Homestead, on a flat red soil plain, dissected slopes and swales of the Foscal Landsystem.

Within the Survey Area, *S. stylosa* was recorded occurring within vegetation type AcMpSs. AcMpSs consisted of light brown loam, sand to medium clay with limestone. Associated species included *Acacia cuspidifolia, A. synchronicia, Eremophila cuneifolia, Maireana polypterygia* and *M. georgei.* Across the mapped extent, an estimated population size of < 250 individuals were recorded within the Survey Area, with plants being in a fruiting state (Plate 1).

The population size was extrapolated using data collected within the quadrats. It is considered that they Survey Area was adequately surveyed for the purposes of assessing the species population boundaries and estimated population number. Plate 2 shows the largest density of *S. stylosa* recorded within the Survey Area at SLK 45-78, with the density being 10 % foliage cover within the quadrat.

Plate 1: *Sclerolaena stylosa* (P1) specimen collected within the Survey Area

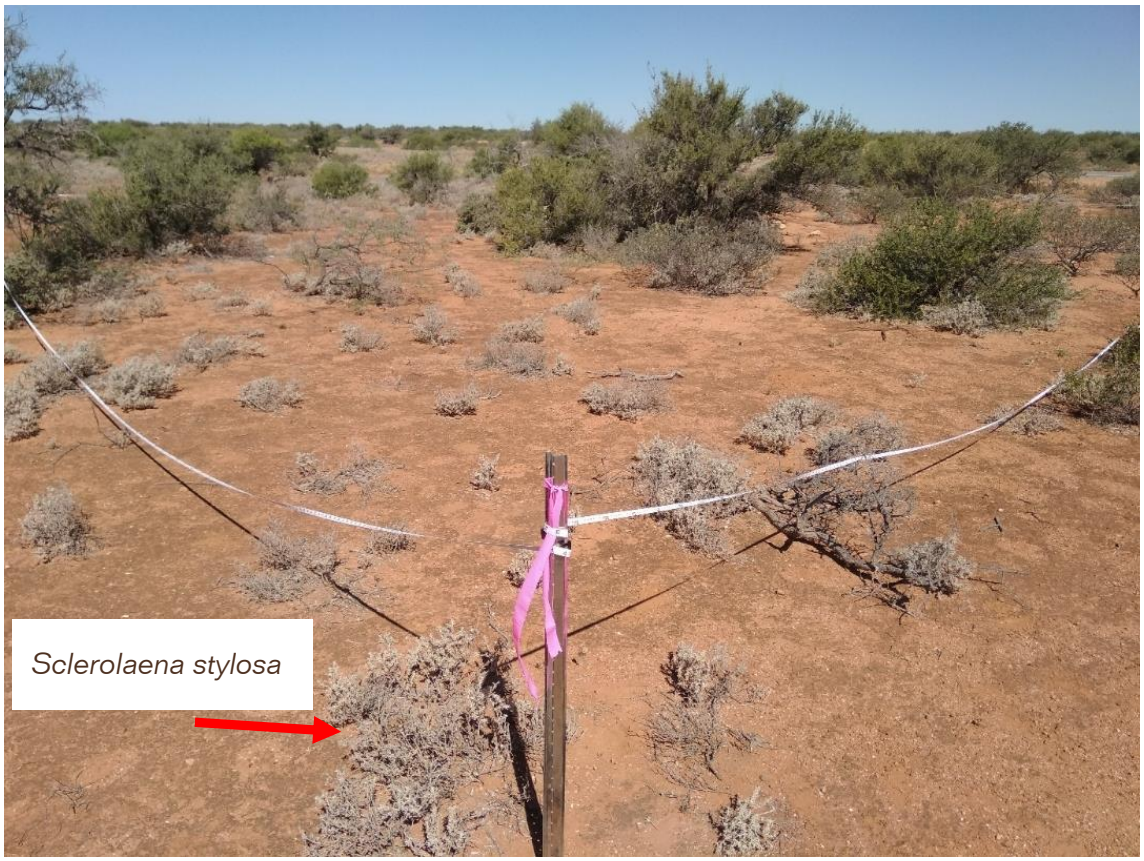


Plate 2: *Sclerolaena stylosa* (P1) population within SLK 45-78, Quadrat EMQ11

Acacia startii (P3)

A. startii is a dense, rounded, much-branched shrub growing to 2 m in height and 3 m in width. It produces yellow flowers between July to August and is known to occur with mixed *Acacia* spp. over *Triodia*, on calcareous loam with limestone pebbles, on stony hills and watercourses (DBCA, 2017b).

There are 30 records of *A. startii* at the WA herbarium, all of which are situated within the Carnarvon (CAR01) bioregion, and near to the Survey Area. Many of the records state that *A. startii* was frequent, abundant or locally common within the collection sites.

Within the Survey Area, *A. startii* was recorded growing predominantly in orange loam, sand and medium clay with limestone, with associated species *Acacia bivenosa, A. synchronicia, Acacia sclerosperma, Acacia tetragonophylla,* and *Triodia glabra.*

Six populations were recorded within the Survey Area, with an estimate of over 6300 individuals. The majority of plants were sterile at the time of survey, with a few plants flowering. A number of targeted searches were completed for *A. startii.* It is considered that the Survey Area was adequately traversed for the purposes of delineating population boundaries and estimating population sizes of *A. startii* within the Survey Area (Figure 13).

Plate 3: *Acacia startii* (P3) leaves and flowers

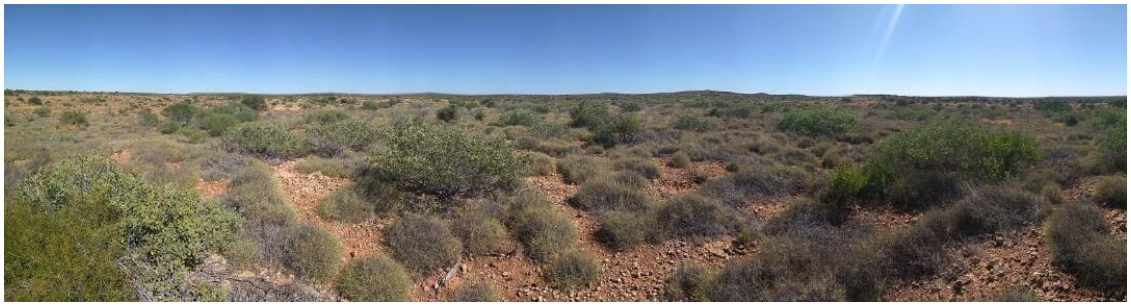


Plate 4: An *Acacia startii* (P3) population within the Survey Area

4.1.4 Other Significant Flora

A total of 20 species identified within the Survey Area are considered to represent an extension of their known range (greater than 30 km from the Survey Area) when compared to the current records of known locations on Florabase (DBCA, 2017b) and NatureMap (DBCA, 2018b) (Table 6, Appendix N). Fourteen of these range extensions are considered to be significant (greater than 50 km from the Survey Area).

Table 6: Species Recorded within the Survey Area Considered to be Range Extensions

Family	Species	Estimated Range Extension (km)
Asteraceae	*Calotis plumulifera*	52.5
	Ixiochlamys cuneifolia	117
	Rhodanthe humboldtiana	51
	Vittadinia eremaea	45
Campanulaceae	*Lobelia heterophylla* subsp. *pilbarensis*	110
Celastraceae	*Stackhousia* sp. Mid west coastal (D. & B. Bellairs 6561)	80
Chenopodiaceae	*Maireana georgei*	130
	Sclerolaena diacantha	60
Euphorbiaceae	*Euphorbia biconvexa*	65
Fabaceae	*Lotus australis*	45
	Senna ferraria	37
	Vigna lanceolata var. *lanceolata*	55
Haloragaceae	*Haloragis gossei* var. *gossei*	117
Malvaceae	*Sida arenicola*	70
	Sida arsiniata	78
Marsileaceae	*Marsilea drummondii*	45
Poaceae	*Cymbopogon ambiguus*	40
	Eriachne helmsii	36
Scrophulariaceae	*Eremophila latrobei* subsp. *glabra*	55
	Eremophila latrobei subsp. *latrobei*	160

4.1.5 Vegetation Types

A total of nine vegetation types were mapped within the Survey Area. Descriptions of these are listed in Table 8, along with a representative photo, their extents within the Survey Area and within a 500 m buffer of the linear parts of the Survey Area.

Four vegetation types represent *Acacia* dominated shrublands over *Triodia* (AaSaTg, AiHlTg, AbAtTg, CcVfTe), one vegetation type represents *Melaleuca* dominated low shrubland over *Triodia* (McTdTe), one vegetation type represents *Acacia* dominated shrubland over **Cenchrus ciliaris* (AxAcCc), one vegetation type represents *Acacia*

dominated shrubland over Chenopods (AcMpSs) and two vegetation types (EvAcAt and AcVfCc) represent drainage lines within the Survey Area.

Vegetation type EvAcAt was a large drainage line, which comprised of an overstorey of *Eucalyptus victrix*, and AcVfCc was a smaller drainage line, with no overstorey of *Eucalyptus victrix.* Neither drainage line contained any water and are ephemeral.

Statistical analysis of the species presence/absence confirmed the aligned vegetation types (Table 8). AxAcCc vegetation type had the minimum three representative quadrats during the field assessment, however was reduced to two quadrats after the statistical grouping aligned quadrat EMQ10 as being more similar to vegetation type AcMpSs based on species presence. Appendix H illustrates the similarity grouping of each quadrat.

Vegetation type mapping, quadrats and the relevé are presented in Figure 15a-f. Quadrat and relevé data are presented in Appendix L.

4.1.6 Introduced Species

A total of eight introduced species were recorded within the Survey Area, representing approximately 4.5 % of the total taxa. None of these are listed as Declared Pests under the BAM Act or WoNS (Table 7; Figure 16a-f).

Table 7: Introduced Flora Species within the Survey Area

Species	Common Name
**Aerva javanica*	Kapok Bush
**Argemone ochroleuca*	Mexican Poppy
**Cenchrus ciliaris*	Buffel Grass
**Datura leichhardtii*	Native Thornapple
**Flaveria trinervia*	Speedy Weed
**Hypochaeris glabra*	Smooth Cat's-ear
**Malvastrum americanum*	Spiked Malvastrum
**Vachellia farnesiana*	Mimosa Bush

Table 8: Vegetation Type Descriptions and their Extent within the Survey Area including 500 m buffer

VEGETATION TYPE CODE	VEGETATION TYPE DESCRIPTION	QUADRAT	EXTENT (HA) IN THE SURVEY AREA	EXTENT (%) IN THE SURVEY AREA	EXTENT (HA) WITHIN 500M BUFFER	EXTENT (%) WITHIN 500M BUFFER	REPRESENTATIVE PHOTO
AaSaTg	*Acacia ancistrocarpa, A. bivenosa* tall open shrubland over *Senna artemisioides* subsp. *oligophylla*, *Eremophila cuneifolia* mid sparse shrubland over *Triodia epactia*, *T. glabra* tall open tussock grassland	EMQ03 EMQ05 EMQ29	42.5	2.2	42.5	0.6	
AbAtTg	*Acacia bivenosa, A. synchronicia, A. sclerosperma* tall open shrubland over *A. tetragonophylla, Senna artemisioides* subsp. *oligophylla*, *Solanum lasiophyllum* low isolated clumps of shrubs over **Cenchrus ciliaris, Triodia epactia* grassland	EMQ07 EMQ08 EMQ09 EMQ17 EMQ31 EMQ32	351.7	18.2	1185	16.6	

VEGETATION TYPE CODE	VEGETATION TYPE DESCRIPTION	QUADRAT	EXTENT (HA) IN THE SURVEY AREA	EXTENT (%) IN THE SURVEY AREA	EXTENT (HA) WITHIN 500M BUFFER	EXTENT (%) WITHIN 500M BUFFER	REPRESENTATIVE PHOTO
AcMpSs	*Acacia cuspidifolia* tall open shrubland over *A. synchronicia*, *Maireana polypterygia*, *Eremophila cuneifolia* mid isolated clumps of shrubs over **Cenchrus ciliaris* low grassland over *Maireana georgei*, *Sclerolaena stylosa* (P1) low isolated clumps of chenopods	EMQ10 ENQ11 ENQ15 EMQ16	179	9.2	1052	14.8	
AcVfCc	*Acacia coriacea* subsp. *coriacea*, *A. sclerosperma*, *A. xiphophylla* tall shrubland over **Vachellia farnesiana*, *Acacia tetragonophylla*, *Abutilon geranioides* mid sparse shrubland over **Cenchrus ciliaris* tall closed grassland	EMQ12 EMQ13 EMQ14	31.9	1.6	80.9	1.1	

VEGETATION TYPE CODE	VEGETATION TYPE DESCRIPTION	QUADRAT	EXTENT (HA) IN THE SURVEY AREA	EXTENT (%) IN THE SURVEY AREA	EXTENT (HA) WITHIN 500M BUFFER	EXTENT (%) WITHIN 500M BUFFER	REPRESENTATIVE PHOTO
AiHlTg	*Acacia inaequilatera* tall sparse shrubland over *A. ancistrocarpa*, *Hakea lorea*, *A. bivenosa* mid open shrubland over *Triodia glabra* tall grassland	EMQ04 EMQ06 EMQ30 EMR01	94.3	4.9	94.3	1.3	
AxAcCc	*Acacia xiphophylla*, *A. synchronicia*, *A. tetragonophylla* tall open shrubland over *Acacia coriacea* subsp. *coriacea*, *Acacia sclerosperma*, *Alectryon oleifolius* subsp. *oleifolius* mid isolated clumps of shrubs over **Cenchrus ciliaris* open grassland	EMQ19 EMQ20	373	19.3	1460	20.5	

VEGETATION TYPE CODE	VEGETATION TYPE DESCRIPTION	QUADRAT	EXTENT (HA) IN THE SURVEY AREA	EXTENT (%) IN THE SURVEY AREA	EXTENT (HA) WITHIN 500M BUFFER	EXTENT (%) WITHIN 500M BUFFER	REPRESENTATIVE PHOTO
CcVfTe	*Acacia bivenosa, Codonocarpus cotinifolius, A. coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *Verticordia forrestii, Dampiera incana* var. *incana*, *Quoya loxocarpa* low isolated clumps of shrubs over *Triodia epactia* tall tussock grassland	EMQ23 EMQ24 EMQ25 EMQ26	13	0.67	114	1.6	
EvAcAt	*Eucalyptus victrix* low woodland over *Acacia coriacea* subsp. *coriacea* tall open shrubland over *A. tetragonophylla, A. inaequilatera*, *A. bivenosa* mid sparse shrubland over *Acacia sclerosperma*, *Abutilon lepidum, *Vachellia farnesiana* low isolated clumps of shrubs over *Cenchrus ciliaris* tall grassland	EMQ18 EMQ21 EMQ22	8.7	0.4	59	0.8	

VEGETATION TYPE CODE	VEGETATION TYPE DESCRIPTION	QUADRAT	EXTENT (HA) IN THE SURVEY AREA	EXTENT (%) IN THE SURVEY AREA	EXTENT (HA) WITHIN 500M BUFFER	EXTENT (%) WITHIN 500M BUFFER	REPRESENTATIVE PHOTO
McTdTe	*Melaleuca cardiophylla*, *Acacia coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *A. sclerosperma*, *Thryptomene dampieri*, *A. gregorii* low isolated shrubs over *Triodia epactia* tall closed grassland	EMQ01 EMQ02 EMQ27 EMQ28	450.4	23.3	2278	32	
Mosaic - AbAtTg/AxAcCc			88.3	4.6	244	3.4	
Mosaic - AbAtTg/McTdTe			37	1.9	163	2.3	
Previous Disturbance/Regrowth			129	6.7	208	2.9	
Road/Shoulder			138	7	143	2	
Total Area			**1937**	**100**	**7124**	**100**	

4.1.7 Vegetation Condition

Vegetation condition within the Survey Area ranged from Very Good to Degraded. The majority of the Survey Area was considered to be in Very Good condition (44.4 %). Disturbances included areas of historical clearing, pasture lands and associated impacts by cattle, litter, tracks and weeds. Vegetation condition and its extent within the Survey Area, and within a 500 m buffer of the Survey Area are presented in Table 9 and Figure 16a – 16f.

Table 9: Vegetation Condition Assessed within the Survey Area

Vegetation Condition	Extent within Survey Area (ha)	Extent within Survey Area (%)	Extent within 500m buffer (ha)	Extent within 500m buffer (%)
Very Good	768.4	39.7	3165	44.4
Good	677	35	2598	36.5
Poor	75.8	3.9	339.7	4.8
Degraded	278	14.4	877.6	12.3
Cleared	138	7	143	2
Total Area	**1937**	**100**	**7124**	**100**

4.1.8 Threatened and Priority Ecological Communities

The database search showed that the Survey Area occurred within the buffer of the Priority 1 Ecological Community, Tussock grasslands or grassy tall or low shrublands of the Yarcowie Land System (Carnarvon Basin) (Figure 10). It has been concluded that none of the vegetation types surveyed during the field survey represent the Priority 1 Ecological Community. This is based on an examination of the database searches and the known characteristics of the Yarcowie Land System. Within the Survey Area the soils recorded included:

- Orange sand;
- Orange loam, sand and clay over limestone;
- Brown clay over calcrete; and
- Light brown to orange sand, loam and clay over laterite and limestone.

No Gilgai soils were recorded within the Survey Area.

None of the vegetation types recorded during the survey are considered to represent any other TEC or PEC occurring within the Carnarvon bioregion.

4.1.9 Other Significant vegetation

Vegetation type AcMpSs is considered to be locally significant due to the presence of *Sclerolaena stylosa* (P1).

Vegetation types AbAtTg, AxAcCc and McMpSs are considered to be of local importance due to the presence of *A. startii* populations. These vegetation types occur on flat to undulating plains, and contain orange or light brown sand, loam to medium clay soils, associated with limestone.

4.1.10 Regional Representation

Vegetation types described in the Survey Area correlated with Beard (1975) and Shepherd et al. (2002) broad vegetation associations (Table 10). Differences exist with the terminology used in the descriptions as they are based on different methods of categorising and characterising vegetation types, and different spatial scales of the analysis (i.e. region vs. local scale). The most common broad vegetation association within the Survey Area was Giralia Anticline 680, which was represented by vegetation types AbAtTg, AcMpSs, AaSaTg, AcVfCc and AxAcCc, and covered 946 ha within the Survey Area and 3739 ha within the Survey Area plus 500 m buffer.

Table 10: Representation of Broad Vegetation Associations and Corresponding Vegetation Types

Beard (1975) Vegetation association	Corresponding Vegetation type	Vegetation type extent in Survey Area (ha)	Vegetation type extent in 500 m buffer (ha)
Coastal Dunes 662	CcVfTe, McTdTe	450	2391
Giralia Anticline 151	EvAcTe, AcVfCc	40.6	139.8
Giralia Anticline 267	-	0	0
Giralia Anticline 658	-	0	0
Giralia Anticline 680	AbAtTg, AcMpSs, AaSaTg, AcVfCc, AxAcCc	946	3739
Cape Yannare Coastal Plain 2675	AiHlTg	94.3	94.3

4.2 Vertebrate Fauna Results

4.2.1 Desktop Assessment

A total of 258 vertebrate fauna species were retrieved from the database searches. Of these, 40 are conservation significant vertebrate fauna species (including Priority species) from 16 families. The DBCA Threatened Fauna Database records contain GPS coordinates for each species recorded as illustrated in Appendix E.

The following are a summary from the key findings from the fauna database searches:

- Amphibian - The database searches identified four amphibian species as having been previously recorded in the surrounding area, these species are not of conservation significance;
- Reptile - The database searches identified 85 reptile species as having been previously recorded in the surrounding area, this included one species of conservation significance (Ningaloo worm-lizard, *Aprasia rostrata* P3);
- Bird - The database searches identified 137 bird species as having been previously recorded in the surrounding area, this included 32 species of conservation significance; and
- Mammal - The database searches identified 21 mammal species as having been previously recorded in the surrounding area, this included seven species of conservation significance.

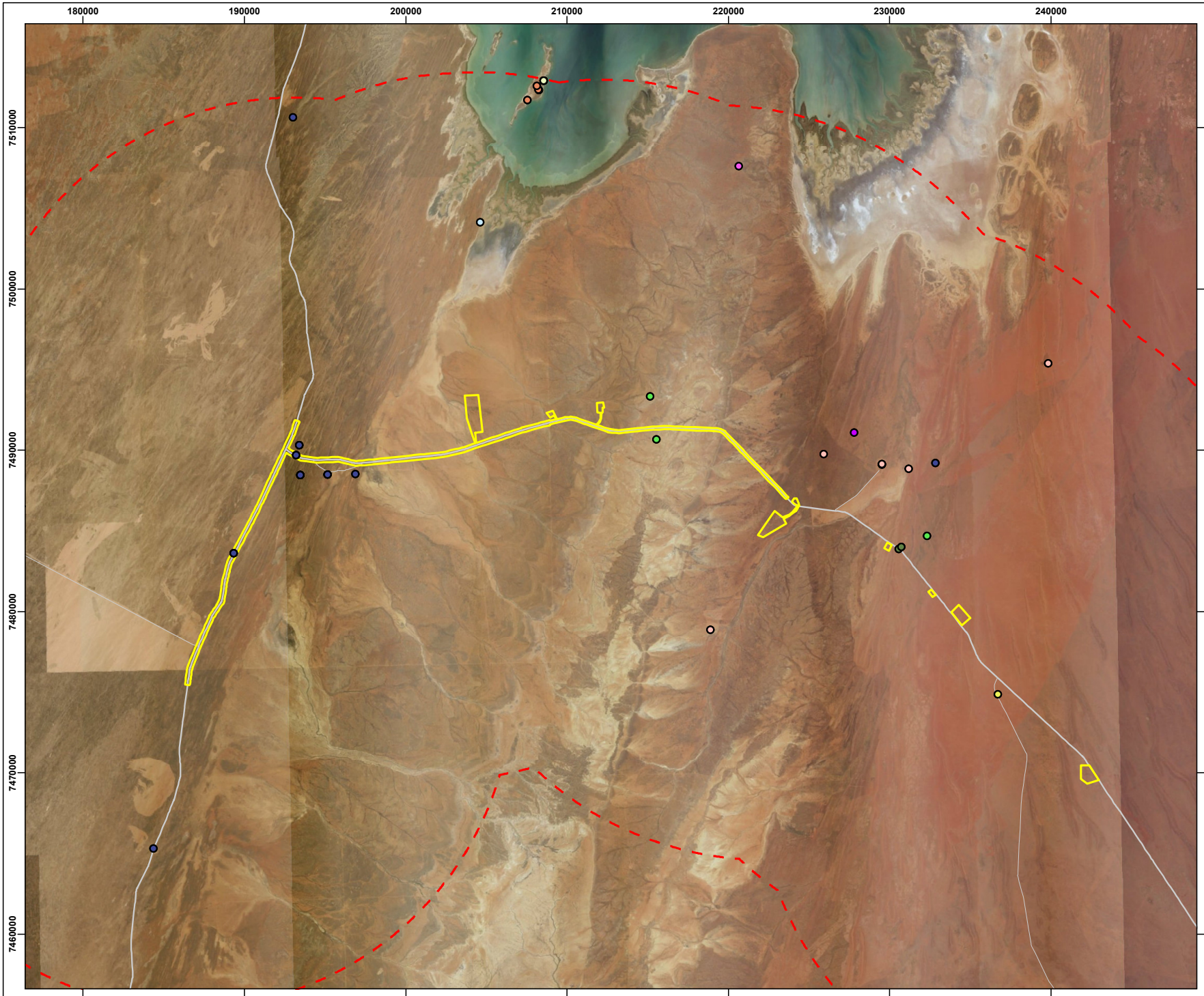
The Survey Area is inland from the ocean and so does not contain marine habitat, as such, marine species have been excluded from any further discussion.

4.2.1.1 Likelihood

The 40 conservation significant fauna species were assessed post-survey for their likelihood of occurrence within the Survey Area (Appendix I).

The results determined that:

- No species of conservation significance were recorded during the survey;
- A total of four species are considered to have a high likelihood of occurrence within the Survey Area (Rainbow Bee-eater, Brush-tailed Mulgara, Short-tailed Mouse and Ningaloo Worm Lizard);
- A total of three species are considered to have a medium likelihood of occurrence within the Survey Area (Eastern Osprey, Grey Falcon, Peregrine Falcon); and
- A total of 33 species are considered to have a low likelihood of occurrence within the Survey Area.



Legend

- Survey Area
- Study Area
- State Road
- Local Road

DBCA Fauna Records

- Hermite Island Worm-Lizard
- Lakeland Downs Mouse, Kerakenga
- Shark Bay Mouse, Djoongari
- Bar-tailed Godwit
- Bilby, Dalgyte, Ninu
- Brush-tailed Mulgara
- Grey Falcon
- Grey Plover
- Night Parrot
- Oriental Pratincole
- Rainbow Bee-eater
- Ruddy Turnstone
- Sharp-tailed Sandpiper

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- FAUNA SOURCED DBCA 2018
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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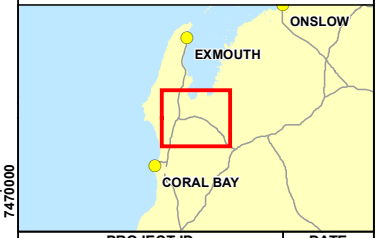
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	1

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 12 DBCA Threatened and Priority Fauna Records

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4.2.2 Field Survey

A total of 74 fauna species were recorded within the Survey Area during the survey, from 38 families. This included 18 reptile species from four families, 47 bird species from 27 families and nine mammal species from seven families.

No Threatened or Priority fauna were recorded within the Survey Area.

A systematic fauna species list is presented in Appendix O.

4.2.3 Fauna Habitat

A total of 37 fauna habitat assessments were undertaken during the survey, identifying five general fauna habitats which were mapped at a 1:55,000 scale. The general fauna habitat types are presented in Table 11 and include:

- *Acacia* shrubland (*Acacia* spp. over mixed shrubs over *Triodia* spp.);
- Grassland (*Triodia epactia* grassland);
- Dune (Mixed low shrubs over *T. epactia*);
- Major Drainage (*Eucalyptus victrix* over mixed shrubs over **C. ciliaris* grassland); and
- Minor Drainage (*Acacia* spp. over **Cenchrus ciliaris* grassland).

Table 11: General Fauna Habitat Types and Extent within the Survey Area

Fauna Habitat	Extent within Survey Area		Extent within 500 m buffer	
	Ha	%	Ha	%
Acacia Shrubland	1166	60	4241	59.5
Grassland (McTdTe)	450	23	2278	32
Dune (CcVfTe)	13	0.7	114	1.6
Major Drainage (EvAcAt)	10	0.5	60	0.8
Minor Drainage (AcVfCc)	31	1.6	80	1.1
Cleared/Highly Disturbed	267	13.8	350.7	4.9
Total Area	**1937**	**100**	**7124**	**100**

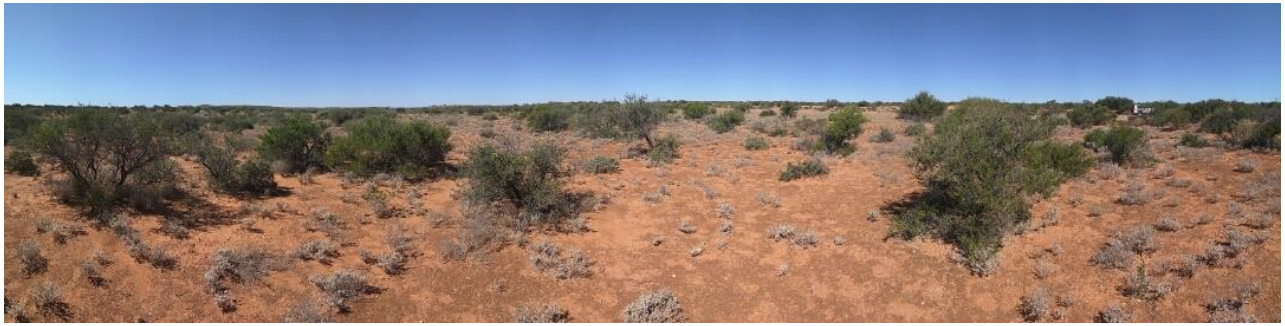
The majority of the vegetation within the Survey Area was considered to be in Very Good condition (44.4 %). These habitat types are considered to be typical of, and widespread across the Carnarvon bioregion. Cleared or Highly Disturbed areas such as road and shoulder areas, provide little to no value to native fauna species and is not considered to be fauna habitat. Termite mounds were also recorded within the Grassland Fauna Habitat (Figure 17; Table 12).

Each fauna habitat type and extent is presented in Figure 17a-f, and a detailed description is presented in Table 12. Each general fauna habitat type can be refined and related to the vegetation types within the Survey Area.

Table 12: Fauna Habitat within the Survey Area.

Fauna Habitat	Vegetation Type Code	Vegetation Type Description	Representative Photo
Acacia Shrubland	AaSaTg	*Acacia ancistrocarpa*, *A. bivenosa* tall open shrubland over *Senna artemisioides* subsp. *oligophylla*, *Eremophila cuneifolia* mid sparse shrubland over *Triodia epactia* and *Triodia glabra* tall open tussock grassland	
	AiHlTg	*Acacia inaequilatera* tall sparse shrubland over *A. ancistrocarpa*, *Hakea lorea* and *A. bivenosa* mid open shrubland over *Triodia glabra* tall grassland	

Fauna Habitat	Vegetation Type Code	Vegetation Type Description	Representative Photo
	AbAtTg	*Acacia bivenosa*, *A. synchronicia*, *A. sclerosperma* tall open shrubland over *A. tetragonophylla*, *Senna artemisioides* subsp. *oligophylla*, *Solanum lasiophyllum* low isolated clumps of shrubs over **Cenchrus ciliaris*, *Triodia epactia* grassland	
	AxAcCc	*Acacia xiphophylla*, *A. synchronicia*, *A. tetragonophylla* tall open shrubland over *A. coriacea* subsp. *coriacea*, *A. sclerosperma*, *Alectryon oleifolius* subsp. *oleifolius* mid isolated clumps of shrubs over **Cenchrus ciliaris* open grassland	

Fauna Habitat	Vegetation Type Code	Vegetation Type Description	Representative Photo
	AcMpSs	*Acacia cuspidifolia* tall open shrubland over *A. synchronicia*, *Maireana polypterygia*, *Eremophila cuneifolia* mid isolated clumps of shrubs over **Cenchrus ciliaris* low grassland over *M. georgei*, *Sclerolaena stylosa* (P1) low isolated clumps of chenopods	
Minor Drainage	AcVfCc	*Acacia coriacea* subsp. *coriacea*, *A. sclerosperma*, *A. xiphophylla* tall shrubland over **Vachellia farnesiana*, *A. tetragonophylla*, *Abutilon geranioides* mid sparse shrubland over **Cenchrus ciliaris* tall closed grassland	

Fauna Habitat	Vegetation Type Code	Vegetation Type Description	Representative Photo
Major Drainage	EvAcAt	*Eucalyptus victrix* low woodland over *Acacia coriacea* subsp. *coriacea* tall open shrubland over *A. tetragonophylla*, *A. inaequilatera*, *A. bivenosa* mid sparse shrubland over *A. sclerosperma*, *Abutilon lepidum*, **Vachellia farnesiana* low isolates clumps of shrubs over **Cenchrus ciliaris* tall grassland	
Dune	CcVfTe	*Acacia bivenosa*, *Codonocarpus cotinifolius*, *A. coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *Verticordia forrestii*, *Dampiera incana* var. *incana*, *Quoya loxocarpa* low isolated clumps of shrubs over *Triodia epactia* tall tussock grassland	

Fauna Habitat	Vegetation Type Code	Vegetation Type Description	Representative Photo
Grassland	McTdTe	*Melaleuca cardiophylla*, *Acacia coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *A. sclerosperma*, *Thryptomene dampieri*, *A. gregorii* low isolated shrubs over *Triodia epactia* tall closed grassland	

4.2.4 Conservation Significant Fauna

No fauna of conservation significance was recorded within the Survey Area. No evidence of fauna of conservation significance, such as scats or tracks, were recorded. The suitability of each fauna habitat for all identified conservation significant species considered as having a high or medium likelihood of occurrence, are outlined below in Table 13.

Table 13: Fauna Habitat Suitability for Conservation Significant Species Identified within Desktop Assessment

Species	Fauna Habitat Type				
	Acacia Shrubland	Minor Drainage	Major Drainage	Dune	Grassland
Oriental Pratincole (IA)	-	-	-	-	-
Eastern Osprey (MA)	-	-	-	-	-
Grey Falcon (VU)	-	-	X	-	-
Peregrine Falcon (OS)	-	-	X	-	-
Rainbow Bee-eater (MA)	X	X	X	X	X
Brush-tailed Mulgara (P4)	X	-	-	X	X
Short-tailed Mouse (P4)	X	X	X	X	X
Ningaloo Worm Lizard (P3)	X	-	-	X	X

Excluding the Rainbow Bee-eater, the remaining three species of conservation significance considered to have a high likelihood of occurrence are discussed below.

Brush-tailed Mulgara (*Dasycercus blythi*) - Priority 4

The species is distributed widely across inland Australia with a population that fluctuates somewhat in response to seasonal conditions (Woinarski, Burbidge and Harrison, 2014). Suitable habitat for this species is broadly contained by the Tanami Desert in the north, the Simpson Desert in the east, the Great Victoria Desert in the south and within the Carnarvon, Murchison and Pilbara IBRA regions in the west (Woinarski, Burbidge and Harrison, 2014). The species is associated with hummock spinifex grasslands, but also uses other habitat types (often sandplains, grasslands and woodlands) when mixed with or adjacent to hummock grasslands. It is mainly nocturnal and shelters during the day in burrow systems.

With two DBCA database records being recorded in the last 15 years, one of which was recorded just 5 km from the Survey Area and appropriate habitat occurring within the Survey Area, the species is considered to have a high likelihood of occurrence. The species preferred habitat types are common and well represented within the surrounding area.

Therefore, any disturbance within the Survey Area is unlikely to significantly impact the species.

Short-tailed Mouse (*Leggadina lakedownensis*) – Priority 4

The Short-tailed Mouse is a nocturnal, usually solitary and infrequently seen species. It is distributed across the north of Australia, from Queensland to WA, and occurs in a diverse range of habitats including the monsoonal tropical coast, spinifex grasslands, samphire shrublands, sedge lands, *Acacia* shrublands and *Eucalyptus* and *Melaleuca* woodlands (Van Dyck and Strahan, 2008). Research on the population on Thevenard Island, off the WA coast, has shown that the Short-tailed Mouse breeding season is restricted primarily to the dry season (April to October), where it will have one or two litters. Populations on Thevenard Island were shown to fluctuate across the year in response to rainfall, however, research on populations in Kakadu were noted to show dramatic oscillation regardless of environmental factors (Van Dyck and Strahan, 2008).

The species has been recorded on six occasions within close proximity to the Survey Area, with one record within 500 m from the Survey Area. The Survey Area contains appropriate habitat (*Triodia* Grassland and *Acacia* Shrubland at a minimum), therefore the species is considered to have a high likelihood of occurrence within the Survey Area. The habitat that the species may utilise is common and well represented within the surrounding area. The species exhibits a boom and bust population cycle, and considering the Survey Area is outside what is considered the species core distribution, which ranges between the Pilbara in WA to the east coast of Cape York between Princess Charlotte Bay and south to Tennent Creek and The Granites, Northern Territory, with isolated records west of Paluma Queensland, and Thevenard Island off Onslow, WA. (Menkhorst and Knight, 2004; van Dyck and Strahan, 2008), any disturbance within the Survey Area is unlikely to significantly impact the species.

Ningaloo Worm Lizard (*Aprasia rostrata*) – Priority 3

The Ningaloo Worm Lizard occupies the North West Cape south to Yardie creek and Learmonth and inland to Bullara Station. It occupies a variety of sandy habitats including white coastal dunes and red dunes vegetated with *Triodia* (Wilson and Swan, 2017).

The Survey Area occurs within the species known distribution and contains appropriate habitat, especially within the *Triodia* Grassland and Dune fauna habitat. The species is therefore considered to have a high likelihood of occurrence within the Survey Area; however, its occurrence is difficult to confirm without intensive trapping for the species. Both of the species preferred fauna habitats are well represented within the surrounding area, particularly the *Triodia* Grassland habitat. Although the Dune habitat is less represented within the surrounding area, a minimal amount of this fauna habitat occurs within the Survey Area (13 ha or 0.7% of the Survey Area). Therefore, any disturbance within the Survey Area is unlikely to significantly impact the species.

4.2.5 Species Considered to have a Medium Likelihood of Occurrence

Excluding two marine and coastal birds (Oriental Pratincole and Eastern Osprey), two species of conservation significance considered as listed by the State, are considered to have a medium likelihood of occurrence:

Grey Falcon (*Falco hypoleucos*) - Vulnerable

The Grey Falcon is listed as Vulnerable under the BC Act. It is a poorly known endemic of inland Australia and is considered Australia's rarest falcon. It is also among the rarest Falcon species in the world (Schoenjahn, 2013). The species is a resident or nomadic visitor to inland parts of all states (except Tasmania) from a range of habitats but are mainly found where annual rainfall is <500 mm, except when wet years are followed by drought and then they are more widespread (Garnett, S.T, Szabo, J.K, and Dutson, 2011). It frequents timbered lowland plains, particularly, *Acacia* Shrublands that are crossed by tree-lined watercourses. It also hunts in treeless areas and frequents tussock grassland and open woodland, especially in winter (Garnett, S.T, Szabo, J.K, and Dutson, 2011). Nesting has been recorded from River Red Gum (*Eucalyptus camaldulensis*) and Coolibah (*E. victrix*) trees up to 15 m above the ground (Johnstone and Storr, 1998; Garnett, S.T, Szabo, J.K, and Dutson, 2011).

The DCBA database search returned only one record of the species in the Exmouth area in 2000. The Survey Area does not contain the preferred habitat of the species and is on the outer extent of the species known distribution. The Major Drainage Line is the only fauna habitat likely to be utilised by the species. Only a small portion of this fauna habitat occurs within the Survey Area and the species is unlikely to be dependent on this fauna habitat.

Peregrine Falcon (*Falco peregrinus*) – Other Specially Protected Fauna

The Peregrine Falcon is listed as Other Specially Protected fauna under the BC Act and is an uncommon but wide-ranging bird across Australia (Barrett et al., 2003). It occurs mainly along rivers and ranges as well as wooded watercourses and lakes and nests primarily on cliffs, granite outcrops and quarries. The diet of the Peregrine Falcon has been well studied and primarily includes flocking species such as Parrots and Pigeons and on the east coast European Starlings (Olsen and Fuentes, 2008).

The DCBA database search did not return any records of the species, however given the species dispersal ability, it has the potential to utilise the Survey Area. However, none of the Survey Area contains the species preferred habitat. It may utilise the Major Drainage Line fauna habitat, however, only a small portion of this fauna habitat occurs within the Survey Area and the species is unlikely to be dependent on this fauna habitat.

5 Discussion

5.1 Flora

The post-survey likelihood of occurrence assessment found that one species, *Eremophila youngii* subsp. *lepidota* (P4) had a high likelihood of occurrence within the Survey Area based on known distance to the Survey Area and its preferred habitat being present. The survey coincided with the flowering period for *E. youngii* subsp. *lepidota.* The majority of the Survey Area was traversed on foot, with specific vegetation types targeted for the presence of flora of conservation significance. However, due to time constraints and the size of the Survey Area, the entire Survey Area was not able to be traversed on foot therefore it is possible that *E. youngii* subsp. *lepidota* occurs in the Survey Area yet has not been recorded.

Two Priority flora species were recorded within the Survey Area, *Sclerolaena stylosa* (P1) and *Acacia startii* (P3).

S. stylosa (P1) was recorded on Burkett Road SLK 45-78, within vegetation type AcMpSs - *Acacia cuspidifolia* over *Maireana polypterygia*. This species was identified at the WA Herbarium, not in the field, however, population density and boundaries have been extrapolated based on data collected in the field.

A. startii (P3) was targeted within the Survey Area at locations known from previous historical records, as shown in the desktop assessment. Some of these populations were able to be confirmed, with population boundary and densities assessed. Several records could not be confirmed as *A. startii* could not be found at the coordinates provided. As well as previous recorded locations being checked, new populations were recorded, boundaries mapped and densities, where possible, were recorded. Some of the populations, however, extended far beyond the Survey Area boundary, and therefore, the populations were extrapolated using aerial imagery. *A. startii* was recorded occurring on Burkett Road SLK 45-78. It was found to grow predominantly in vegetation type AbAtTg, in association with *Acacia bivenosa,* mixed *Acacia* spp., and mixed shrubs over *Triodia glabra*.

A total of 20 species were considered to be an extension of their known range. This is likely attributed to the lack of surveys that have been undertaken in the region, and consequently there is limited information available on the distribution of flora species. Of these species, 14 are considered to represent significance range extensions, as their current known range occurs greater than 50 km from the Survey Area. None of these species are Threatened or Pirority species. Specimens of each species have been vouchered at the WA Herbarium.

No Declared Pests or WoNS were recorded within the Survey Area. Weed species diversity was considered to be low on average, with only eight weed species recorded, however, abundance in some parts of the Survey Area was high, with **Cenchrus ciliaris* and **Vachellia farnesiana* occurring in large numbers along Burkett Road SLK 45-78, particularly the drainage lines and road sides.

*C. *ciliaris* was present as a dominant understory in some areas of the Survey Area and has been widely planted in pastoral regions as pasture grass. This weed has become widespread throughout roadsides, creek lines and river edges from Geraldton to the Pilbara region. It generates higher fuel loads, is more flammable and increases frequency of fires (Hussey, B.M. J *et al.*, 2007).

Originally from central America, **V. farnesiana* is now a widespread weed in northern and central Australia. It is a brambly, spiny, rounded shrub growing to 4 m in height, occasionally as tall as 7 m. **V. farnesiana* is categorised as Permitted -s11 for the whole of the state and is not assigned to any control category for local government areas (DPIRD, 2018).

The Survey Area occurred within the buffer of one Priority 1 PEC, the Tussock grasslands or grassy tall or low shrublands of the Yarcowie Land System (Carnarvon Basin).

The Yarcowie Land System is a highly restricted Land System which consists of Gilgai soils and grasslands. Soils recorded within the Survey Area included orange sand, orange loam, sand and clay over limestone, brown clay over calcrete and light brown to orange sand, loam and clay over laterite and limestone. No areas of Gilgai soils were recorded within the Survey Area. Nine vegetation types were described for the Survey Area, none of which are considered to be representative of the Priority 1 PEC Tussock grasslands or grassy tall or low shrublands of the Yarcowie Land System (Carnarvon Basin), or any other TECs or PECs.

The majority of the vegetation condition within the Survey Area was considered to be in Very Good condition (44.4%). Parts of the Survey Area are situated within cattle stations, therefore disturbance within the Survey Area consisted of disturbance related to cattle including grazing, trampling and the spread of weeds. Other types of disturbance within the Survey Area included litter, vehicle tracks and historical clearing.

5.2 Vertebrate Fauna

Of the 40 conservation significant fauna species, 28 of these are marine birds. Although all of these marine bird species have the potential to occur within the Survey Area (due to the proximity to the coast), none are likely to forage, refuge or breed in these habitats. Therefore, marine birds, including the Osprey, have been excluded from any further discussion and are considered unlikely to be negatively impacted by any disturbance within the Survey Area.

Any species with a conservation listing which is solely Marine under the EPBC Act, such as the Rainbow Bee-eater (which was previously listed as Migratory, but has recently been delisted), will not be discussed further, as the Survey Area contains no marine habitat.

Termite mounds were recorded within the Grassland fauna habitat and provide important refuge for other fauna species like spiders, geckoes, lizards, pythons and birds for nesting purposes. Removal of this habitat could not only impact the termite but other species that

are reliant on the termite mounds. However, the termite mounds within the Survey Area are unlikely to provide habitat for fauna of conservation significance as listed in the likelihood table (Appendix I).

5.2.1 Species Considered to have a High Likelihood of Occurrence

Excluding the Rainbow Bee-eater, the remaining three species of conservation significance are considered to have a high likelihood of occurrence:

- Brush-tailed Mulgara (*Dasycercus blythi*) - Priority 4
- Short-tailed Mouse (*Leggadina lakedownensis*) – Priority 4
- Ningaloo Worm Lizard (*Aprasia rostrata*) – Priority 3

5.2.2 Species Considered to have a Medium Likelihood of Occurrence

Excluding two marine and coastal birds (Oriental Pratincole and Eastern Osprey), two species of conservation significance, as listed by the State, are considered to have a medium likelihood of occurrence:

- Grey Falcon (*Falco hypoleucos*) - Vulnerable
- Peregrine Falcon (*Falco peregrinus*) – Other Specially Protected Fauna

6 Conclusion

6.1 Flora and vegetation

In summary, the following conclusions on the existing flora and vegetation are made:

- No Threatened flora species pursuant to the EPBC Act and/or gazetted as Declared Rare Flora pursuant to the BC Act were recorded during the survey or are considered to have a high likelihood of occurrence in the Survey Area;
- Two DBCA listed Priority flora were recorded within the Survey Area, *Sclerolaena stylosa* (P1), and *Acacia startii* (P3);
- Twenty species were considered to be an extension of their current range;
- Eight introduced species were recorded during the survey. None are listed as a Declared Pest or a WoNS; and
- None of the nine vegetation types recorded are considered to represent any Federal or State listed TECs or DBCA listed PECs.

6.2 Vertebrate Fauna

In summary, the following conclusions on the vertebrate fauna of the Survey Area are made:

- During the level 1 vertebrate fauna survey, five general fauna habitats were identified and mapped, including;
    - Acacia shrubland (*Acacia* spp. over mixed shrubs over *Triodia* spp.);
    - Dune (Mixed low shrubs over *Triodia epactia*);
    - Grassland (*Triodia epactia* grassland);
    - Major Drainage (*Eucalyptus Victrix* over mixed shrubs over **Cenchrus ciliaris* grassland); and
    - Minor Drainage (*Acacia* spp. over **Cenchrus ciliaris* grassland).

Of the 40-conservation significant vertebrate fauna species retrieved from the database searches:

- Four species of conservation significance are considered to have a high likelihood of occurrence within the Survey Area (Rainbow Bee-eater (Ma), Brush-tailed Mulgara (P4), Short-tailed Mouse (P4) and Ningaloo Worm Lizard (P3));
- Three species are considered to have a medium likelihood of occurrence within the Survey Area (Eastern Osprey (Ma), Grey Falcon (VU), and Peregrine Falcon (P4)); and

- 33 species are considered to have a low likelihood of occurrence within the Survey Area.

The fauna assessment was undertaken at a time considered appropriate for the species of conservation significance considered likely to be present within the Survey Area. Any disturbance within the Survey Area is unlikely to have any significant impact on species of conservation significance.

7 References

360 Environmental Pty Ltd (2015) *Level 1 Flora and Vegetation Assessment, Truscott Crescent Exmouth.*

360 Environmental Pty Ltd (2017) *Australian Bundle Site - Detailed Flora and Vegetation Assessment*.

360 Environmental Pty Ltd (2018) *Shark Bay Biological Survey - Flora, Vegetation and Fauna Assessment*.

Barrett, G., Silcocks, A., Barry, S., Cunningham, R., Poulter, R. (2003) *The new atlas of Australian birds*. Melbourne, Australia: Royal Australasian Ornithologists Union.

Beard, J. S. (1975) *Pilbara, 1:1 000,000 vegetation series: explanatory notes to sheet 5*. Perth, Australia: University of Western Australia Press.

Bureau of Meteorology (2018) *Monthly climate data statistics*.

Clarke, K. R. and Gorley, R. N. (2006) 'Primer-E v6'. Plymouth, United Kingdom.

Department of Biodiversity Conservation and Attractions (2017) *DBCA - Legislated lands and waters (GIS dataset)*. Perth, Australia.

Department of Biodiversity Conservation and Attractions (2018a) *FloraBase - the Western Australian flora*, *Herbarium Database*.

Department of Biodiversity Conservation and Attractions (2018b) *NatureMap database search*. Perth, Australia.

Department of Biodiversity Conservation and Attractions (2018c) *Threatened and Priority Ecological Communities database request (custom search).* Perth, Australia.

Department of Biodiversity Conservation and Attractions (2018d) *Threatened and Priority Flora database request (custom search)*. Perth, Australia.

Department of Biodiversity Conservation and Attractions (2019a) *Conservation Codes for Western Australian Flora and Fauna*. Available at: https://www.dpaw.wa.gov.au/images/documents/plants-animals/threatened-species/Listings/Conservation code definitions.pdf.

Department of Biodiversity Conservation and Attractions (2019b) *FloraBase - The Western Australian Flora*. Perth, Australia.

Department of Environment and Conservation (2010) *Biodiversity values of basic raw materials sites within Cape Range National Park*.

Department of Environment and Conservation (2013) *Definitions, categories and criteria for Threatened and Priority Ecological Communities*. Perth, Australia.

Department of Mines Industry Regulation and Safety (2016) *State interpreted bedrock geology*.

Department of Parks and Wildlife (2013) *An integrated approach to Weed Management on DPaW-managed lands in WA*. Perth, Australia. Available at: https://www.dpaw.wa.gov.au/images/documents/plants-animals/plants/weeds/weed_prioritisation_process.pdf.

Department of Primary Industries and Regional Development (2018a) *Declared Plants List*.

Department of Primary Industries and Regional Development (2018b) 'Soil-landscape systems of Western Australia (GIS dataset)'. Perth, Australia. Available at: https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-systems.

Department of Sustainability Environment Water Population and Communities (2011) *Survey guidelines for Australia's threatened mammals*. Canberra, Australia.

Department of the Environment (2013) *Matters of National Environmental Significance: Significant impact guidelines 1.1*. Canberra, Australia.

Department of the Environment and Energy (1999) *EPBC Act List of Threatened Flora*.

Department of the Environment and Energy (2016) *Interim Biogeographic Regionalisation for Australia, Version 7*. Canberra, Australia.

Department of the Environment and Energy (2018) *Protected Matters Search Tool*. Canberra, Australia.

Department of the Environment Water Heritage and the Arts (2010) *Survey Guidelines for Australia's Threatened Birds Guidelines for detecting birds listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*.

Department of Water and Environmental Regulation (2018) *Clearing Regulations - Environmentally Sensitive Areas GIS Dataset*.

van Dyck, S. and Strahan, R. (2008) *The mammals of Australia*. 3rd edn. Sydney, Australia: New Holland Publishers.

Environmental Protection Authority (2016a) 'Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment', (December).

Environmental Protection Authority (2016b) 'Technical Guidance - Sampling Methods for Terrestrial Vertebrate Fauna', (December).

Environmental Protection Authority (2016c) 'Technical Guidance - Terrestrial Fauna Surveys', (December).

Garnett, S.T, Szabo, J.K, and Dutson, G. (2011) *The action plan for Australian birds 2010*. Collingwood, Victoria.

GHD (2016) *Minilya-Exmouth Road Biological Survey, Main Roads WA*.

Government of Western Australia (2018) *2017 Statewide Vegetation Statistics - Full Report*.

Graham, G. (2001) *A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002.*

Hussey, B.M. J., Keighery, G., Dodd, J., Lloyd, S.G., Cousens, R.D. (2007) *Western weeds: A guide to the weeds of Western Australia 2nd ed*. Victoria Park, Western Australia: Weeds Society of Western Australia.

Johnstone, R. E. and Storr, G. M. (1998) *Handbook of Western Australian birds*. Edited by D. Louise. Perth, Australia: Western Australian Museum.

Keighery, G. and Gibson, N. (1993) *Biogeography and composition of the flora of the Cape Range peninsula, Western Australia*.

Menkhorst, P. and Knight, F. (2004) *A field guide to the mammals of Australia*. Melbourne, Australia: Oxford University Press.

Olsen, J. and Fuentes, E. (2008) 'Dietary shifts based upon prey availability in Peregrine Falcons and Australian Hobbies breeding near Canberra, Australia', *Journal of Raptor Research*, 42, pp. 125–137.

Schaetzl, R.J., and Anderson, S. (2007) 'Soils: genesis and geomorphology', p. 283.

Schoenjahn, J. (2013) 'A hot environment and one type of prey: investigating why the Grey Falcon (Falco hypoleucos) is Australia's rarest falcon', *Emu*, 113, pp. 19–25.

Shepherd, D. P., Beeston, G. R. and Hopkins, A. J. M. (2002) *Native Vegetation in Western Australia Technical Report 249*. Perth, Australia.

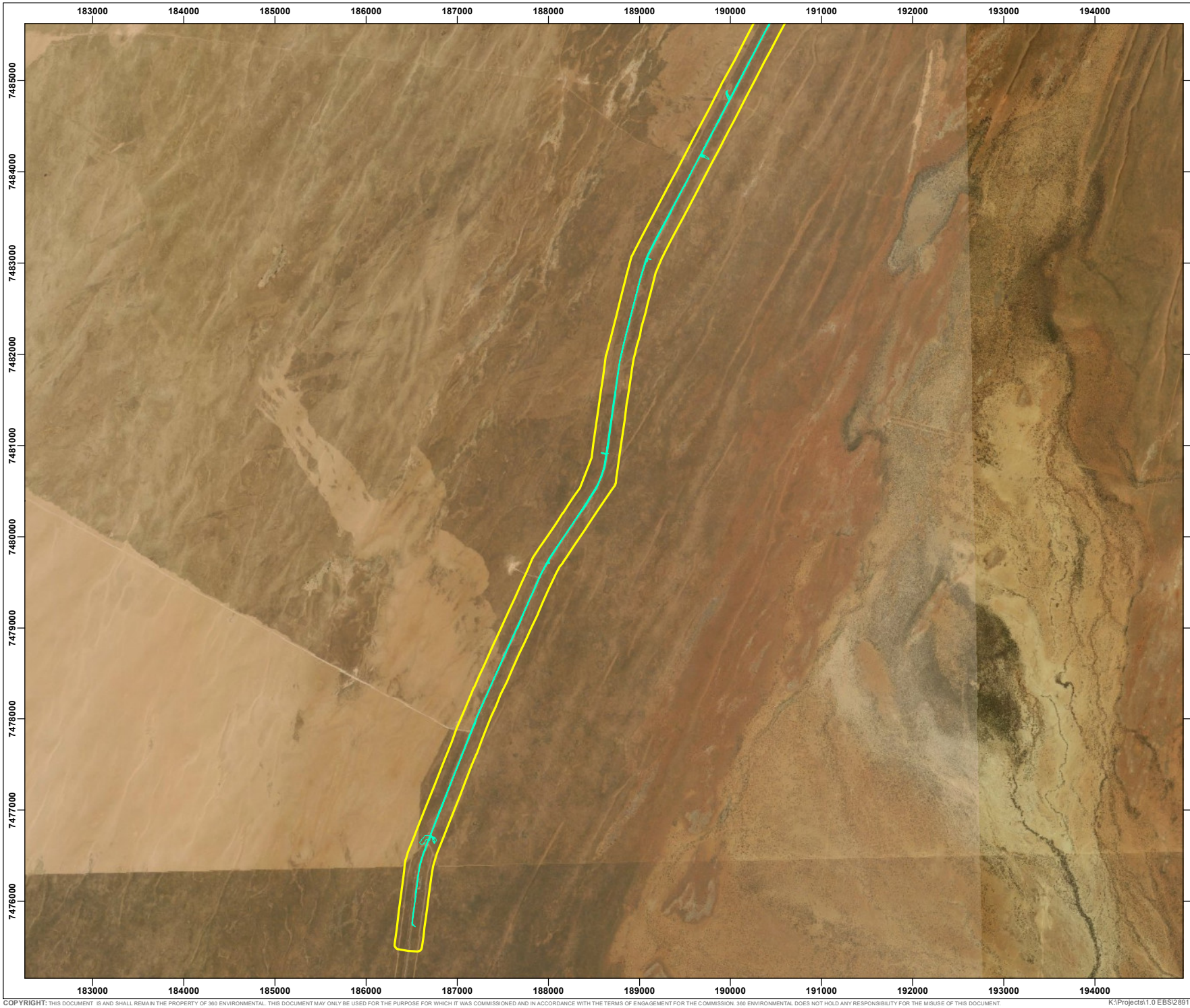
Species and Communities Branch Department of Biodiversity Conservation and Attractions (2017) *Priority Ecological Communities For Western Australia Version 27*.

Thorp, J. R. and Lynch, R. (2000) *The determination of weeds of national significance*. Launceston, Australia: National Weeds Strategy Executive Committee.

Western Australian Museum (2018) *Checklist of the Terrestrial Vertebrate Fauna of Western Australia | Western Australian Museum*. Australia.

Woinarski, J., Burbidge, A. and Harrison, P. (2014) *The action plan for Australian mammals 2012*. CSIRO Publishing.

FIGURES



Legend

- Survey Area
- GPS Tracks

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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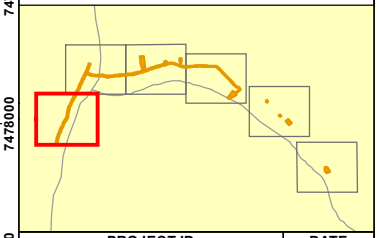

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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

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Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 13a
Survey Effort

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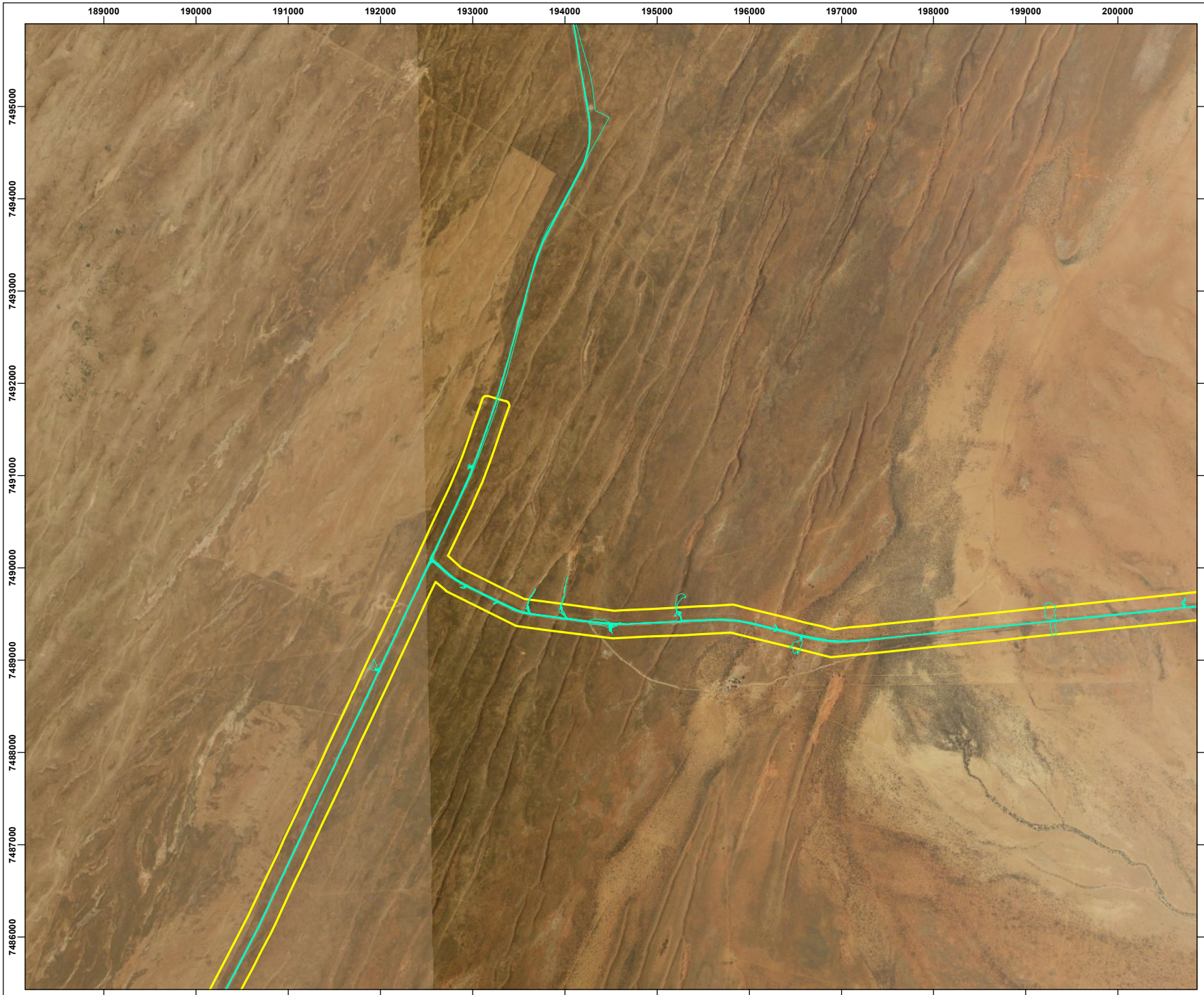

Legend

- Survey Area
- GPS Tracks

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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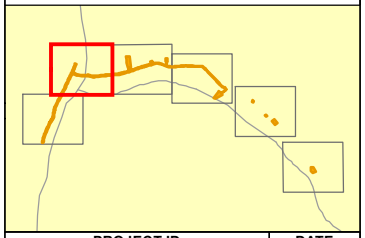

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HORIZONTAL DATUM AND PROJECTION
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Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 13b
Survey Effort

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Legend

- Survey Area
- GPS Tracks

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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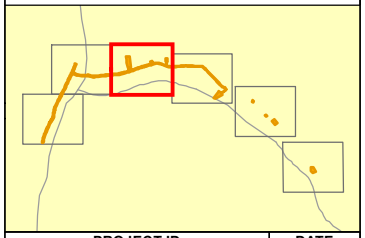


PROJECT ID	DATE
2891	9/10/2018

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

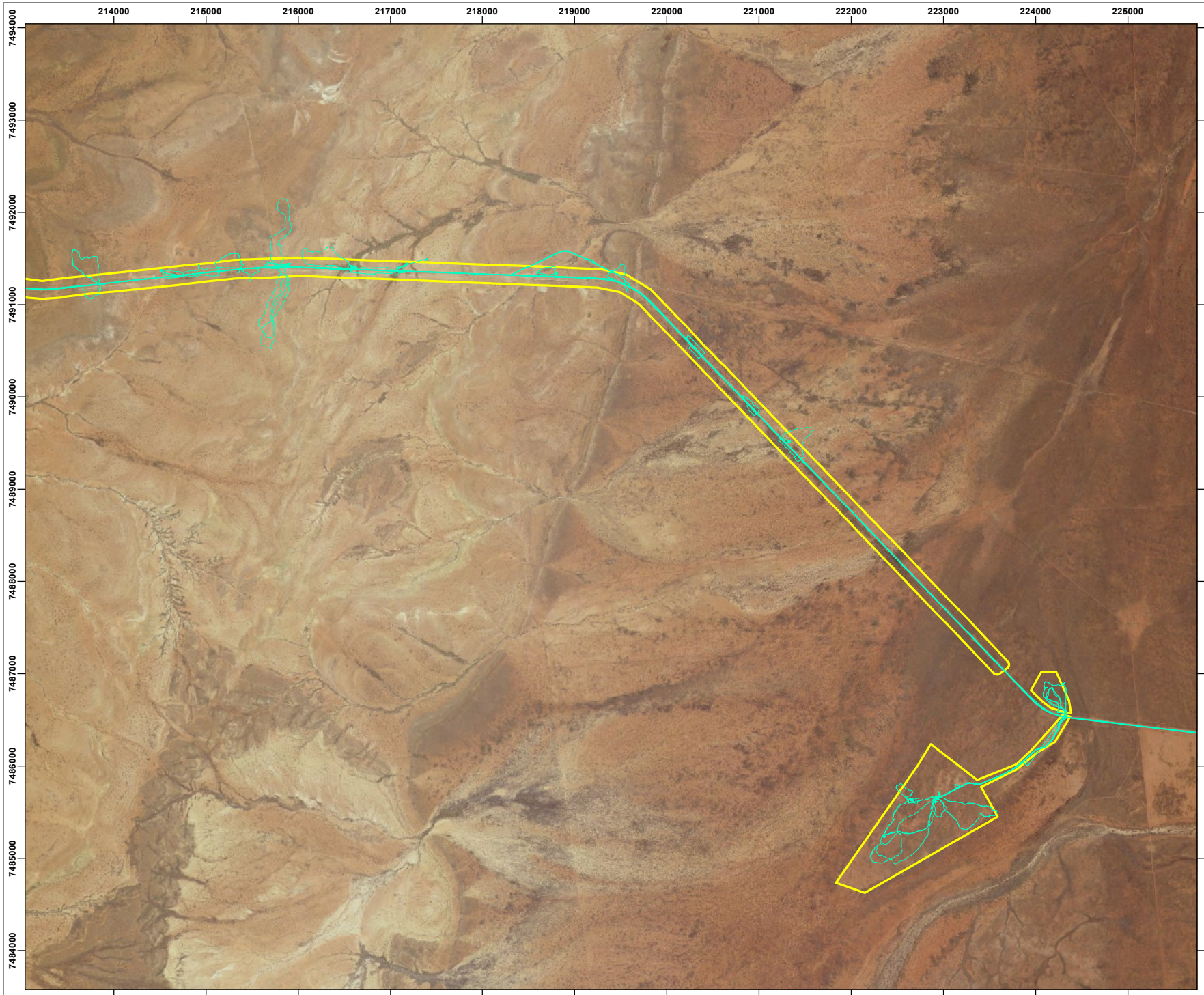
CREATED	CHECKED	APPROVED	REVISION
SL	AH	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 13c
Survey Effort

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F9 Survey Effort Shark Bay.mxd



Legend

- Survey Area
- GPS Tracks

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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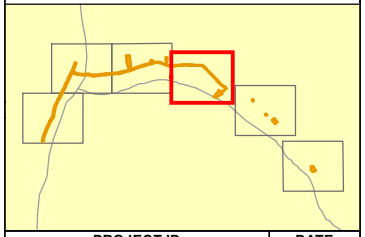
LOCALITY MAP



PROJECT ID	DATE
2891	9/10/2018

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	AH	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 13d
Survey Effort

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Legend

- Survey Area
- GPS Tracks

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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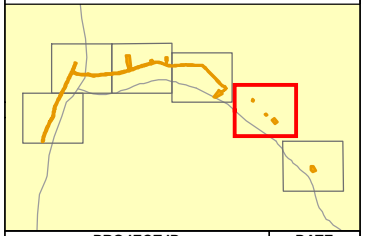

PROJECT ID	DATE
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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	AH	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 13e
Survey Effort

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Legend

- Survey Area
- GPS Tracks

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
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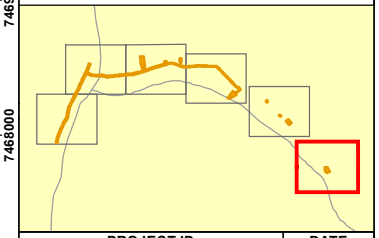
LOCALITY MAP



PROJECT ID	DATE
2891	9/10/2018

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	AH	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 13f
Survey Effort

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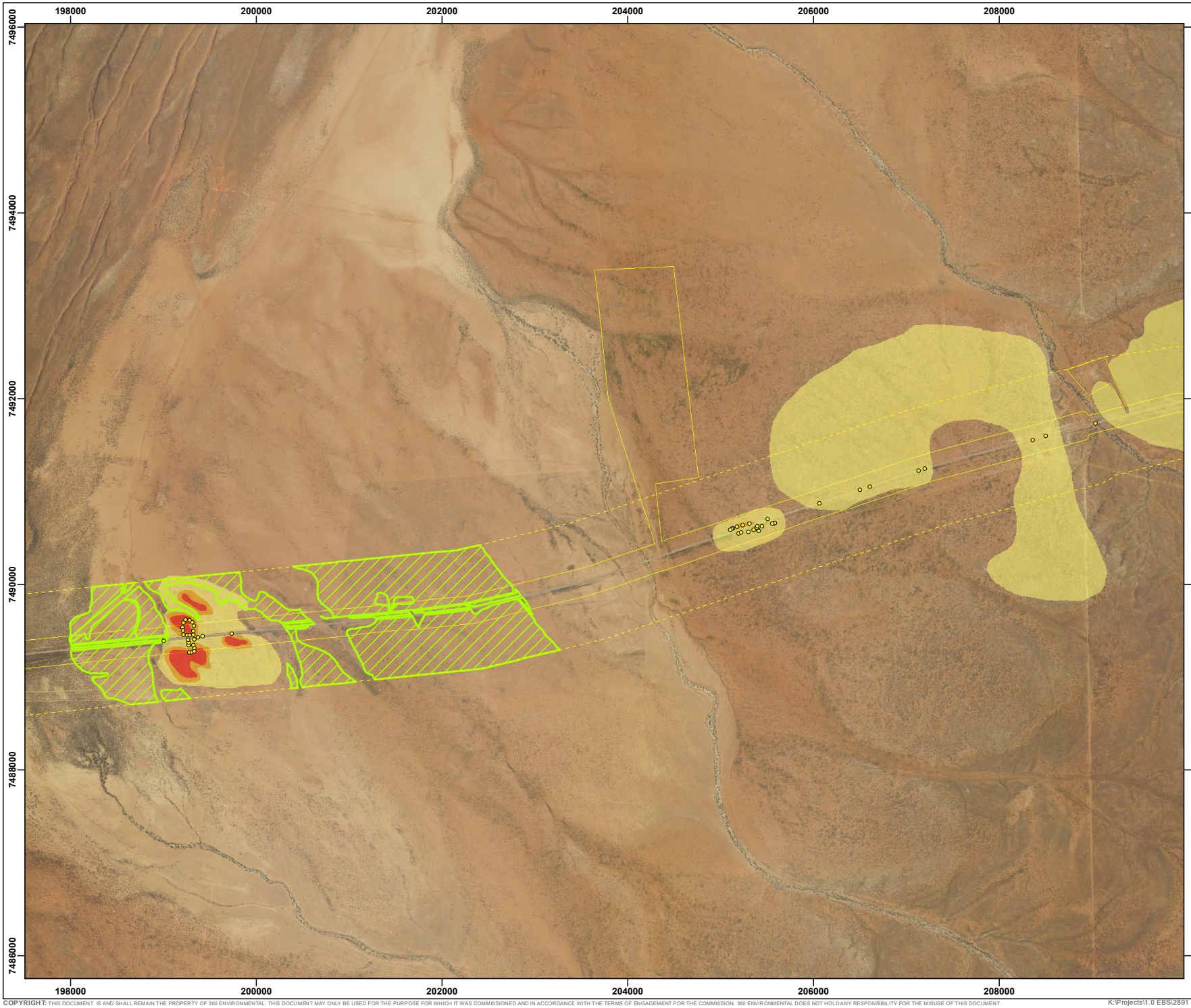

Legend

- Survey Area
- Survey Area 500m buffer
- *Acacia startii* (Priority 3) Recorded Locations
- *Sclerolaena stylosa* (Priority 1) Extrapolated Population
- *Acacia startii* (Priority 3) Extrapolated Population Extent and Density
  - High (>20 per 50x50m area)
  - Medium (5-20 per 50x50m area)
  - Low (< 5 per 50x50m area)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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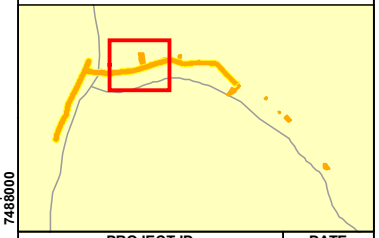

PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 14a Priority Flora Locations

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F13 Priority Flora Locations.mxd

Legend

- Survey Area
- Survey Area 500m buffer
- *Acacia startii* (Priority 3) Recorded Locations
- *Sclerolaena stylosa* (Priority 1) Recorded Locations
- Sclerolaena stylosa (Priority 1) Extrapolated Population

Acacia startii (Priority 3) Extrapolated Population Extent and Density

- High (>20 per 50x50m area)
- Medium (5-20 per 50x50m area)
- Low (<5 per 50x50m area)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
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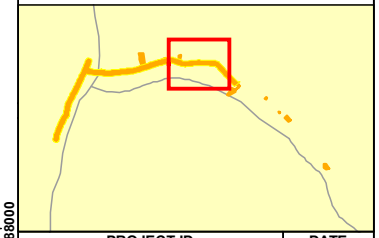
LOCALITY MAP



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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 14b
Priority Flora Locations

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F13 Priority Flora Locations.mxd

Legend

- Survey Area
- Survey Area 500m buffer
- Flora Quadrat Locations

Vegtation Types

- CcVfTe
- McTdTe
- Previous Disturbance / Regrowth
- Road/Shoulder

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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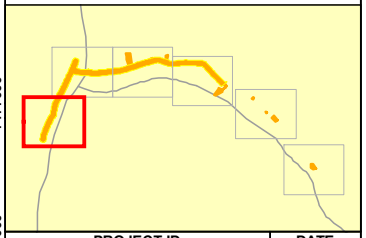
LOCALITY MAP



PROJECT ID	DATE
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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

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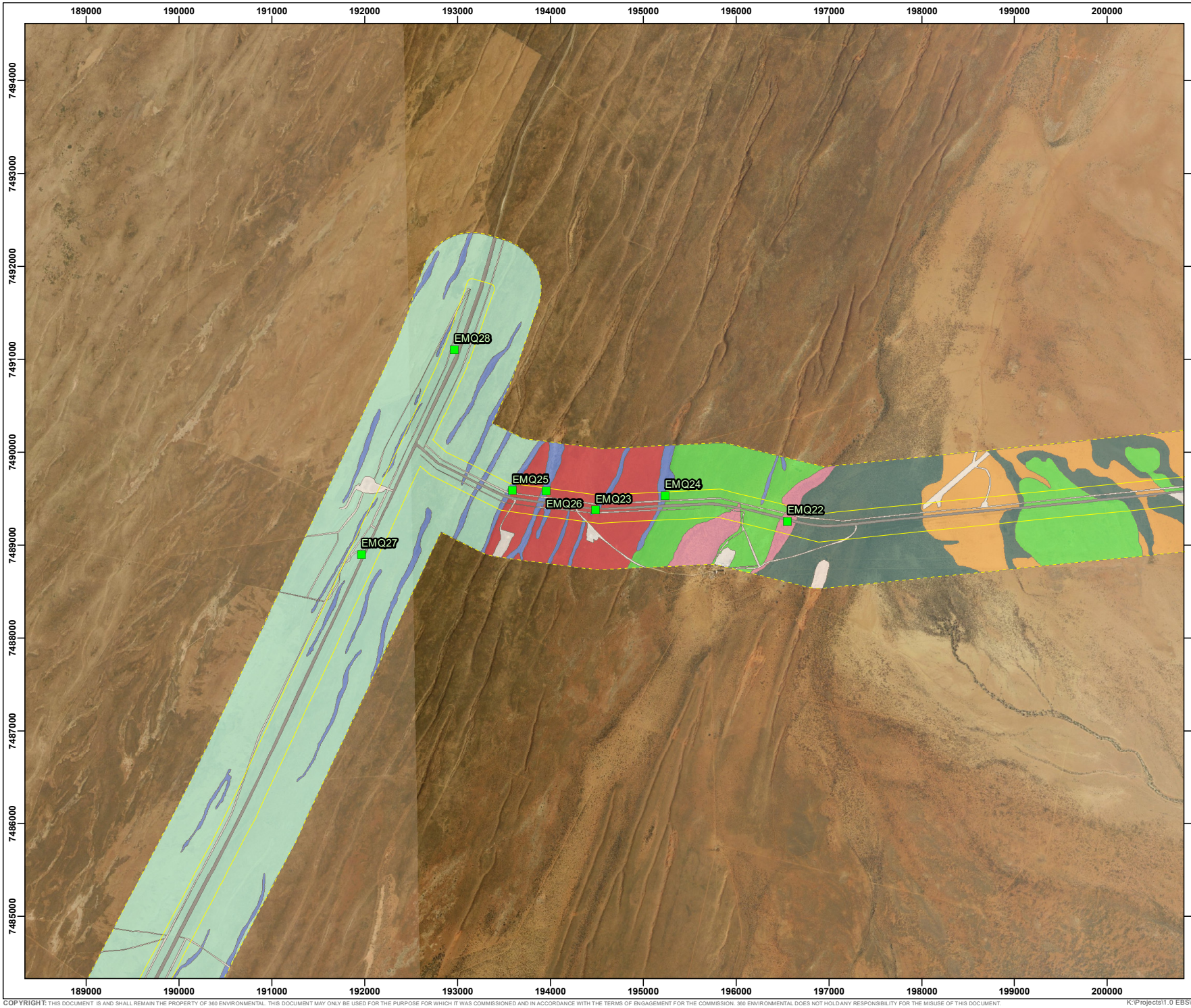
Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 15a Vegetation Types and Quadrat Locations

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F12 Vegetation Types.mxd



Legend

- Survey Area
- Survey Area 500m buffer
- Flora Quadrat Locations

Vegtation Types

- AbAtTg
- AbAtTg/ McTdTe mosaic
- AcMpSs
- AxAcCc
- CcVfTe
- EvAcAt
- McTdTe
- Previous Disturbance / Regrowth
- Road/Shoulder

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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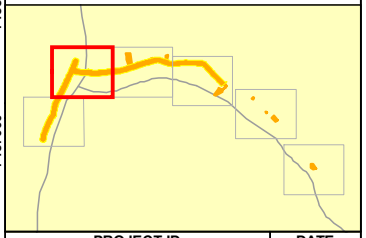
LOCALITY MAP



PROJECT ID	DATE
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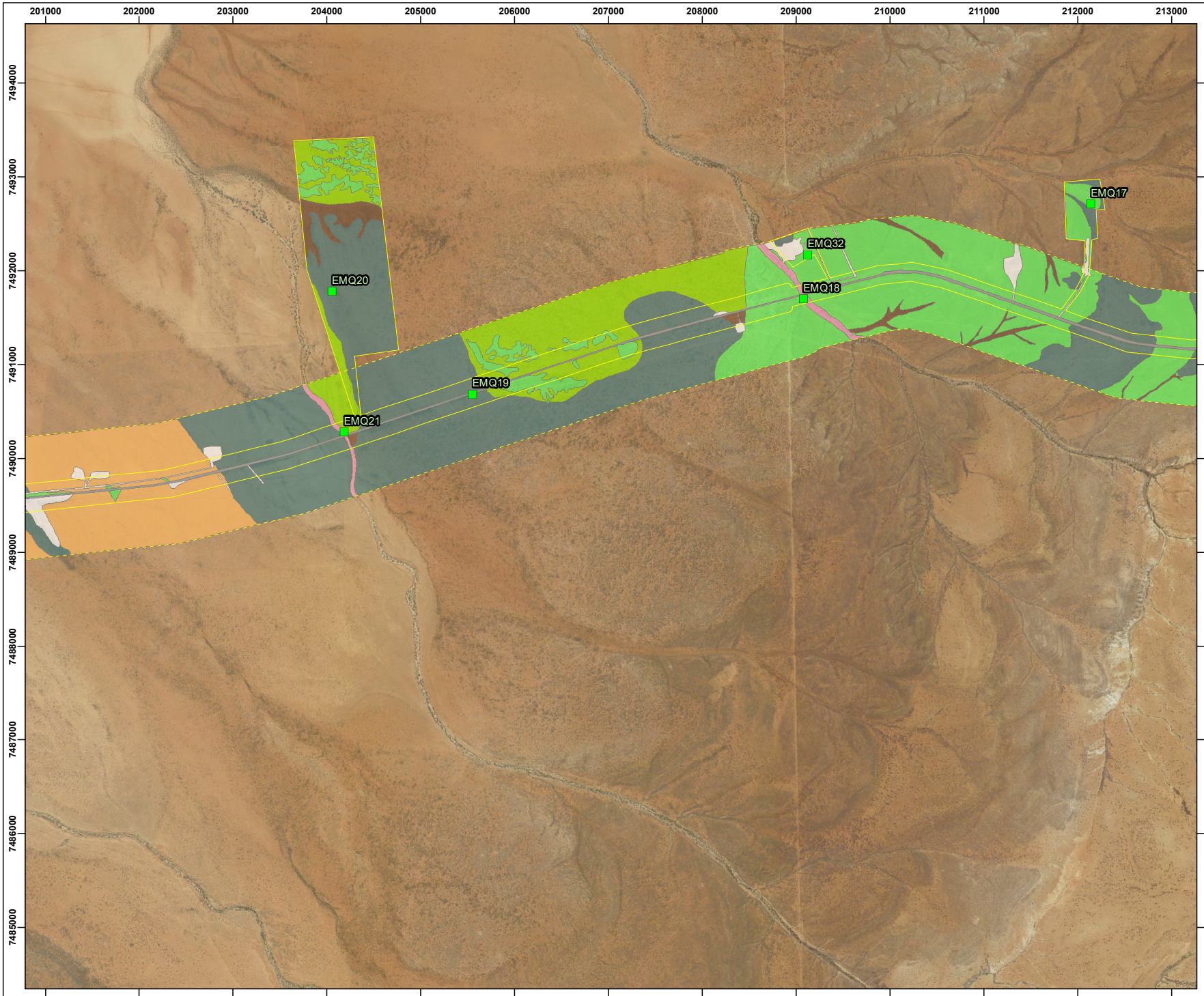
HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 15b Vegetation Types and Quadrat Locations



Legend

- Survey Area
- Survey Area 500m buffer
- Flora Quadrat Locations

Vegtation Types

- AbAtTg
- AbAtTg/ AxAcCc mosaic
- AcMpSs
- AcVfCc
- AxAcCc
- EvAcAt
- Previous Disturbance / Regrowth
- Road/Shoulder

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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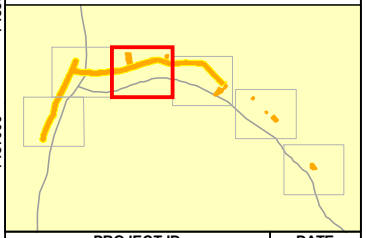
LOCALITY MAP



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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

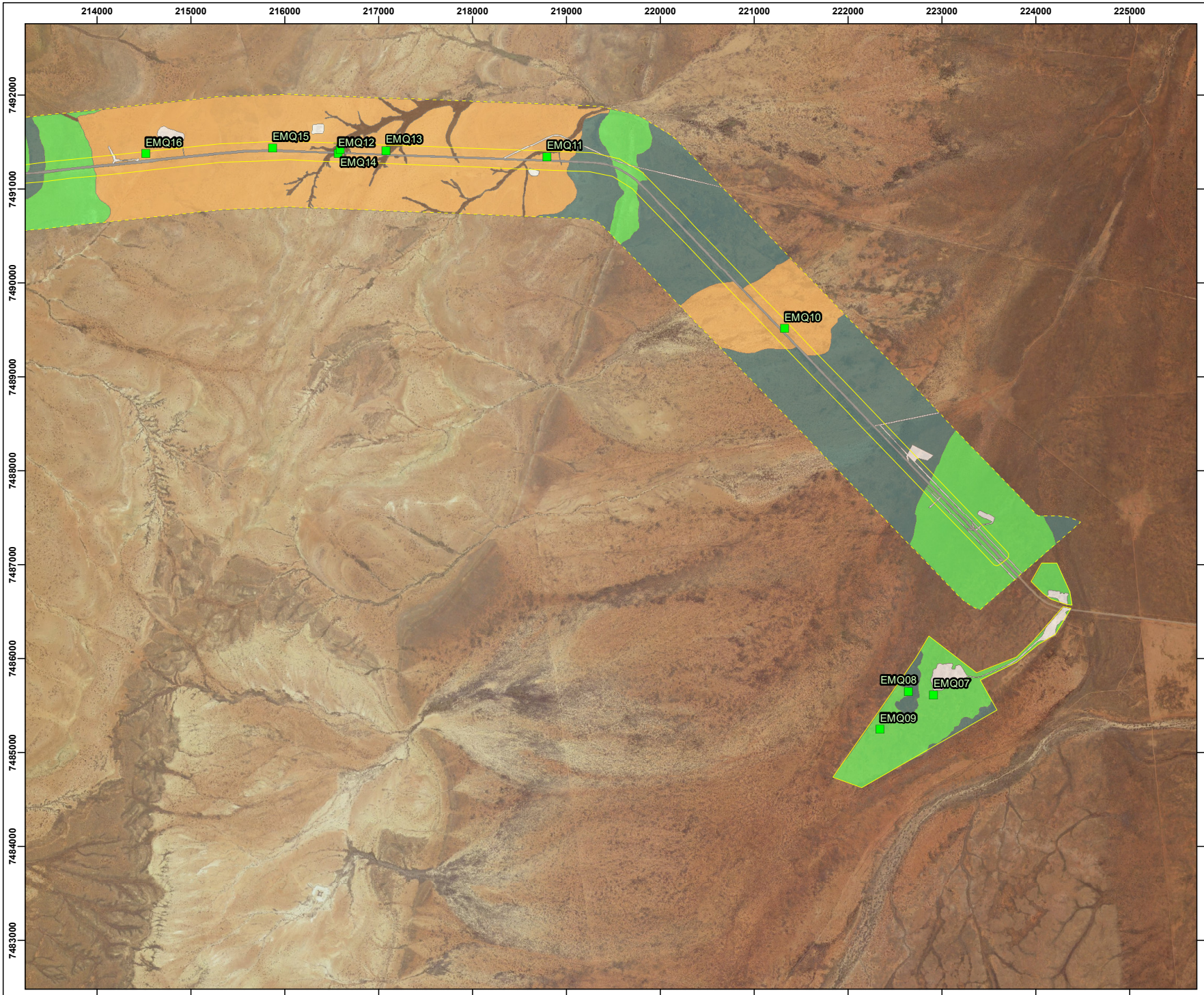
CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 15c Vegetation Types and Quadrat Locations

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F12 Vegetation Types.mxd



Legend

- Survey Area
- Survey Area 500m buffer
- Flora Quadrat Locations

Vegtation Types

- AbAtTg
- AcMpSs
- AcVfCc
- AxAcCc
- Previous Disturbance / Regrowth
- Road/Shoulder

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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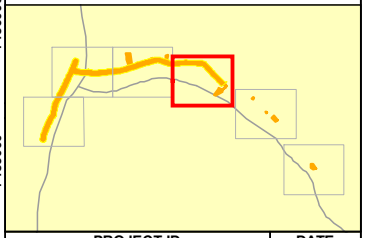
LOCALITY MAP



PROJECT ID	DATE
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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

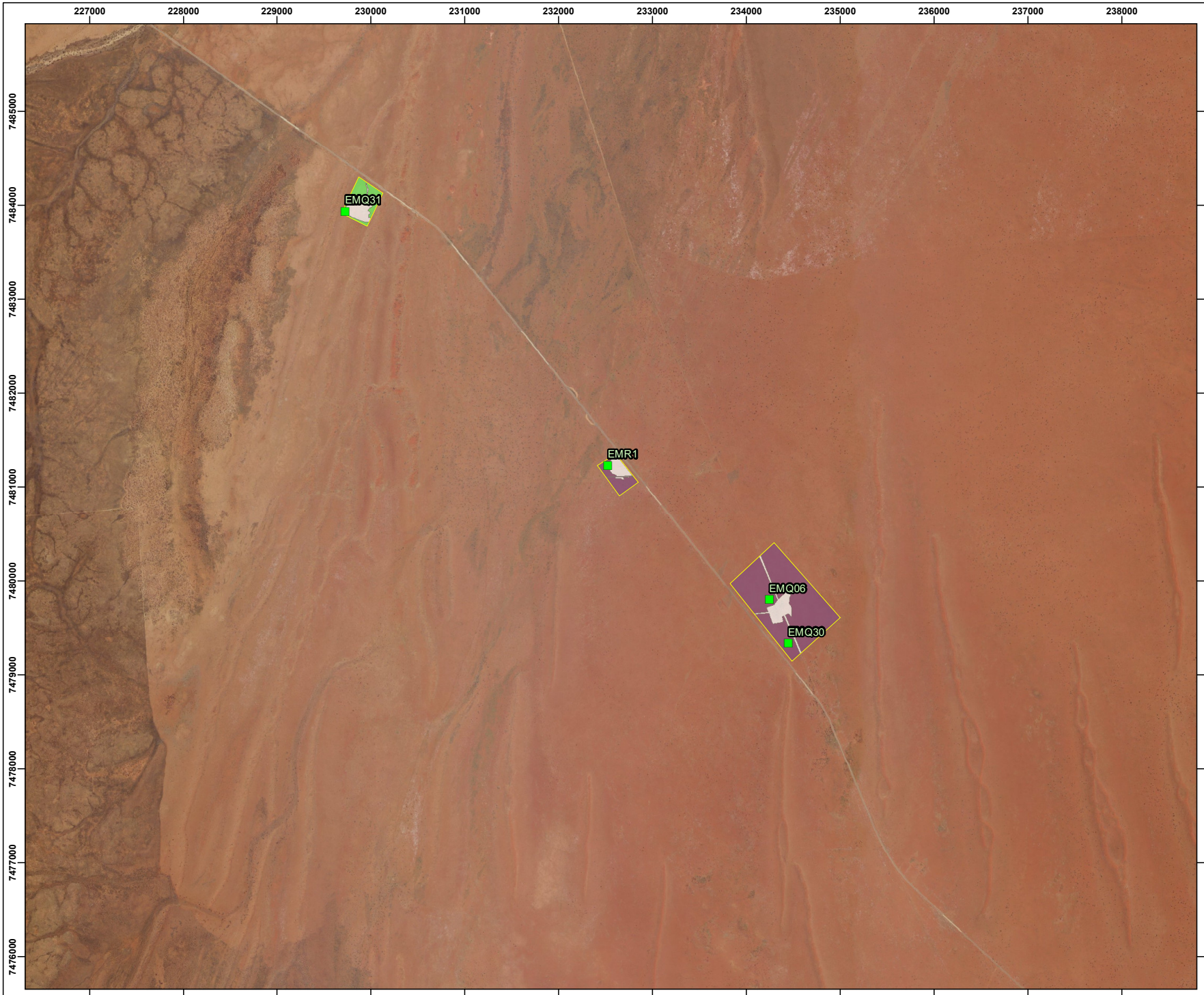
CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 15d Vegetation Types and Quadrat Locations

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F12 Vegetation Types.mxd



Legend

- Survey Area
- Flora Quadrat Locations

Vegtation Types

- AbAtTg
- AiHlTg
- Previous Disturbance / Regrowth
- Road/Shoulder

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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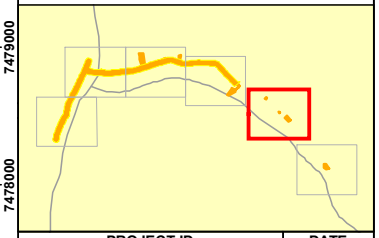
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 15e Vegetation Types and Quadrat Locations

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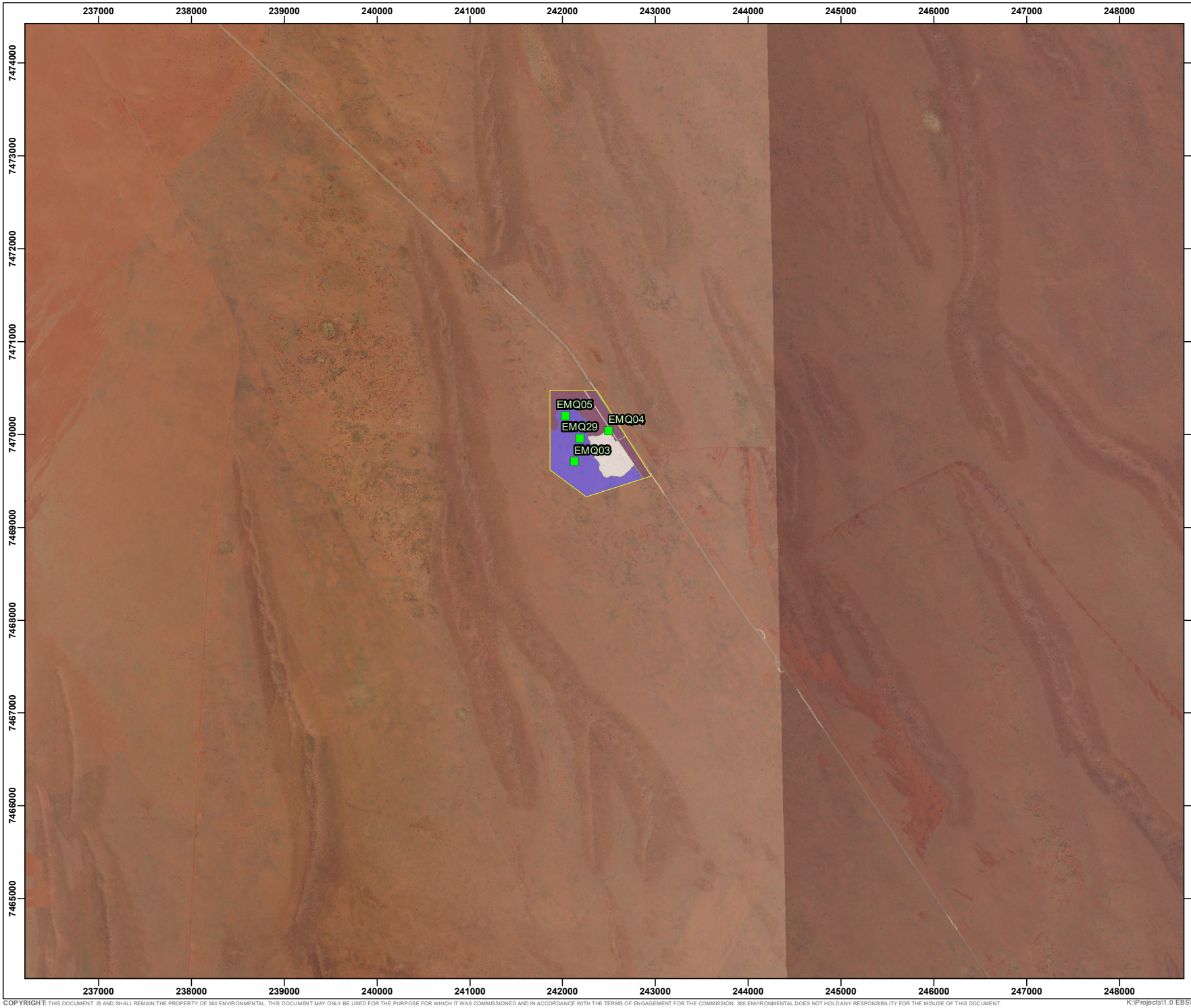

Legend

- Survey Area
- Flora Quadrat Locations

Vegtation Types

- AaSaTg
- AiHlTg
- Previous Disturbance / Regrowth
- Road/Shoulder

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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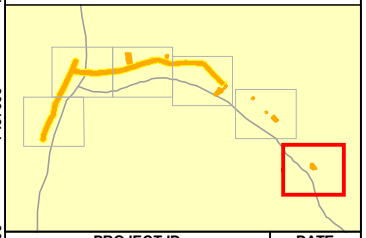
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 15f Vegetation Types and Quadrat Locations

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Legend

- Survey Area
- Survey Area 500m buffer
- **Vachellia farnesiana*

Vegetation Condition

- Very Good
- Degraded
- Cleared

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
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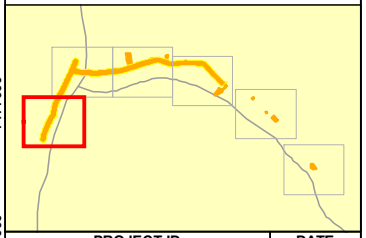
LOCALITY MAP



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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
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Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 16a Vegetation Condition and Weed Locations

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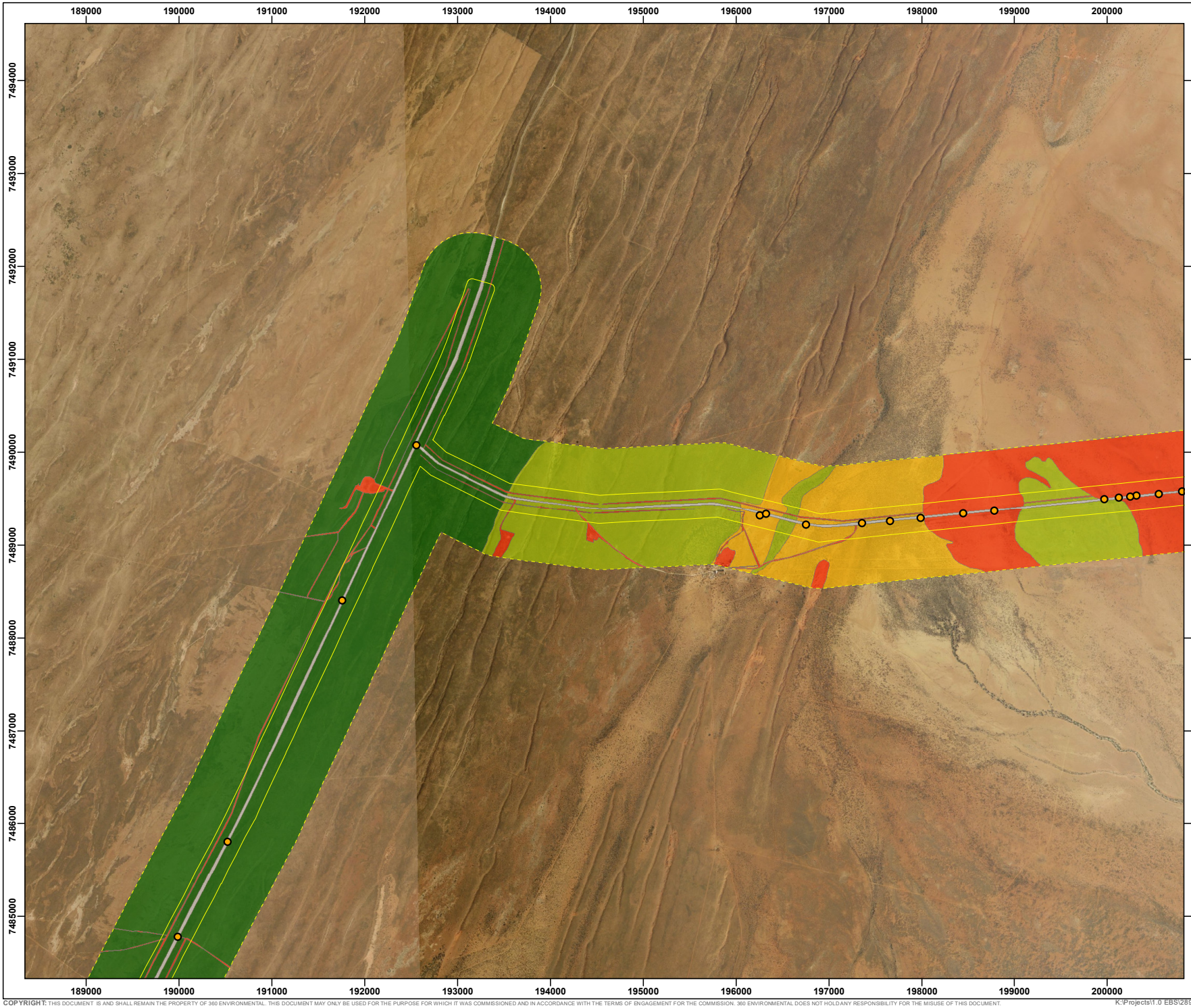

Legend

- Survey Area
- Survey Area 500m buffer
- **Vachellia farnesiana*

Vegetation Condition

- Very Good
- Good
- Poor
- Degraded
- Cleared

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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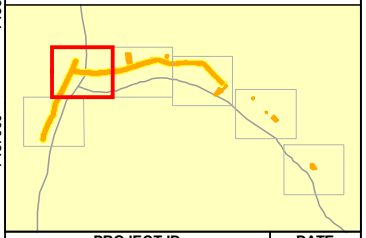
LOCALITY MAP



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HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

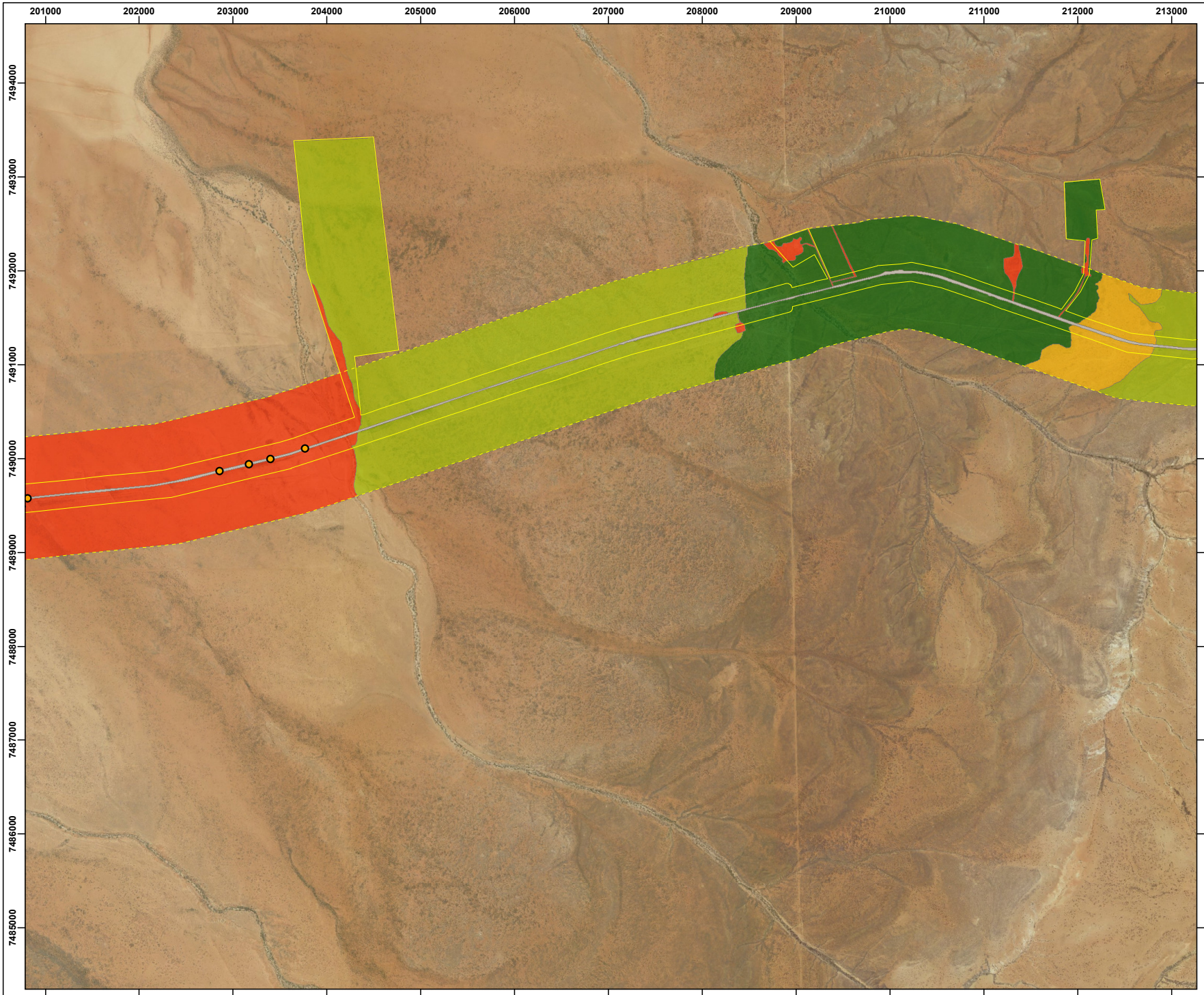
CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 16b Vegetation Condition and Weed Locations

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F14 Vegetation Condition.mxd



Legend

- Survey Area
- Survey Area 500m buffer
- **Vachellia farnesiana*

Vegetation Condition

- Very Good
- Good
- Poor
- Degraded
- Cleared

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
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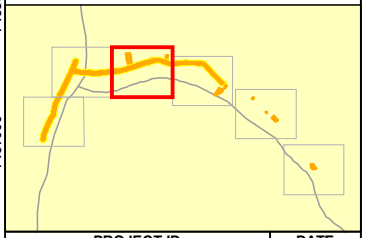

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GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
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Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 16c Vegetation Condition and Weed Locations

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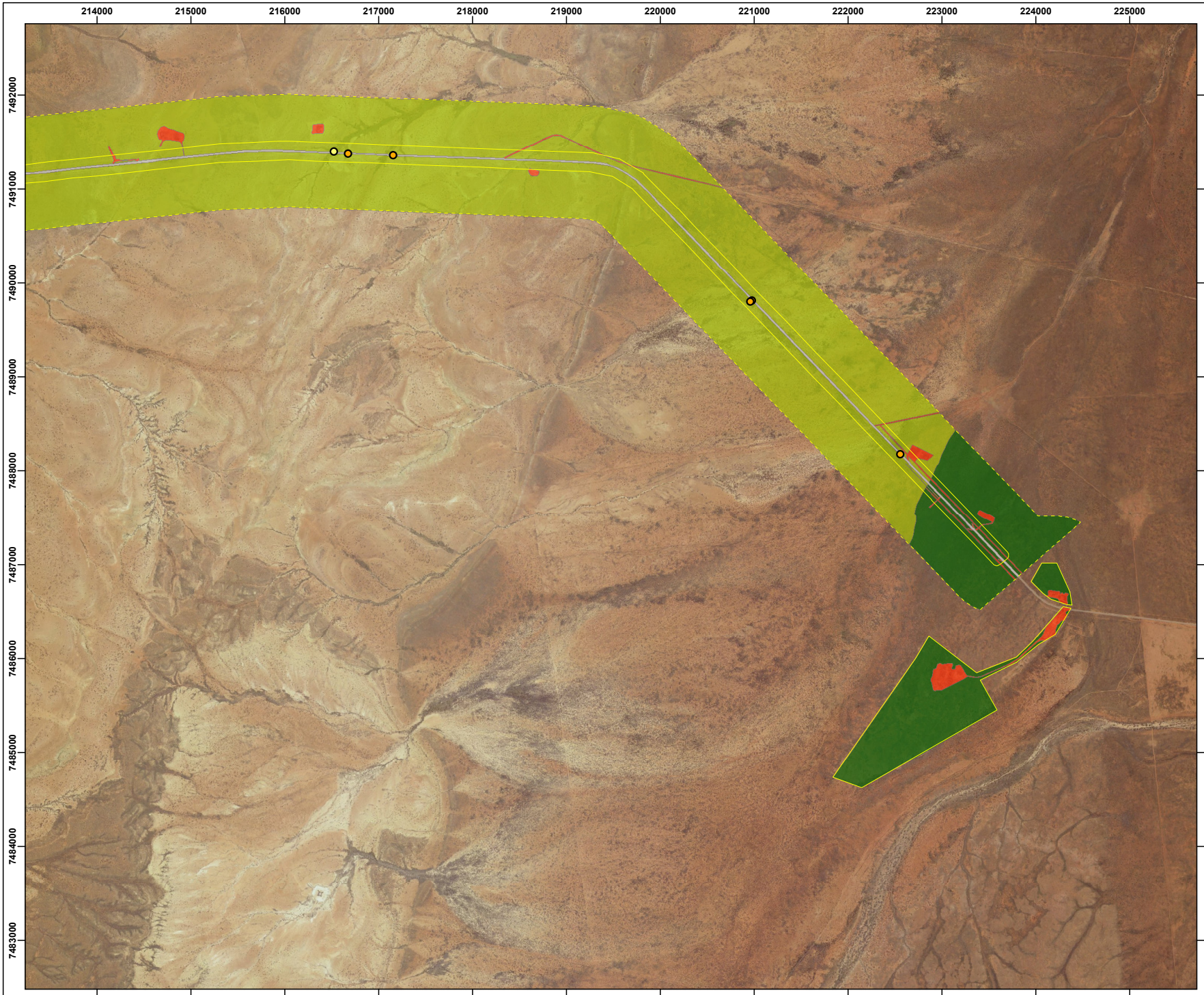

Legend

- Survey Area
- Survey Area 500m buffer
- *Argemone ochroleuca*
- *Vachellia farnesiana*

Vegetation Condition

- Very Good
- Good
- Degraded
- Cleared

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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Meters

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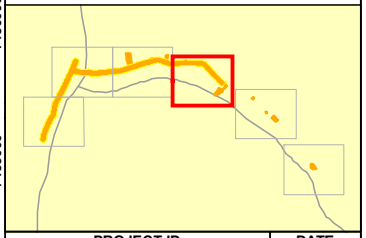
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 16d Vegetation Condition and Weed Locations

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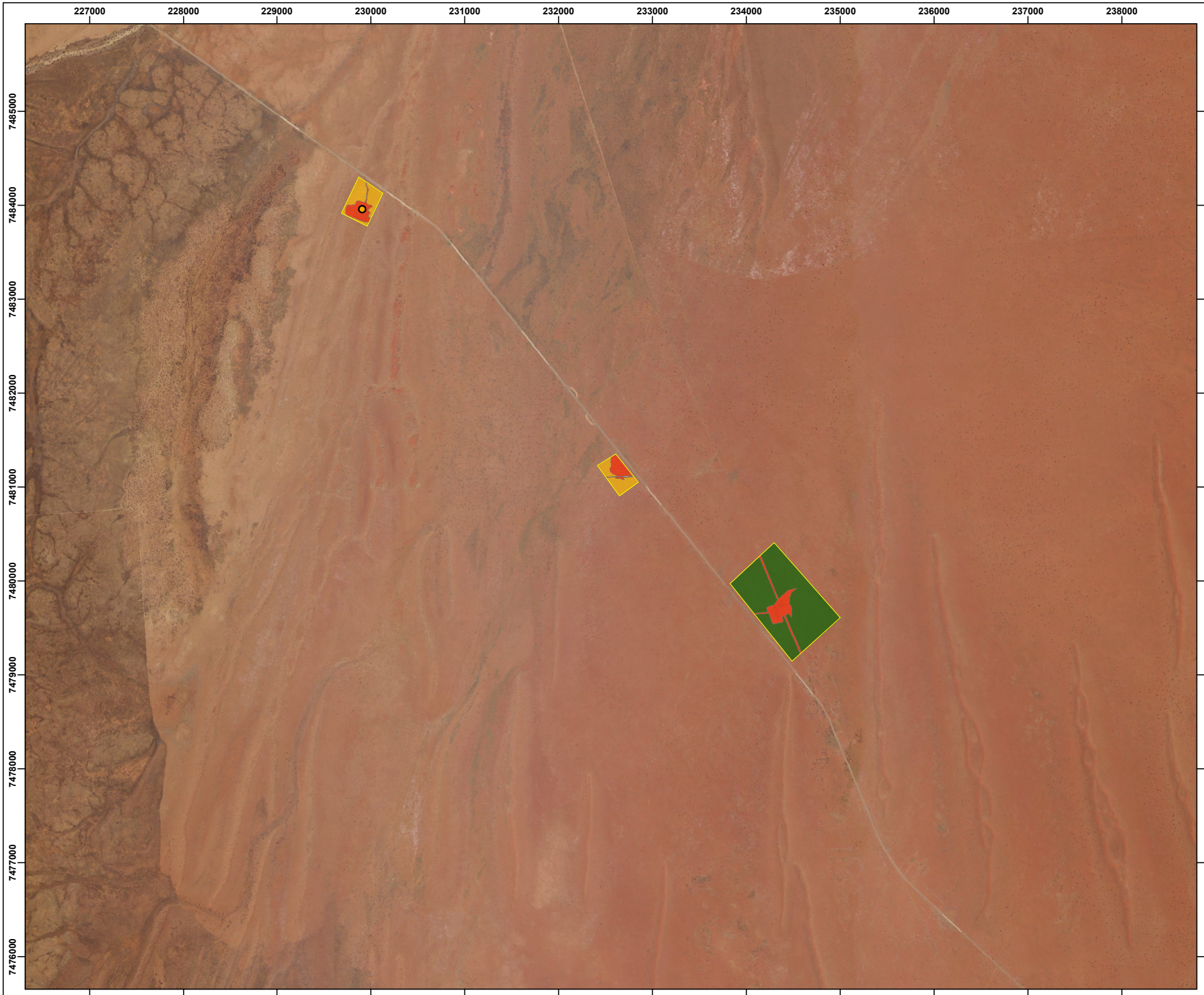

Legend

- Survey Area
- *Vachellia farnesiana*

Vegetation Condition

- Very Good
- Poor
- Degraded
- Cleared

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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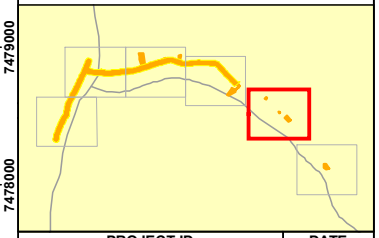
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 16e Vegetation Condition and Weed Locations

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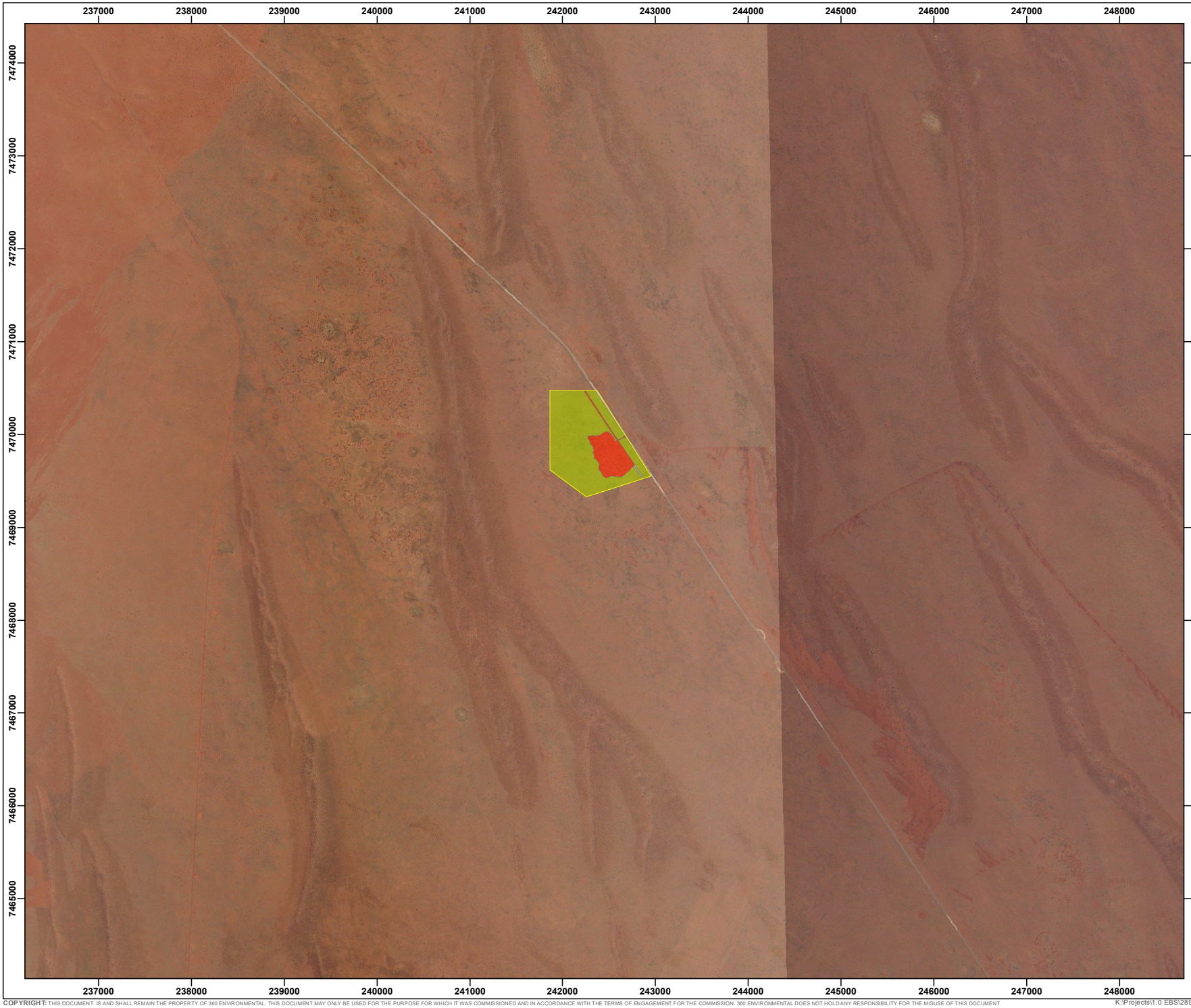

Legend

Survey Area

Vegetation Condition

- Good
- Degraded
- Cleared

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
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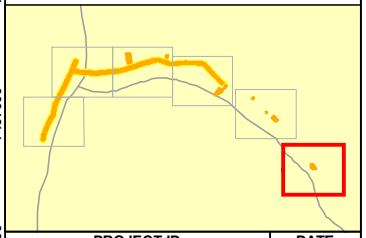
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	0

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 16f Vegetation Condition and Weed Locations

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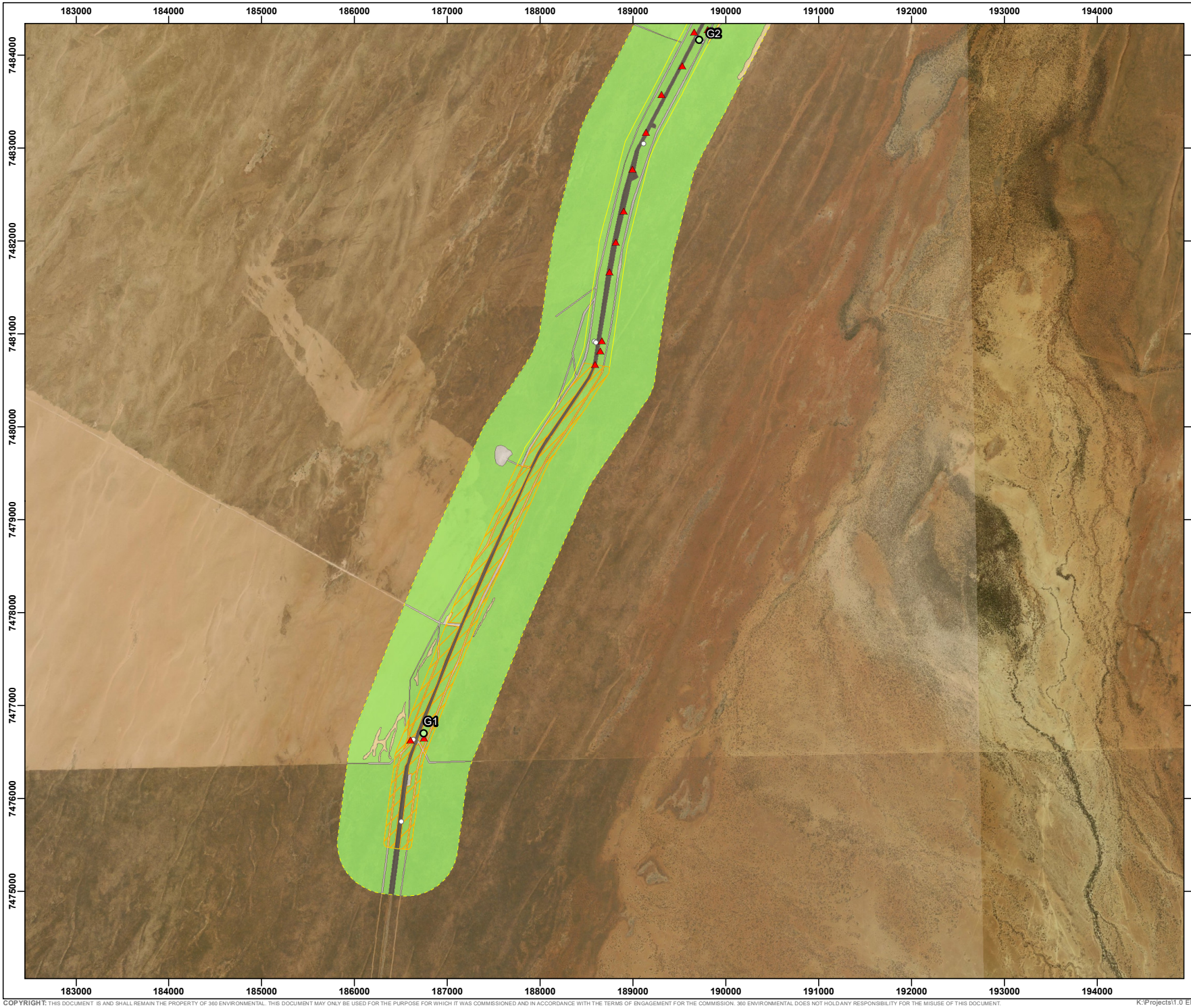

Legend

- Survey Area
- Survey Area 500m buffer
- Fauna recorded during survey

Fauna Habitat

- Dune
- *Triodia* Grassland
- Previous Disturbance / Regrowth
- Road/Shoulder
- Termite Mound Records
- High Density Termite Mound

Fauna Habitat Assessment Locations

- Grassland with low Shrubs (G)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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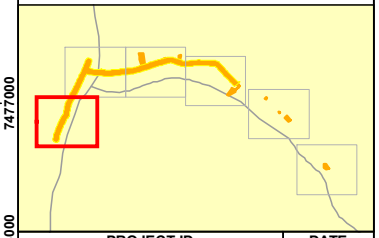
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	2

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 17a Fauna Habitat

K:\Projects\1.0 EBS\2891 Minilya Exmouth Biological Survey 2018\2891 F16 Fauna Habitat.mxd

Legend

- Survey Area
- Survey Area 500m buffer
- Fauna recorded during survey

Fauna Habitat

- *Acacia* Shrubland
- Dune
- Major Drainage
- *Triodia* Grassland
- Previous Disturbance / Regrowth
- Road/Shoulder
- Termite Mound Records

Fauna Habitat Assessment Locations

- *Acacia* Shrubland (AS)
- Dune (D)
- Grassland with low Shrubs (G)
- Major Drainage (Major D)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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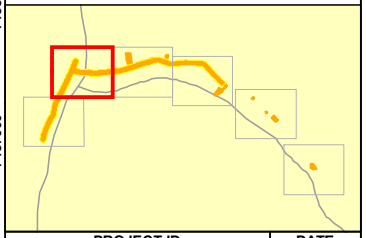
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

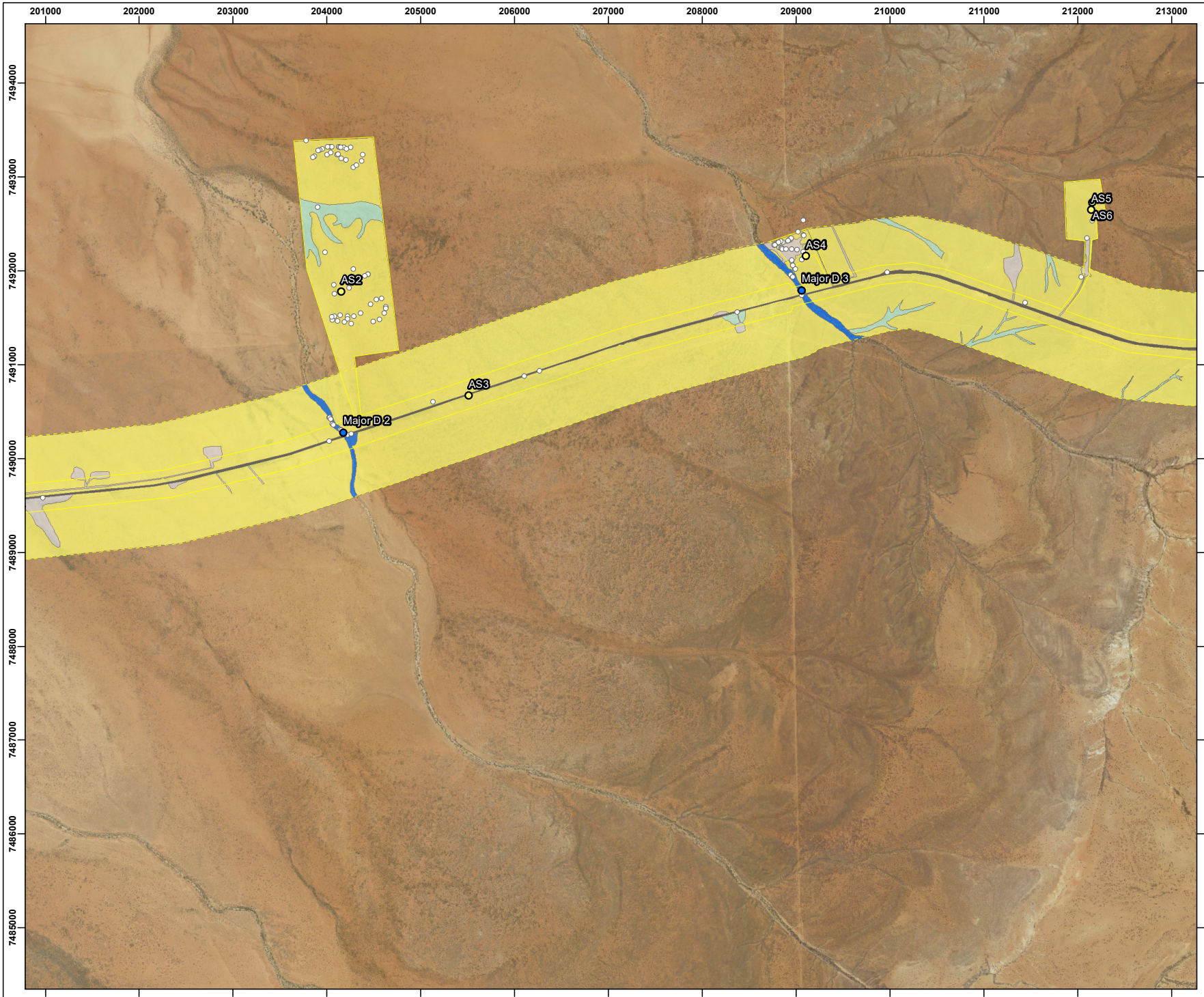
HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	2

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 17b Fauna Habitat



Legend

- Survey Area
- Survey Area 500m buffer
- Fauna recorded during survey

Fauna Habitat

- *Acacia* Shrubland
- Major Drainage
- Minor Drainage
- Previous Disturbance / Regrowth
- Road/Shoulder

Fauna Habitat Assessment Locations

- *Acacia* Shrubland (AS)
- Major Drainage (Major D)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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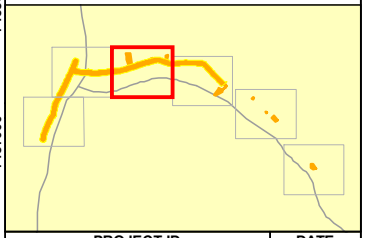
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	2

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 17c Fauna Habitat

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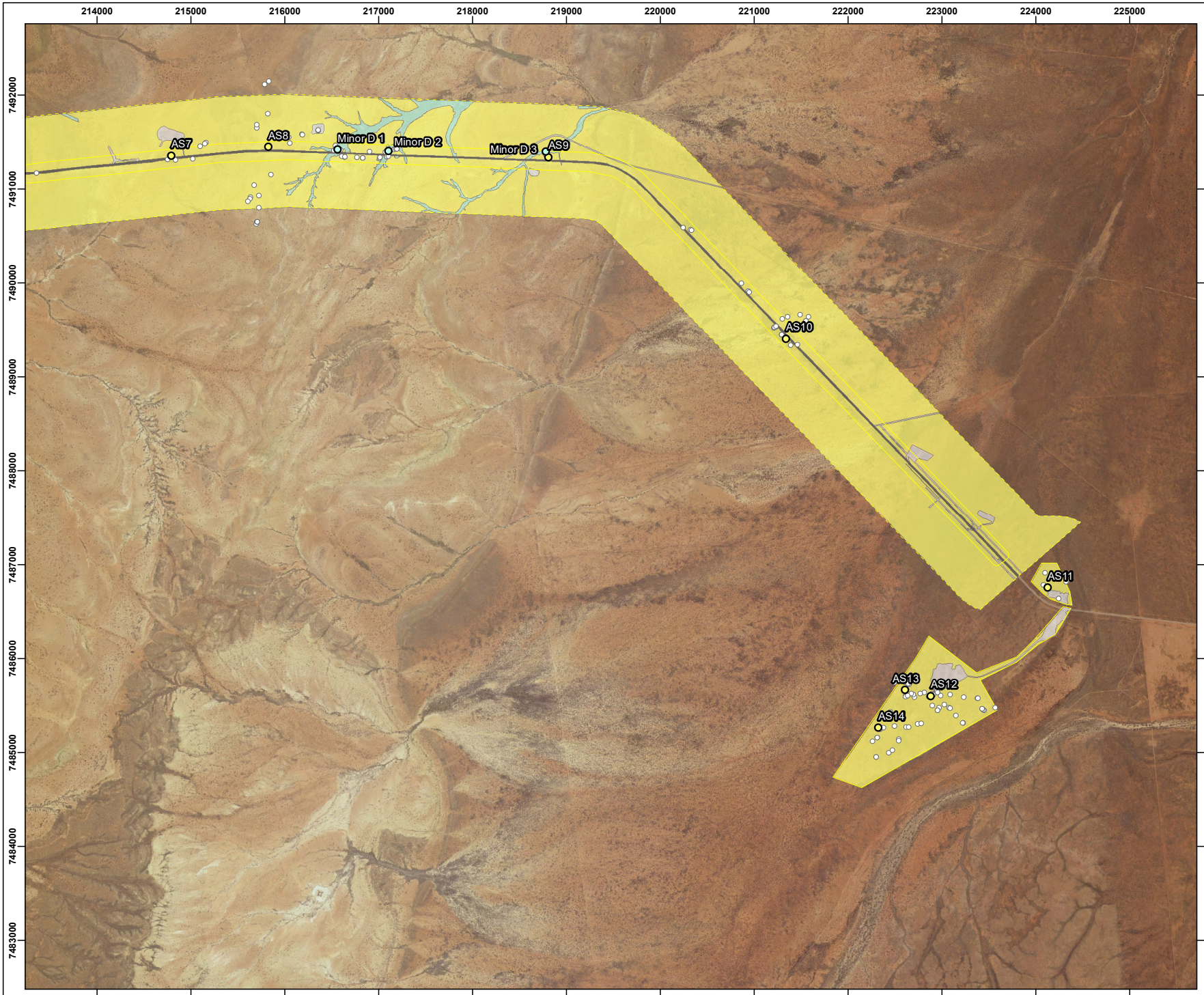

Legend

- Survey Area
- Survey Area 500m buffer
- Fauna recorded during survey

Fauna Habitat

- *Acacia* Shrubland
- Minor Drainage
- Previous Disturbance / Regrowth
- Road/Shoulder

Fauna Habitat Assessment Locations

- *Acacia* Shrubland (AS)
- Minor Drainage (Minor D)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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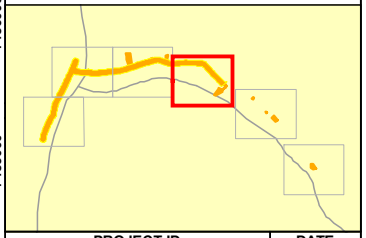
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	2

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 17d Fauna Habitat

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Legend

- Survey Area
- Fauna recorded during survey

Fauna Habitat

- *Acacia* Shrubland
- Previous Disturbance / Regrowth
- Road/Shoulder

Fauna Habitat Assessment Locations

- *Acacia* Shrubland (AS)
- Previous Disturbance Revegetation (PDR)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
- LOCALITY MAP SOURCED LANDGATE 2017
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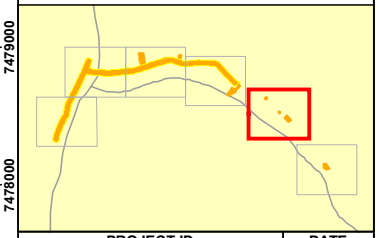
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	2

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 17e Fauna Habitat

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Legend

Survey Area

Fauna recorded during survey

Fauna Habitat

Acacia Shrubland

Previous Disturbance / Regrowth

Road/Shoulder

Fauna Habitat Assessment Locations

Acacia Shrubland (AS)

- NOTE THAT POSITION ERRORS CAN BE >5M IN SOME AREAS
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- AERIAL PHOTOGRAPHY SOURCED LANDGATE 2017
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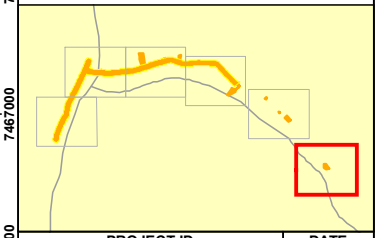
LOCALITY MAP



PROJECT ID	DATE
2891	21/02/2019

HORIZONTAL DATUM AND PROJECTION
GDA 1994 MGA Zone 50

CREATED	CHECKED	APPROVED	REVISION
SL	SF	SW	2

Main Roads WA
Minilya Exmouth and Burkett Road, Exmouth

Biological Survey

Figure 17f Fauna Habitat

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APPENDIX A

Legislative and Non-Legislative Descriptions Definition of Declared Rare/Priority/Threatened Flora and Fauna

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act aims to protect matters of national environmental significance (MNES). Under the EPBC Act, the Commonwealth Department of the Environment and Energy (DEE) lists threatened species and communities in categories determined by criteria set out in the EPBC Act.

Projects likely to cause a significant impact on MNES should be referred to the DEE for assessment under the EPBC Act.

Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* replaces the *Wildlife Conservation Act 1950* and the *Sandalwood Act 1929*. The BC Act aims to conserve and protect biodiversity and biodiversity components within the State and to promote ecologically sustainable use of biodiversity components in the State. The Act covers important biodiversity conservation matters not previously recognised in the WC Act, including threatened ecological communities, threatening processes, critical habitats and environmental pests and weeds. The Act also provides incentives for private and community conservation initiatives through new biodiversity conservation agreements and biodiversity conservation covenants. In addition, the Act provides for new public and landholder consultation mechanisms previously absent from the WC Act.

Environmental Protection Act 1986

Declared Rare Flora (DRF) and Threatened Ecological Communities (TECs) are given special consideration in environmental impact assessments and have special status as Environmentally Sensitive Areas (ESAs) under the EP Act and the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*. Exemptions for a clearing permit do not apply in an ESA. In addition, habitat necessary for the maintenance of indigenous fauna is considered in the clearing principles and assessed during consideration of applications for a clearing permit.

Biosecurity and Agricultural Management Act 2007

Plants may be 'Declared' by the Minister for Agriculture and Food under the BAM Act. The Western Australian Organism List contains information on the area(s) in which a plant is declared and the control and keeping categories to which, it has been assigned in Western Australia. Details of the definitions of these categories are provided in Appendix C. A declaration may apply to the whole State, to districts, individual properties or even to single paddocks. If a plant is 'Declared', landholders are obliged to control that plant on their properties (DPRID, 2018).

Weeds of National Significance

The Australian Government, along with the State and Territory Governments, has endorsed 32 Weeds of National Significance (WoNS). Four major criteria were used in determining WoNS:

- The invasiveness of a weed species;
- A weed's impact(s);
- The potential for spread of a weed; and
- Socio-economic and environmental values.

Each WONS has a national strategy and a national coordinator responsible for implementing the strategy. WoNS are regarded as priority weeds in Australia because of their invasiveness, potential for spread and economic and environmental impacts (Thorp and Lynch 2000).

Department of Biodiversity, Conservation and Attractions Priority Lists

DBCA lists 'Priority' flora and fauna that have not been assigned statutory protection as Declared Rare or 'Scheduled' under the BC Act and are under consideration for declaration as Threatened. Flora and fauna assessed as Priority 1-3 are considered to be in urgent need of further survey. Priority 4 flora requires monitoring every 5 -10 years and Priority 5 flora and fauna is subject to a specific conservation program.

DBCA maintains a list of Priority Ecological Communities (PECs) which identifies plant communities that require further investigation before possible nomination for TEC status. Once listed, a community becomes a PEC and, when endorsed by the WA Minister for Environment, becomes a TEC and protected as an ESA under *Environmental Protection (Clearing of Native Vegetation) Regulations 2004*.

Informal Recognition of Flora and Fauna

Certain populations or communities of flora and/or fauna may be of local significance or interest because of their patterns of distribution and abundance. For example, specific locations of flora and may be locally significant because they are range extensions to the previously known distribution, or are newly discovered taxa (and have the potential to be of more than local significance). In addition, many species are in decline as a result of threatening processes (land clearing, grazing, and changed fire regimes) and relict populations of such species assume local importance for DBCA. It is not uncommon for DBCA to make comment on these species of interest.

APPENDIX B

Definition of Declared Rare / Priority / Threatened Flora Species

Categories of Threatened flora species under the EPBC Act (DEE, 1999)

CONSERVATION CODE	DESCRIPTION
Ex	**Extinct** Taxa which at a particular time if, at the time, there is no reasonable doubt that the last member of the species has died.
ExW	**Extinct in the Wild** Taxa which is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
CE	**Critically Endangered** Taxa which at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
E	**Endangered** Taxa which is not critically endangered and it is facing a very high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
V	**Vulnerable** Taxa which is not critically endangered or endangered and is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
CD	**Conservation Dependent** Taxa which at a particular time if, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years.

Categories of Declared Rare Flora (BC Act) and DBCA Priority flora rankings (DBCA, 2019a)

Conservation Code	Description
X	**Presumed Extinct Flora (Declared Rare Flora – Extinct)** "Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 under the *Wildlife Conservation Act 1950*)."
T	**Threatened Flora (Declared Rare Flora – Extant)** "Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 under the *Wildlife Conservation Act 1950*)." "Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria: CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild; EN: Endangered – considered to be facing a very high risk of extinction in the wild; VU: Vulnerable – considered to be facing a high risk of extinction in the wild."
P1	**Priority One: Poorly-known taxa** "Taxa which are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes."
P2	**Priority Two: Poorly-known taxa** "Taxa which are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown Land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes."

CONSERVATION CODE	DESCRIPTION
P3	**Priority Three: Poorly-known taxa** "Taxa which are known from collections or sight records from several localities not under imminent threat, or few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them."
P4	**Priority Four: Rare, Near Threatened and other taxa in need of monitoring** a. Rare. "Taxa which 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 taxa are usually represented on conservation lands." b. Near Threatened. "Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable." c. "Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy."
P5	**Priority Five: Conservation Dependent taxa** "Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years."

Source: Department of Parks and Wildlife (2013). Online: http://florabase.dpaw.wa.gov.au.

APPENDIX C

Conservation Categories of Threatened or Priority Ecological Communities

Definitions of Threatened Ecological Communities as Endorsed by the Western Australian Minister for the Environment (DEC, 2013)

PRESUMED TOTALLY DESTROYED (PD)
An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies (A or B); A) Records within the last 50 years have not been confirmed despite thorough searches or known or likely habitats or B) All occurrences recorded within the last 50 years have since been destroyed.
CRITICALLY ENDANGERED (CR)
An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and either or both of the following apply (i or ii) i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 5 years) ii) modification throughout its range is continuing such that in the immediate future (within approximately 5 years) the community is unlikely to be capable of being substantially rehabilitated. B) Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 5 years) ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the immediate future (within approximately 5 years)

ENDANGERED (EN)
An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 70% and either or both of the following apply (i or ii) i) geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term (within approximately 10 years) ii) modification throughout its range is continuing such that in the short term future (within approximately 10 years) the community is unlikely to be capable of being substantially restored or rehabilitated. B) Current distribution is limited, and one or more of the following apply (i, ii or iii): i) geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 10 years) ii) there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes iii) there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the short term future (within approximately 10 years).
VULNERABLE (VU)
An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction in the medium to long term future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The ecological community exists largely as modified occurrences which are likely to be capable of being substantially restored or rehabilitated. B) The ecological community can be modified or destroyed and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. C) The ecological community may still be widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.

Definitions of Priority Ecological Communities as listed DBCA (DBCA, 2013)

Possible threatened ecological communities that do not meet survey criteria or that are not adequately defined are added to the Priority Ecological Community Lists under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as threatened ecological communities. Ecological Communities that are adequately known, and are rare but not threatened or meet criteria for Near Threatened, or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5.

PRIORITY ONE: POORLY KNOWN ECOLOGICAL COMMUNITIES
Ecological communities with apparently few, small occurrences, all or most not actively managed for conservation (e.g. within agricultural or pastoral lands, urban areas, active mineral leases) and for which current threats exist. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under immediate threat from known threatening processes across their range.
PRIORITY TWO: POORLY KNOWN ECOLOGICAL COMMUNITIES
Communities that are known from few small occurrences, all or most of which are actively managed for conservation (e.g. within national parks, conservation parks, nature reserves, State forest, unallocated Crown land, water reserves, etc.) and not under imminent threat of destruction or degradation. Communities may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements, and/or are not well defined, and appear to be under threat from known threatening processes.
PRIORITY THREE: POORLY KNOWN ECOLOGICAL COMMUNITIES
(i) Communities that are known from several to many occurrences, a significant number or area of which are not under threat of habitat destruction or degradation or: (ii) Communities known from a few widespread occurrences, which are either large or within significant remaining areas of habitat in which other occurrences may occur, much of it not under imminent threat, or; (iii) Communities made up of large, and/or widespread occurrences, that may or not be represented in the reserve system, but are under threat of modification across much of their range from processes such as grazing by domestic and/or feral stock, and inappropriate fire regimes. Communities may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and/or are not well defined, and known threatening processes exist that could affect them.

PRIORITY FOUR: ECOLOGICAL COMMUNITIES THAT ARE ADEQUATELY KNOWN, RARE BUT NOT THREATENED OR MEET CRITERIA FOR NEAR THREATENED OR THAT HAVE BEEN RECENTLY REMOVED FROM THE THREATENED LIST.
These communities require regular monitoring. (a) Rare. Ecological communities known from few occurrences that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These communities are usually represented on conservation lands. (b) Near Threatened. Ecological communities that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable. (c) Ecological communities that have been removed from the list of threatened communities during the past five years.
PRIORITY FIVE: CONSERVATION DEPENDENT ECOLOGICAL COMMUNITIES.
Ecological communities that are not threatened but are subject to a specific conservation program, the cessation of which would result in the community becoming threatened within five years

APPENDIX D

WoNS, Declared Plant and Environmental Weed Categories

To help focus national efforts to address weed problems in Australia, a list of Weeds of National Significance (WoNS) was compiled. Plant species were selected on the basis of their invasiveness and impact characteristics, their potential and current area of spread and their primary industry, environmental and socioeconomic impacts. Thirty-two WoNS have been identified by Australian governments. In Western Australia many of these WoNS are also declared pests under the *Biosecurity and Agriculture Management Act 2007*.

To protect Western Australia's agriculture, the Department of Primary Industries and Regional Development:

- Regulates weeds under the Biosecurity and Agriculture Management Act 2007 (BAM Act);
- Provides a weed identification service; and
- Provides information on weed control, crop weeds, regulated/declared plants and herbicides.

Under the BAM Act, all declared pests are placed in one of three categories, namely C1 (exclusion), C2 (eradication) or C3 (management).

Declared pest categories under the BAM Act (DPIRD, 2018)

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

The Weed Prioritisation Process for DBCA contains criteria for the assessment and ranking of weeds in terms of their environmental impact on biodiversity (DPaW, 2013). These criteria are as follows:

- Potential Distribution – Area of potential habitat in the Region that could be occupied or the area at risk of invasion by the weed;
- Current Distribution - Area of habitat in the Region currently occupied by the weed, in relation to the habitat that it could invade;
- Ecological Impact - Impact of species within the Region, from low impact (causes minimal disruption to ecological processes or loss of biodiversity) to high (causes acute disruption of ecological processes, dominates and/or significantly alters vegetation structure, composition and function of ecosystems);
- Invasiveness – rate of spread of a weed in native vegetative, encompassing factors of establishment, reproduction and long distance dispersal (>100m); and
- Feasibility of Control - The longer a coordinated control program takes to achieve its desired goal, the more expensive and less feasible it becomes. Is it feasible to eradicate or at least contain the infestation?

Weed Prioritisation Process prioritises weeds in each DBCA region in terms of Ecological impact under each of the categories of very high (VH), high (H), medium (M), low (L) and negligible (N). Weeds are also prioritised by regions in relation to invasiveness according to the categories of slow (S), Moderate (M), Rapid (R) and Unknown (U) (DPaW, 2013).

APPENDIX E

Database Assessment Search Results

Appendix E. Database Assessment Search Results; DBCA TEC and PEC Results

OBJECTID	OCC_UNIQUE	STATUS	S_ID_COUNT	FIRST_S_ID	LAST_S_ID	BUFFER	BDY_ID	Shape_Leng	Shape_Area	COM_ID	COM_NAME	STATE_CATG	COMM_CATG
1	17149		1	YarcowieLS		35000	0	1.270736506323250	0.001249216316193	Yarcowie Land System	Yarcowie Land System	Priority 1	
1	17149		1	YarcowieLS		35000	0	2.077184979086480	0.241212224938817	Yarcowie Land System	Yarcowie Land System	Priority 1	
1	17149	Priority	1	YarcowieLS		35000	0	1.270736503810590	0.001249216297064				
1	17149	Priority	1	YarcowieLS		35000	0	2.077184978703890	0.241212224942553				
1	17149		1	YarcowieLS		35000	0	1.270736506323250	0.001249216316193	Yarcowie Land System	Yarcowie Land System	Priority 1	
1	17149		1	YarcowieLS		35000	0	2.077302711877280	0.241267058629541	Yarcowie Land System	Yarcowie Land System	Priority 1	
1	17149	Priority	1	YarcowieLS		35000	0	1.270736503810590	0.001249216297064				
1	17149	Priority	1	YarcowieLS		35000	0	2.077302712811290	0.241267058617939				

Appendix E. Database Assessment Search Results; WA Herbarium

OBJECTII	FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Latitude	Longitude	Geocode_Me	Precision	Date	Sheet_Numb
1					3							-22.666667000	114.130667	MAN	2.000000	29/08/1988	854425.00000
2					3							-22.658333000	114.163833	MAN	2.000000	29/08/1988	854433.00000
1					3							-22.783333000	114.083333	MAN	0.000000	5/08/1986	5310253.00000
2					3							-22.783333000	114.116667	MAN	0.000000	5/08/1986	5310245.00000
3					3							-22.766667000	114.133333	MAN	0.000000	5/08/1986	5310237.00000
4					4							-22.712250000	114.230778	GPS	1.000000	19/06/2004	7515529.00000
5					4							-22.712250000	114.230778	GPS	1.000000	19/06/2004	7515537.00000
6					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703643.00000
7					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703619.00000
8					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703635.00000
9					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703600.00000
10					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703627.00000
11					3							-22.683333000	114.116667	MAN	0.000000	3/08/1986	5310148.00000
12					1							-22.668920000	114.232226	GPS	1.000000	15/06/2004	7492375.00000
13					3							-22.666667000	113.900000	UNK	3.000000	17/12/1981	7890257.00000
14					3							-22.666667000	114.100000	MAN	3.000000	20/08/1983	685321.00000
15					3							-22.666667000	114.100000	MAN	3.000000	20/08/1983	189316.00000
16					3							-22.666667000	114.130667	MAN	2.000000	29/08/1988	854425.00000
17					3							-22.666667000	114.133333	MAN	0.000000	3/08/1986	5310121.00000
18					3							-22.666667000	114.133333	MAN	0.000000	3/08/1986	5310113.00000
19					3							-22.666667000	114.233333	MAN	0.000000	3/08/1986	5310083.00000
20					3							-22.666667000	114.233333	MAN	0.000000	3/08/1986	5431956.00000
21					3							-22.658333000	114.163833	MAN	2.000000	29/08/1988	854433.00000
22					3							-22.650000000	114.150000	MAN	3.000000	21/07/1984	685305.00000
23					3							-22.650000000	114.150000	MAN	3.000000	21/09/1984	685313.00000
24					3							-22.650000000	114.150000	MAN	3.000000	21/07/1984	189294.00000
25					3							-22.650000000	114.150000	MAN	3.000000	21/09/1984	189286.00000
26					3							-22.500000000	114.150000	MAN	4.000000	29/08/1988	880477.00000
27					3							-22.483333000	114.033333	MAN	3.000000	21/07/1964	195537.00000
1	4013	854425.000	13076.000	Acacia startii	3	Dense rounded shrub to 1.5 m tall; stems more or less erect, bark grey to grey-brown, smooth. Phyllodes green, 2-nerved.	In flat country on shallow pale brown loam.	With Acacia bivenosa, A. sclerosperma, A. tetragonophylla,		Abundance: occasional.	13.2 km E along Bullara - Giralia Road from Exmouth Road	-22.666667000	114.130667	MAN	2.000000	19880829000000	
2	4024	854433.000	13076.000	Acacia startii	3	Dense rounded shrub to 1.5 m tall, 2 m wide. Bark grey; branches erect. Phyllodes green or tomentose and milky-green when young. Heads lemon, racemes growing out.	On top of limestone rise 200 m W of watercourse, in pale loam.	In Acacia, Triodia scrub with A. bivenosa.		Abundance: locally common.	16.6 km E along Bullara - Giralia Road from Exmouth Road	-22.658333000	114.163833	MAN	2.000000	19880829000000	
1	4031	5310253.000	13076.000	Acacia startii	3	Spreading straggly shrub 1.8 m x 2.5 m; bark whitish grey, smooth.	On edge of alluvial flat, foot of low rise to the W, powdery clay loam.	Open scrub with A. sclerosperma, Heterodendron.			12.5 km SSE of Bullara Homestead, ca 42 km SSE of Ningaloo	-22.783333000	114.083333	MAN	0.000000	19860805000000	
2	4015	5310245.000	13076.000	Acacia startii	3	Spreading dense canopied shrub 1.5 m x 2.5 m.	Gradual slope, W aspect, powdery red brown earth and scattered limestone.	Open low scrub with Acacia bivenosa, A. sclerosperma and A. tetragonophylla.	dominant.		14.5 km SSE of Bullara Homestead, 40 km SSE of Ningaloo	-22.783333000	114.116667	MAN	0.000000	19860805000000	
3	4014	5310237.000	13076.000	Acacia startii	3	Infundibular shrub 1 m x 1.5 m; bark smooth, pink grey; phyllodes olive green.	Very gradual slope, W aspect, powdery red earth.	With Acacia tetragonophylla and A. victoriae.			4.6 km S of Cyclone Bore on Bullara Station & 12.5 km SE of Bullara Homestead, ca 50 km SSE of Learmonth	-22.766667000	114.133333	MAN	0.000000	19860805000000	
4	1966	7515529.000	16040.000	Eremophila youngii subsp. lepidota	4	Dense spreading shrub 1 - 3 m high, flowers red.	Firecracker Land System.				Bungarra Dam in Giralia Station S of Exmouth Gulf	-22.712250000	114.230778	GPS	1.000000	20040619000000	
5	1966	7515537.000	16040.000	Eremophila youngii subsp. lepidota	4	Dense spreading shrub 1 - 3 m high, flowers cream.	Firecracker Land System.				Bungarra Dam in Giralia Station S of Exmouth Gulf	-22.712250000	114.230778	GPS	1.000000	20040619000000	

OBJECTII	FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Latitude	Longitude	Geocode_Me	Precision	Date	Sheet_Numb
6	1513	7703600.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
7	1513	7703619.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
8	1513	7703627.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
9	1513	7703635.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
10	1513	7703643.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
11	4026	5310148.000	13076.000	Acacia startii	3	Spreading shrub 1.5 m tall, 2 m wide; canopy to ground level dense, green, finely hirsute; bark smooth and grey; flowers golden yellow.	Broad flat, powdery pale pinkish brown earth and surface limestone.	Open low scrub with Acacia sclerosperma, A. victoriae, A. tetragonophylla.			Ca 81 km NW then W from Y-junction of North West Coastal Highway with road to Marrilla, Giralia & Bullara Homesteads, ca 50 km S of Learmonth	-22.683333000	114.116667	MAN	0.000000	19860803000000	
12	4139	7492375.000	2629.000	Sclerolaena stylosa	1	Prostrate perennial herb 10 cm high, flowers pale yellow.	In quadrat in light orange sandy clay, limestone origin, in low undulating hills, in Firecracker Land System.	Acacia synchronicia tall open shrubland over Maireana sp. low shrubland.			Quadrat GIR-016, ca 10 km SW of homestead in Giralia Station S of Exmouth Gulf	-22.668920000	114.232226	GPS	1.000000	20040615000000	
13	4038	7890257.000	13076.000	Acacia startii	3	Shrub <1 m. Globular flower and coily legumes in bunches smaller than Acacia bivenosa. Young twigs finely pinnate. Older are reticulate.	In sandy loam with much limestone.	In association with occasional A. bivenosa and hummock grass.	occasional.		22 km W of Bullara Homestead, Carnarvon Botanical District	-22.666667000	113.900000	UNK	3.000000	19811217000000	

OBJECTII	FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Latitude	Longitude	Geocode_Me	Precision	Date	Sheet_Numb
14	4027	685321.000	13076.000	Acacia startii	3	Shrub to 1 m tall and 2 m diameter.	Pale red sandy loam with limestone pebbles.	In low scrub dominated by Acacia spp., Santalum and Cassia spp.	abundant.		5 km E of Bullara Homestead,	-22.666667000	114.100000	MAN	3.000000	19830820000000	
15	4037	189316.000	13076.000	Acacia startii	3	Shrub to 1 m tall and 2 m diameter.	In pale red sandy loam with limestone pebbles.	In low scrub dominated by Acacia spp., Santalum and Cassia spp.	abundant.		5 km E of Bullara Homestead	-22.666667000	114.100000	MAN	3.000000	19830820000000	
16	4013	854425.000	13076.000	Acacia startii	3	Dense rounded shrub to 1.5 m tall; stems more or less erect, bark grey to grey-brown, smooth. Phyllodes green, 2-nerved.	In flat country on shallow pale brown loam.	With Acacia bivenosa, A. sclerosperma, A. tetragonophylla,		Abundance: occasional.	13.2 km E along Bullara - Giralia Road from Exmouth Road	-22.666667000	114.130667	MAN	2.000000	19880829000000	
17	4029	5310121.000	13076.000	Acacia startii	3	Spreading shrub 2 m x 4 m; canopy to ground level, dense, green, finely hirsute; bark smooth and grey; flowers just opening, golden yellow.	Broad flat between low hills, powdery pale pinkish brown earth and surface limestone.	Scrub of Acacia tetragonophylla, A. bivenosa & A. victoriae.			Ca 74.6 km NW then W from Y-junction of North West Coastal Highway with road to Marrilla, Giralia and Bullara Homesteads, ca 46 km SSE of Learmonth	-22.666667000	114.133333	MAN	0.000000	19860803000000	
18	4030	5310113.000	13076.000	Acacia startii	3	Spreading shrub to 1.5 x 3.5 m; bark smooth, pale grey to ground; canopy green, finely hirsute when young; flowers golden yellow.	Gradual hillslope NE aspect, pale pinkish brown powdery earth and surface limestone.	Open low scrub over spinifex hummock grassland.	common.		Ca 66 km from Y-junction of North West Coastal Highway with road to Marrilla, Giralia & Bullara Homesteads, ca 50 km SSE of Learmonth	-22.666667000	114.133333	MAN	0.000000	19860803000000	
19	4010	5431956.000	13076.000	Acacia startii	3	Dense canopied to ground level, spreading 1.5 m tall, 2 m wide; green phyllodes bark smooth grey, pale brown to ground, persistent bracts, old pods on ground <3 m wide.	Hillslope aspect.				Ca 60 km from Y-junction of North West Coastal Highway with road to Marrilla, Giralia and Bullara Homestead, ca 50 km SSE of Learmonth,	-22.666667000	114.233333	MAN	0.000000	19860803000000	
20	4034	5310083.000	13076.000	Acacia startii	3	Spreading shrub, spreading canopy to ground level 1.5 m tall, 3 m across; bark smooth grey-pale brown to ground; phyllodes green hirsute; inflorescences with persistent bracts; old pods on ground <3 mm wide.	Gradual slope E aspect, powdery pinkish brown earth.		common.		Ca 60 km from Y-junction of North West Coastal Highway with road to Marrilla, Giralia and Bullara Homestead, ca 50 km SSE of Learmonth,	-22.666667000	114.233333	MAN	0.000000	19860803000000	
21	4024	854433.000	13076.000	Acacia startii	3	Dense rounded shrub to 1.5 m tall, 2 m wide. Bark grey; branches erect. Phyllodes green or tomentose and milky-green when young. Heads lemon, racemes growing out.	On top of limestone rise 200 m W of watercourse, in pale loam.	In Acacia, Triodia scrub with A. bivenosa.		Abundance: locally common.	16.6 km E along Bullara - Giralia Road from Exmouth Road	-22.658333000	114.163833	MAN	2.000000	19880829000000	
22	4028	685313.000	13076.000	Acacia startii	3	Round shrub to 1.5 m tall.	On thin pale loam on limestone.	Growing with A. bivenosa and Hummock Grass.	frequent.		Approx 10 km E of Bullara Homestead on Bullara - Giralia Road	-22.650000000	114.150000	MAN	3.000000	19840921000000	
23	4032	189294.000	13076.000	Acacia startii	3	Round shrub to 1.5 m tall.	On pale loam on limestone.	Growing with Acacia bivenosa and Hummock grass.	frequent.		Approx 10 km E of Bullara Homestead on Bullara - Giralia Road	-22.650000000	114.150000	MAN	3.000000	19840721000000	
24	4033	685305.000	13076.000	Acacia startii	3	Round shrub to 1.5 m tall.	In thin pale loam on limestone.	Growing with Acacia bivenosa dn Hummock grass.	frequent.		Approx 10 km E of Bullara Homestead on Bullara - Giralia Road	-22.650000000	114.150000	MAN	3.000000	19840721000000	
25	4040	189286.000	13076.000	Acacia startii	3	Round shrub to 1.5 m tall.	On thin pale loam on limestone.	Growing with A. bivenosa and Hummock grass.	frequent.		Approx 10 km E of Bullara Homestead on Bullara - Giralia Road	-22.650000000	114.150000	MAN	3.000000	19840921000000	

OBJECTII	FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Latitude	Longitude	Geocode_Me	Precision	Date	Sheet_Numb
26	4017	880477.000	13076.000	Acacia startii	3	Compact round shrub 1.5 m tall, much-branched at ground level, main branches straighter and less widely spreading than in A. bivenosa (BRM 6207) which also grew at this locality. New shoots milky green, hairy. Phyllodes dark green. Heads lemon yellow, 10	Low limestone hill.	With Triodia ground cover.		Abundance: common.	16.5 km E of Exmouth-Minilya road on road to Giralia	-22.500000000	114.150000	MAN	4.000000	19880829000000	
27	4019	195537.000	13076.000	Acacia startii	3	Low wattle 3 ft. Fleshy leaves, like A. inaequiloba.	Stony hills.	With spinifex.			Rough Range	-22.483333000	114.033333	MAN	3.000000	19640721000000	
1					3							-22.666667000	114.130667	MAN	2.000000	29/08/1988	854425.00000
2					3							-22.658333000	114.163833	MAN	2.000000	29/08/1988	854433.00000
1					3							-22.783333000	114.083333	MAN	0.000000	5/08/1986	5310253.00000
2					3							-22.783333000	114.116667	MAN	0.000000	5/08/1986	5310245.00000
3					3							-22.766667000	114.133333	MAN	0.000000	5/08/1986	5310237.00000
4					4							-22.712250000	114.230778	GPS	1.000000	19/06/2004	7515529.00000
5					4							-22.712250000	114.230778	GPS	1.000000	19/06/2004	7515537.00000
6					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703643.00000
7					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703619.00000
8					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703635.00000
9					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703600.00000
10					2							-22.710811000	114.391433	GPS	1.000000	1/08/2007	7703627.00000
11					3							-22.683333000	114.116667	MAN	0.000000	3/08/1986	5310148.00000
12					1							-22.668920000	114.232226	GPS	1.000000	15/06/2004	7492375.00000
13					3							-22.666667000	113.900000	UNK	3.000000	17/12/1981	7890257.00000
14					3							-22.666667000	114.100000	MAN	3.000000	20/08/1983	685321.00000
15					3							-22.666667000	114.100000	MAN	3.000000	20/08/1983	189316.00000
16					3							-22.666667000	114.130667	MAN	2.000000	29/08/1988	854425.00000
17					3							-22.666667000	114.133333	MAN	0.000000	3/08/1986	5310121.00000
18					3							-22.666667000	114.133333	MAN	0.000000	3/08/1986	5310113.00000
19					3							-22.666667000	114.233333	MAN	0.000000	3/08/1986	5310083.00000
20					3							-22.666667000	114.233333	MAN	0.000000	3/08/1986	5431956.00000
21					3							-22.658333000	114.163833	MAN	2.000000	29/08/1988	854433.00000
22					3							-22.650000000	114.150000	MAN	3.000000	21/07/1984	685305.00000
23					3							-22.650000000	114.150000	MAN	3.000000	21/09/1984	685313.00000
24					3							-22.650000000	114.150000	MAN	3.000000	21/07/1984	189294.00000
25					3							-22.650000000	114.150000	MAN	3.000000	21/09/1984	189286.00000
26					3							-22.500000000	114.150000	MAN	4.000000	29/08/1988	880477.00000
27					3							-22.483333000	114.033333	MAN	3.000000	21/07/1964	195537.00000
1	4013	854425.000	13076.000	Acacia startii	3	Dense rounded shrub to 1.5 m tall; stems more or less erect, bark grey to grey-brown, smooth. Phyllodes green, 2-nerved.	In flat country on shallow pale brown loam.	With Acacia bivenosa, A. sclerosperma, A. tetragonophylla,		Abundance: occasional.	13.2 km E along Bullara - Giralia Road from Exmouth Road	-22.666667000	114.130667	MAN	2.000000	19880829000000	
2	4024	854433.000	13076.000	Acacia startii	3	Dense rounded shrub to 1.5 m tall, 2 m wide. Bark grey; branches erect. Phyllodes green or tomentose and milky-green when young. Heads lemon, racemes growing out.	On top of limestone rise 200 m W of watercourse, in pale loam.	In Acacia, Triodia scrub with A. bivenosa.		Abundance: locally common.	16.6 km E along Bullara - Giralia Road from Exmouth Road	-22.658333000	114.163833	MAN	2.000000	19880829000000	
1	4031	5310253.000	13076.000	Acacia startii	3	Spreading straggly shrub 1.8 m x 2.5 m; bark whitish grey, smooth.	On edge of alluvial flat, foot of low rise to the W, powdery clay loam.	Open scrub with A. sclerosperma, Heterodendron.			12.5 km SSE of Bullara Homestead, ca 42 km SSE of Ningaloo	-22.783333000	114.083333	MAN	0.000000	19860805000000	
2	4015	5310245.000	13076.000	Acacia startii	3	Spreading dense canopied shrub 1.5 m x 2.5 m.	Gradual slope, W aspect, powdery red brown earth and scattered limestone.	Open low scrub with Acacia bivenosa, A. sclerosperma and A. tetragonophylla.	dominant.		14.5 km SSE of Bullara Homestead, 40 km SSE of Ningaloo	-22.783333000	114.116667	MAN	0.000000	19860805000000	

OBJECTII	FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Latitude	Longitude	Geocode_Me	Precision	Date	Sheet_Numb
3	4014	5310237.000	13076.000	Acacia startii	3	Infundibular shrub 1 m x 1.5 m; bark smooth, pink grey; phyllodes olive green.	Very gradual slope, W aspect, powdery red earth.	With Acacia tetragonophylla and A. victoriae.			4.6 km S of Cyclone Bore on Bullara Station & 12.5 km SE of Bullara Homestead, ca 50 km SSE of Learmonth	-22.766667000	114.133333	MAN	0.000000	19860805000000	
4	1966	7515529.000	16040.000	Eremophila youngii subsp. lepidota	4	Dense spreading shrub 1 - 3 m high, flowers red.	Firecracker Land System.				Bungarra Dam in Giralia Station S of Exmouth Gulf	-22.712250000	114.230778	GPS	1.000000	20040619000000	
5	1966	7515537.000	16040.000	Eremophila youngii subsp. lepidota	4	Dense spreading shrub 1 - 3 m high, flowers cream.	Firecracker Land System.				Bungarra Dam in Giralia Station S of Exmouth Gulf	-22.712250000	114.230778	GPS	1.000000	20040619000000	
6	1513	7703600.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
7	1513	7703619.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
8	1513	7703627.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
9	1513	7703635.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
10	1513	7703643.000	1491.000	Crinum flaccidum	2		Conservation Park. Low plain of moist red sandy loam over limestone. Fire in winter 2006.	Hummock grassland with scattered Eucalypt trees. Associated vegetation: Triodia pungens and Eucalyptus sp.	estimate of 2750 + 1000 plants in area 0.2 + 0.25 kilometers squared. Many healthy individuals and large groups of C. flaccidum widespread throughout survey area.	Population condition: healthy. Potential threats: prescribed burning.	Site A ca. 3.5 km ESE of Giralia homestead. Access via tracks E and S of homestead through SE gate	-22.710811000	114.391433	GPS	1.000000	20070801000000	
11	4026	5310148.000	13076.000	Acacia startii	3	Spreading shrub 1.5 m tall, 2 m wide; canopy to ground level dense, green, finely hirsute; bark smooth and grey; flowers golden yellow.	Broad flat, powdery pale pinkish brown earth and surface limestone.	Open low scrub with Acacia sclerosperma, A. victoriae, A. tetragonophylla.			Ca 81 km NW then W from Y-junction of North West Coastal Highway with road to Marrilla, Giralia & Bullara Homesteads, ca 50 km S of Learmonth	-22.683333000	114.116667	MAN	0.000000	19860803000000	

OBJECTII	FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Latitude	Longitude	Geocode_Me	Precision	Date	Sheet_Numb
12	4139	7492375.000	2629.000	Sclerolaena stylosa	1	Prostrate perennial herb 10 cm high, flowers pale yellow.	In quadrat in light orange sandy clay, limestone origin, in low undulating hills, in Firecracker Land System.	Acacia synchronicia tall open shrubland over Maireana sp. low shrubland.			Quadrat GIR-016, ca 10 km SW of homestead in Giralia Station S of Exmouth Gulf	-22.668920000	114.232226	GPS	1.000000	20040615000000	
13	4038	7890257.000	13076.000	Acacia startii	3	Shrub <1 m. Globular flower and coily legumes in bunches smaller than Acacia bivenosa. Young twigs finely pinnate. Older are reticulate.	In sandy loam with much limestone.	In association with occasional A. bivenosa and hummock grass.	occasional.		22 km W of Bullara Homestead, Carnarvon Botanical District	-22.666667000	113.900000	UNK	3.000000	19811217000000	
14	4027	685321.000	13076.000	Acacia startii	3	Shrub to 1 m tall and 2 m diameter.	Pale red sandy loam with limestone pebbles.	In low scrub dominated by Acacia spp., Santalum and Cassia spp.	abundant.		5 km E of Bullara Homestead,	-22.666667000	114.100000	MAN	3.000000	19830820000000	
15	4037	189316.000	13076.000	Acacia startii	3	Shrub to 1 m tall and 2 m diameter.	In pale red sandy loam with limestone pebbles.	In low scrub dominated by Acacia spp., Santalum and Cassia spp.	abundant.		5 km E of Bullara Homestead	-22.666667000	114.100000	MAN	3.000000	19830820000000	
16	4013	854425.000	13076.000	Acacia startii	3	Dense rounded shrub to 1.5 m tall; stems more or less erect, bark grey to grey-brown, smooth. Phyllodes green, 2-nerved.	In flat country on shallow pale brown loam.	With Acacia bivenosa, A. sclerosperma, A. tetragonophylla,		Abundance: occasional.	13.2 km E along Bullara - Giralia Road from Exmouth Road	-22.666667000	114.130667	MAN	2.000000	19880829000000	
17	4029	5310121.000	13076.000	Acacia startii	3	Spreading shrub 2 m x 4 m; canopy to ground level, dense, green, finely hirsute; bark smooth and grey; flowers just opening, golden yellow.	Broad flat between low hills, powdery pale pinkish brown earth and surface limestone.	Scrub of Acacia tetragonophylla, A. bivenosa & A. victoriae.			Ca 74.6 km NW then W from Y-junction of North West Coastal Highway with road to Marrilla, Giralia and Bullara Homesteads, ca 46 km SSE of Learmonth	-22.666667000	114.133333	MAN	0.000000	19860803000000	
18	4030	5310113.000	13076.000	Acacia startii	3	Spreading shrub to 1.5 x 3.5 m; bark smooth, pale grey to ground; canopy green, finely hirsute when young; flowers golden yellow.	Gradual hillslope NE aspect, pale pinkish brown powdery earth and surface limestone.	Open low scrub over spinifex hummock grassland.	common.		Ca 66 km from Y-junction of North West Coastal Highway with road to Marrilla, Giralia & Bullara Homesteads, ca 50 km SSE of Learmonth	-22.666667000	114.133333	MAN	0.000000	19860803000000	
19	4010	5431956.000	13076.000	Acacia startii	3	Dense canopied to ground level, spreading 1.5 m tall, 2 m wide; green phyllodes bark smooth grey, pale brown to ground, persistent bracts, old pods on ground <3 m wide.	Hillslope aspect.				Ca 60 km from Y-junction of North West Coastal Highway with road to Marrilla, Giralia and Bullara Homestead, ca 50 km SSE of Learmonth,	-22.666667000	114.233333	MAN	0.000000	19860803000000	
20	4034	5310083.000	13076.000	Acacia startii	3	Spreading shrub, spreading canopy to ground level 1.5 m tall, 3 m across; bark smooth grey-pale brown to ground; phyllodes green hirsute; inflorescences with persistent bracts; old pods on ground <3 mm wide.	Gradual slope E aspect, powdery pinkish brown earth.		common.		Ca 60 km from Y-junction of North West Coastal Highway with road to Marrilla, Giralia and Bullara Homestead, ca 50 km SSE of Learmonth,	-22.666667000	114.233333	MAN	0.000000	19860803000000	
21	4024	854433.000	13076.000	Acacia startii	3	Dense rounded shrub to 1.5 m tall, 2 m wide. Bark grey; branches erect. Phyllodes green or tomentose and milky-green when young. Heads lemon, racemes growing out.	On top of limestone rise 200 m W of watercourse, in pale loam.	In Acacia, Triodia scrub with A. bivenosa.		Abundance: locally common.	16.6 km E along Bullara - Giralia Road from Exmouth Road	-22.658333000	114.163833	MAN	2.000000	19880829000000	
22	4028	685313.000	13076.000	Acacia startii	3	Round shrub to 1.5 m tall.	On thin pale loam on limestone.	Growing with A. bivenosa and Hummock Grass.	frequent.		Approx 10 km E of Bullara Homestead on Bullara - Giralia Road	-22.650000000	114.150000	MAN	3.000000	19840921000000	
23	4032	189294.000	13076.000	Acacia startii	3	Round shrub to 1.5 m tall.	On pale loam on limestone.	Growing with Acacia bivenosa and Hummock grass.	frequent.		Approx 10 km E of Bullara Homestead on Bullara - Giralia Road	-22.650000000	114.150000	MAN	3.000000	19840721000000	

OBJECTII	FID_	Sheet	NameID	Taxon	Cons_Code	Plant_Desc	Site	Vegetation	Frequency	Notes	Locality	Latitude	Longitude	Geocode_Me	Precision	Date	Sheet_Numb
24	4033	685305.000	13076.000	Acacia startii	3	Round shrub to 1.5 m tall.	In thin pale loam on limestone.	Growing with Acacia bivenosa dn Hummock grass.	frequent.		Approx 10 km E of Bullara Homestead on Bullara - Giralia Road	-22.650000000	114.150000	MAN	3.000000	19840721000000	
25	4040	189286.000	13076.000	Acacia startii	3	Round shrub to 1.5 m tall.	On thin pale loam on limestone.	Growing with A. bivenosa and Hummock grass.	frequent.		Approx 10 km E of Bullara Homestead on Bullara - Giralia Road	-22.650000000	114.150000	MAN	3.000000	19840921000000	
26	4017	880477.000	13076.000	Acacia startii	3	Compact round shrub 1.5 m tall, much-branched at ground level, main branches straighter and less widely spreading than in A. bivenosa (BRM 6207) which also grew at this locality. New shoots milky green, hairy. Phyllodes dark green. Heads lemon yellow, 10	Low limestone hill.	With Triodia ground cover.		Abundance: common.	16.5 km E of Exmouth-Minilya road on road to Giralia	-22.500000000	114.150000	MAN	4.000000	19880829000000	
27	4019	195537.000	13076.000	Acacia startii	3	Low wattle 3 ft. Fleshy leaves, like A. inaequiloba.	Stony hills.	With spinifex.			Rough Range	-22.483333000	114.033333	MAN	3.000000	19640721000000	

Australian Government
Department of the Environment and Energy

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.

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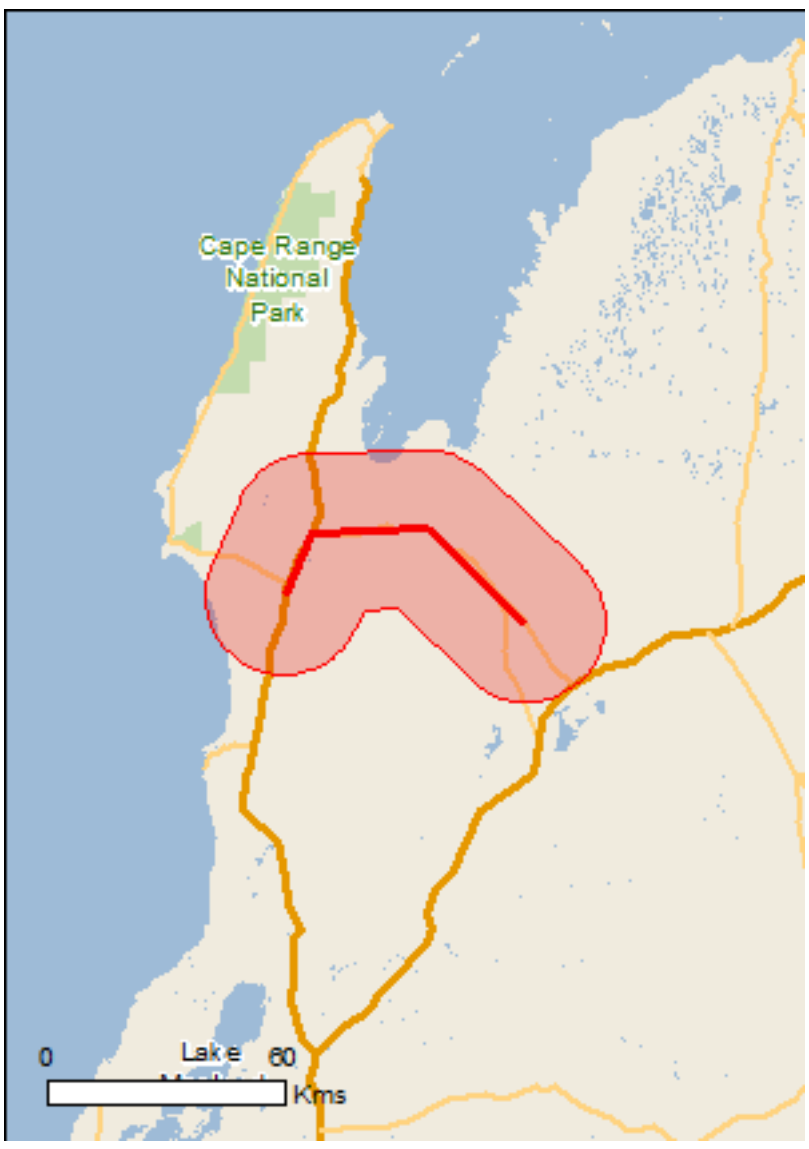

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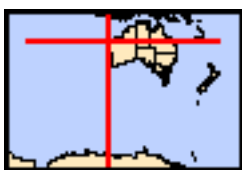

Summary

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:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	28
Listed Migratory Species:	42

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:	70
Whales and Other Cetaceans:	13
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:	2
Regional Forest Agreements:	None
Invasive Species:	13
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties		[Resource Information]
Name	State	Status
The Ningaloo Coast	WA	Declared property

National Heritage Properties		[Resource Information]
Name	State	Status
Natural		
The Ningaloo Coast	WA	Listed place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat may occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Dasyurus hallucatus		
Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petrogale lateralis lateralis		
Black-flanked Rock-wallaby, Moororong, Black-footed Rock Wallaby [66647]	Endangered	Species or species habitat likely to occur within area
Pseudomys fieldi		
Shark Bay Mouse, Djoongari, Alice Springs Mouse [113]	Vulnerable	Species or species habitat likely to occur within area
Rhinonicteris aurantia (Pilbara form)		
Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Aipysurus apraefrontalis		
Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may 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 Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area
[Ardenna carneipes](#) Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat may occur within area
[Calonectris leucomelas](#) Streaked Shearwater [1077]		Species or species habitat may occur within area
[Fregata ariel](#) Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
[Macronectes giganteus](#) Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
[Thalassarche impavida](#) Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
[Anoxypristis cuspidata](#) Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
[Balaena glacialis australis](#) Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
[Carcharodon carcharias](#) White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
[Caretta caretta](#) Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
[Chelonia mydas](#) Green Turtle [1765]	Vulnerable	Breeding known to occur within area
[Dermochelys coriacea](#) Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
[Dugong dugon](#) Dugong [28]		Breeding known to occur within area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
[Lamna nasus](#) Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
[Manta alfredi](#) Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
[Manta birostris](#) Giant Manta Ray, Chevron Manta Ray, Pacific		Species or species

Name	Threatened	Type of Presence
Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		habitat known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis clavata		
Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding likely to occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica		
Barn Swallow [662]		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
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat likely to 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
Glareola maldivarum		
Oriental Pratincole [840]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to 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 likely to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat likely to 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
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
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 known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area
Fish		
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Breeding known to occur within area
Reptiles		
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
[Ephalophis greyi](#) North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
[Eretmochelys imbricata](#) Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
[Hydrophis elegans](#) Elegant Seasnake [1104]		Species or species habitat may occur within area
[Natator depressus](#) Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
[Pelamis platurus](#) Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
[Balaenoptera acutorostrata](#) Minke Whale [33]		Species or species habitat may occur within area
[Balaenoptera edeni](#) Bryde's Whale [35]		Species or species habitat may occur within area
[Balaenoptera musculus](#) Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
[Delphinus delphis](#) Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
[Eubalaena australis](#) Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
[Grampus griseus](#) Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
[Megaptera novaeangliae](#) Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
[Orcinus orca](#) Killer Whale, Orca [46]		Species or species habitat may occur within area
[Sousa chinensis](#) Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
[Stenella attenuata](#) Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
[Tursiops aduncus](#) Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
[Tursiops aduncus (Arafura/Timor Sea populations)](#) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area

Name	Status	Type of Presence
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Giralia	WA
Whitmore,Roberts,Doole Islands And Sandalwood Landing	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
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
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
Equus caballus Horse [5]		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
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
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
Prosopis spp.		
Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus		
Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Exmouth Gulf East	WA

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

-22.798423 113.94672,-22.668596 114.008518,-22.660359 114.269444,-22.857279 114.493977

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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NatureMap
Mapping Western Australia's biodiversity

Minilya Flora

Created By 360 Enviro on 06/09/2018

Kingdom	Plantae
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Line'
Vertices	22° 49' 12" S,113° 57' 39" E 22° 40' 18" S,114° 00' 42" E 22° 40' 45" S,114° 04' 18" E 22° 39' 24" S,114° 10' 12" E 22° 39' 33" S,114° 15' 35" E 22° 41' 52" S,114° 19' 10" E 22° 43' 08" S,114° 22' 28" E 22° 48' 31" S,114° 26' 30" E
Group By	Species Group

Species Group	Species	Records
Alga	6	6
Dicotyledon	308	615
Monocotyledon	58	100
Pteridophyte (Fern)	1	1
TOTAL	**373**	**722**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Alga					
1.	26577	*Caulerpa sertularioides*			
2.	26835	*Galaxaura rugosa*			
3.	26891	*Halimeda cylindracea*			
4.	26970	*Hypnea pannosa*			
5.	27186	*Portieria hornemannii*			
6.	27349	*Udotea flabellum*			
Dicotyledon					
7.	4889	*Abutilon cryptopetalum*			
8.	9080	*Abutilon cunninghamii*			
9.	4891	*Abutilon fraseri (Lantern Bush)*			
10.	4892	*Abutilon geranioides*			
11.	4895	*Abutilon lepidum*			
12.	4901	*Abutilon otocarpum (Desert Chinese Lantern)*			
13.	4902	*Abutilon oxycarpum (Flannel Weed)*			
14.		*Abutilon sp.*			
15.	3214	*Acacia ancistrocarpa (Fitzroy Wattle)*			
16.	3241	*Acacia bivenosa*			
17.	17013	*Acacia colei var. colei*			
18.	13502	*Acacia coriacea subsp. pendens*			
19.	3280	*Acacia cuspidifolia (Bohemia)*			
20.	3300	*Acacia dictyophleba (Sandhill Wattle, Ngarkalya)*			
21.	3356	*Acacia gregorii (Gregory's Wattle)*			
22.	3419	*Acacia ligulata (Umbrella Bush, Watarka)*			
23.	29015	*Acacia pyrifolia var. pyrifolia*			
24.	13078	*Acacia sclerosperma subsp. sclerosperma*			
25.	29135	*Acacia sericophylla*			
26.	3549	*Acacia spathulifolia*			
27.	13076	*Acacia startii*		P3	
28.	19456	*Acacia stellaticeps*			
29.	3577	*Acacia tetragonophylla (Kurara, Wakalpuka)*			
30.	23521	*Acacia trudgeniana*			
31.	3603	*Acacia wiseana*			
32.	3606	*Acacia xiphophylla*			
33.	4583	*Adriana tomentosa*			
34.	17422	*Adriana tomentosa var. tomentosa*			
35.	2646	*Aerva javanica (Kapok Bush)*	Y		
36.	11487	*Alectryon oleifolius subsp. oleifolius*			
37.	2652	*Alternanthera nodiflora (Common Joyweed)*			
38.	4904	*Alyogyne cuneiformis (Coastal Hibiscus)*			
39.	4907	*Alyogyne pinoniana (Sand Hibiscus)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
40.	2657	*Amaranthus clementii*			
41.	2383	*Amyema preissii (Wireleaf Mistletoe)*			
42.	14307	*Amyema sp. Fortescue (M.E. Trudgen 5358)*			
43.	2961	*Argemone ochroleuca (Mexican Poppy)*	Y		
44.	2451	*Atriplex bunburyana (Silver Saltbush)*			
45.	2453	*Atriplex codonocarpa (Flat-topped Saltbush)*			
46.	2476	*Atriplex semilunaris (Annual Saltbush)*			
47.	6828	*Avicennia marina (White Mangrove)*			
48.	5186	*Bergia trimera*			
49.	46338	*Bidens subalternans var. simulans*	Y		
50.	2769	*Boerhavia burbidgeana*			
51.	2770	*Boerhavia coccinea (Tar Vine, Wituka)*			
52.	11167	*Bonamia erecta*			
53.	7893	*Calocephalus knappii*			
54.	48223	*Calocephalus pilbarensis*			
55.	35798	*Calothamnus borealis subsp. borealis*			
56.	5484	*Calytrix truncatifolia*			
57.	3749	*Canavalia rosea (Wild Jack Bean)*			
58.	2976	*Capparis lasiantha (Split Jack, Balqarda)*			
59.	48291	*Capparis spinosa subsp. nummularia*			
60.	12073	*Cassytha aurea var. aurea*			
61.	2950	*Cassytha filiformis (Love Vine, Jirawan)*			
62.	19762	*Centipeda minima subsp. macrocephala*			
63.	7922	*Cephalipterum drummondii (Pompom Head)*			
64.	2489	*Chenopodium gaudichaudianum (Cottony Saltbush)*			
65.	13114	*Chorizema racemosum*			
66.	7369	*Citrullus colocynthis*	Y		
67.	2988	*Cleome viscosa (Tickweed, Tjinduwadhu)*			
68.	2778	*Codonocarpus cotinifolius (Native Poplar, Kundurangu)*			
69.	2776	*Commicarpus australis (Perennial Tar Vine)*			
70.	6612	*Convolvulus clementii*			
71.	13560	*Corchorus crozophorifolius*			
72.	4857	*Corchorus elachocarpus*			
73.	17084	*Corymbia zygophylla*			
74.	11563	*Crassula colorata var. colorata*			
75.	3774	*Crotalaria cunninghamii (Green Birdflower, Bilbun)*			
76.	3783	*Crotalaria medicaginea*			
77.	20179	*Crotalaria medicaginea var. neglecta*			
78.	17117	*Cullen cinereum*			
79.	17439	*Cullen lachnostachys*			
80.	17118	*Cullen leucanthum*			
81.	17119	*Cullen leucochaites*			
82.	17116	*Cullen martinii*			
83.	11723	*Dampiera incana var. incana*			
84.	47241	*Datura leichhardtii subsp. leichhardtii*	Y		
85.	3796	*Daviesia benthamii*			
86.	7958	*Decazesia hecatocephala*			
87.	7164	*Dicladanthera forrestii*			
88.	6754	*Dicrastylis cordifolia*			
89.	4745	*Diplopeltis eriocarpa (Hairy Pepperflower)*			
90.	11669	*Diplopeltis intermedia var. intermedia*			
91.	11320	*Dipteracanthus australasicus subsp. australasicus*			
92.	2499	*Dissocarpus paradoxus (Curious Saltbush)*			
93.	31274	*Duperreya commixta*			
94.	33501	*Dysphania cristata (Crested Goosefoot)*			
95.	33479	*Dysphania melanocarpa (Black Crumbweed)*			
96.	33596	*Dysphania melanocarpa forma leucocarpa*			
97.	2504	*Dysphania plantaginella*			
98.	2511	*Enchylaena tomentosa (Barrier Saltbush)*			
99.	7189	*Eremophila clarkei (Turpentine Bush)*			
100.	7192	*Eremophila cuneifolia (Pinyuru, T'iranju)*			
101.	15052	*Eremophila forrestii subsp. forrestii*			
102.	7230	*Eremophila latrobei (Warty Fuchsia Bush, Mintjingka)*			
103.	7234	*Eremophila longifolia (Berrigan, Tulypurpa)*			
104.	16363	*Eremophila maculata subsp. brevifolia (Native Fuchsia)*			
105.	7242	*Eremophila miniata (Kopi Poverty Bush)*			
106.	18570	*Eremophila oppositifolia subsp. angustifolia*			
107.	16733	*Eremophila setacea*			
108.	16040	*Eremophila youngii subsp. lepidota*		P4	
109.	15155	*Eremophila youngii subsp. youngii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
110.	4335	*Erodium cygnorum (Blue Heronsbill)*			
111.	33519	*Eucalyptus baiophylla*			
112.	5654	*Eucalyptus fruticosa*			
113.	5752	*Eucalyptus prominens*			
114.	14548	*Eucalyptus victrix*			
115.	15592	*Eucalyptus xerothermica*			
116.	35307	*Euphorbia australis var. australis*			
117.	4626	*Euphorbia drummondii (Caustic Weed, Piwi)*			
118.	4635	*Euphorbia myrtoides*			
119.	4644	*Euphorbia sharkoensis*			
120.	12097	*Euphorbia tannensis subsp. eremophila (Desert Spurge)*			
121.	42879	*Euphorbia trigonosperma*			
122.	13281	*Euphorbia vaccaria*			
123.	11200	*Evolvulus alsinoides var. villosicalyx*			
124.	10977	*Exocarpos aphyllus (Leafless Ballart)*			
125.	10765	*Exocarpos sparteus (Broom Ballart, Djuk)*			
126.	35558	*Flaveria trinervia (Speedy Weed)*	Y		
127.	2835	*Glinus lotoides (Hairy Carpet Weed)*			
128.	3938	*Glycine canescens (Silky Glycine)*			
129.	7989	*Gnephosis brevifolia (Short-leaved Gnephosis)*			
130.	7501	*Goodenia corynocarpa*			
131.	12517	*Goodenia cusackiana*			
132.	7509	*Goodenia forrestii*			
133.	7521	*Goodenia lamprosperma*			
134.	7526	*Goodenia microptera*			
135.	7556	*Goodenia tenuiloba*			
136.	4918	*Gossypium robinsonii (Wild Cotton)*			
137.	2001	*Grevillea eriostachya (Flame Grevillea, Kaliny-kalinypa)*			
138.	2012	*Grevillea gordoniana*			
139.	15686	*Grevillea variifolia subsp. bundera*			
140.	2784	*Gyrostemon ramulosus (Corkybark)*			
141.	19137	*Hakea lorea subsp. lorea*			
142.	2207	*Hakea stenophylla*			
143.	16897	*Hakea stenophylla subsp. stenophylla*			
144.	6687	*Halgania cyanea (Rough Halgania)*			
145.	29840	*Halgania cyanea var. Allambi Stn (B.W. Strong 676)*			
146.	23464	*Haloragis gossei var. inflata*			
147.	17782	*Hannafordia quadrivalvis subsp. recurva*			
148.	6705	*Heliotropium crispatum*			
149.	6707	*Heliotropium curassavicum (Smooth Heliotrope)*			
150.	17305	*Heliotropium glanduliferum*			
151.	17307	*Heliotropium inexplicitum*			
152.	6713	*Heliotropium ovalifolium*			
153.	17309	*Heliotropium pachyphyllum*			
154.	17031	*Heliotropium transforme*			
155.	4922	*Hibiscus brachychlaenus*			
156.	4923	*Hibiscus brachysiphonius*			
157.	4924	*Hibiscus burtonii*			
158.	4942	*Hibiscus sturtii (Sturt's Hibiscus)*			
159.	48203	*Hypertelis cerviana*			
160.	3971	*Indigofera boviperda*			
161.	17113	*Indigofera boviperda subsp. boviperda*			
162.	3973	*Indigofera colutea (Sticky Indigo)*			
163.	3980	*Indigofera linifolia*			
164.	3982	*Indigofera monophylla*			
165.	14884	*Indigofera occidentalis*			
166.	3987	*Indigofera trita*			
167.	6633	*Ipomoea muelleri (Poison Morning Glory, Yumbu)*			
168.	3989	*Isotropis atropurpurea (Poison Sage)*			
169.	12059	*Jasminum didymum subsp. lineare (Desert Jasmine)*			
170.	29056	*Jasminum sp. Exmouth (G. Marsh 77)*			
171.	3664	*Labichea cassioides*			
172.	4953	*Lawrencia densiflora*			
173.	7588	*Lechenaultia subcymosa (Wide-branching Leschenaultia)*			
174.	12628	*Lemooria burkittii*			
175.	3035	*Lepidium pedicellosum*			
176.	3037	*Lepidium phlebopetalum (Veined Peppercress)*			
177.	3039	*Lepidium platypetalum (Slender Peppercress)*			
178.	16489	*Leptosema macrocarpum*			
179.	2396	*Lysiana casuarinae*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
180.	2547	*Maireana lanosa (Woolly Bluebush)*			
181.	2556	*Maireana planifolia (Low Bluebush)*			
182.	2558	*Maireana polypterygia (Gascoyne Bluebush)*			
183.	2567	*Maireana tomentosa (Felty Bluebush)*			
184.	4962	*Malvastrum americanum (Spiked Malvastrum)*	Y		
185.	12949	*Marsdenia australis*			
186.	5887	*Melaleuca cardiophylla (Tangling Melaleuca)*			
187.	5908	*Melaleuca eleuterostachya*			
188.	5051	*Melhania oblongifolia*			
189.	4105	*Mirbelia viminalis*			
190.	7378	*Momordica balsamina (Balsam Apple)*	Y		
191.	6490	*Muellerolimon salicorniaceum*			
192.	2573	*Neobassia astrocarpa*			
193.	3614	*Neptunia dimorphantha (Sensitive Plant)*			
194.	6976	*Nicotiana occidentalis (Native Tobacco)*			
195.	42024	*Olearia sp. Kennedy Range (G. Byrne 66)*			
196.	6651	*Operculina aequisepala*			
197.	4518	*Owenia reticulata (Native Walnut, Bandal)*			
198.	34997	*Peripleura arida*			
199.	35003	*Peripleura hispidula var. setosa*			
200.	3674	*Petalostylis cassioides*			
201.	17626	*Phyllanthus erwinii*			
202.	4680	*Phyllanthus maderaspatensis*			
203.	18260	*Pileanthus septentrionalis*			
204.	5230	*Pimelea ammocharis*			
205.	5256	*Pimelea microcephala (Shrubby Riceflower, Banjine)*			
206.	11185	*Pimelea microcephala subsp. microcephala*			
207.	17817	*Pluchea dunlopii*			
208.	45238	*Podolepis aristata subsp. affinis*			
209.	2903	*Polycarpaea longiflora*			
210.	41365	*Polygala glaucifolia*			
211.	6653	*Polymeria ambigua (Morning Glory)*			
212.	2884	*Portulaca oleracea (Purslane, Wakati)*			
213.	8189	*Pseudognaphalium luteoalbum (Jersey Cudweed)*			
214.	8192	*Pterocaulon sphacelatum (Apple Bush, Fruit Salad Plant)*			
215.	8193	*Pterocaulon sphaeranthoides*			
216.	2694	*Ptilotus appendiculatus*			
217.	2696	*Ptilotus astrolasius*			
218.	2699	*Ptilotus axillaris (Mat Mulla Mulla)*			
219.	2711	*Ptilotus clementii (Tassel Top)*			
220.	2717	*Ptilotus divaricatus (Climbing Mulla Mulla)*			
221.	2728	*Ptilotus gomphrenoides*			
222.	2731	*Ptilotus helipteroides (Hairy Mulla Mulla)*			
223.	2738	*Ptilotus latifolius (Tangled Mulla Mulla)*			
224.	2741	*Ptilotus macrocephalus (Featherheads)*			
225.	2747	*Ptilotus obovatus (Cotton Bush)*			
226.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
227.	2766	*Ptilotus villosiflorus*			
228.	41063	*Quoya loxocarpa*			
229.	41061	*Quoya paniculata*			
230.	2582	*Rhagodia eremaea (Thorny Saltbush)*			
231.	2583	*Rhagodia latifolia*			
232.	11240	*Rhagodia preissii subsp. obovata*			
233.	13300	*Rhodanthe citrina*			
234.	13297	*Rhodanthe psammophila*			
235.	6599	*Rhyncharrhena linearis (Bush Bean, Wintjulanypa)*			
236.	4191	*Rhynchosia minima (Rhynchosia)*			
237.	45146	*Roebuckiella oncocarpa*			
238.	48433	*Salicornia blackiana*			
239.	30434	*Salsola australis*			
240.	2359	*Santalum spicatum (Sandalwood, Wilarak)*			
241.	13178	*Scaevola amblyanthera var. centralis*			
242.	7608	*Scaevola cunninghamii*			
243.	7633	*Scaevola parvifolia (Camel Weed)*			
244.	13172	*Scaevola parvifolia subsp. pilbarae*			
245.	12584	*Scaevola pulchella*			
246.	7643	*Scaevola sericophylla*			
247.	7644	*Scaevola spinescens (Currant Bush, Maroon)*			
248.	7648	*Scaevola tomentosa (Raggedleaf Fanflower)*			
249.	41646	*Schenkia clementii*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
250.	13285	*Schoenia ayersii*			
251.	8200	*Schoenia cassiniana (Schoenia)*			
252.	2604	*Sclerolaena costata*			
253.	8877	*Sclerolaena gardneri*			
254.	2620	*Sclerolaena limbata*			
255.	2629	*Sclerolaena stylosa*		P1	
256.	12279	*Senna artemisioides subsp. helmsii*			
257.	12280	*Senna artemisioides subsp. oligophylla*			
258.	12305	*Senna glutinosa subsp. chatelainiana*			
259.	12308	*Senna glutinosa subsp. x luerssenii*			
260.	12312	*Senna notabilis*			
261.	14577	*Senna sp. Meekatharra (E. Bailey 1-26)*			
262.	46816	*Seringia elliptica (Showy fire-bush)*			
263.	4970	*Sida calyxhymenia (Tall Sida)*			
264.	4976	*Sida echinocarpa*			
265.	4977	*Sida fibulifera (Silver Sida)*			
266.	4988	*Sida rohlenae*			
267.	33698	*Sida sp. Pilbara (A.A. Mitchell PRP 1543)*			
268.	45274	*Sida sp. Pindan (B.G. Thomson 3398)*			
269.	6998	*Solanum cleistogamum*			
270.	7002	*Solanum diversiflorum*			
271.	42544	*Solanum elatius*			
272.	7018	*Solanum lasiophyllum (Flannel Bush, Mindjulu)*			
273.	7023	*Solanum nummularium (Money-leaved Solanum)*			
274.	7029	*Solanum phlomoides*			
275.	17295	*Stemodia sp. Onslow (A.A. Mitchell 76/148)*			
276.	8235	*Streptoglossa bubakii*			
277.	8237	*Streptoglossa decurrens*			
278.	8238	*Streptoglossa liatroides*			
279.	8239	*Streptoglossa macrocephala*			
280.	7103	*Striga curviflora*			
281.	3182	*Stylobasium spathulatum (Pebble Bush)*			
282.	43203	*Surreya diandra*			
283.	13592	*Swainsona calcicola*			
284.	13595	*Swainsona elegantoides*			
285.	12356	*Swainsona formosa*			
286.	4231	*Swainsona kingii*			
287.	4242	*Swainsona pterostylis*			
288.	33236	*Tecticornia halocnemoides (Shrubby Samphire)*			
289.	33319	*Tecticornia indica subsp. bidens*			
290.	33220	*Tecticornia pterygosperma subsp. denticulata*			
291.	4263	*Tephrosia clementii*			
292.	19531	*Tephrosia rosea var. clementii*			
293.	15947	*Tephrosia sp. B Kimberley Flora (C.A. Gardner 7300)*			
294.	39422	*Tephrosia sp. Onslow (K.R. Newbey 10571)*			
295.	4285	*Tephrosia supina*			
296.	4286	*Tephrosia uniovulata*			
297.	44710	*Thryptomene dampieri*			
298.	44305	*Trianthema pilosum*			
299.	44362	*Trianthema triquetrum*			
300.	4378	*Tribulus hystrix*			
301.	4379	*Tribulus macrocarpus*			
302.	4380	*Tribulus occidentalis (Perennial Caltrop)*			
303.	4383	*Tribulus terrestris (Caltrop)*	Y		
304.	13559	*Trichodesma zeylanicum var. grandiflorum*			
305.	48201	*Trigastrotheca molluginea*			
306.	13481	*Triumfetta ramosa*			
307.	17529	*Triumfetta tenuiseta*			
308.	30716	*Vachellia farnesiana (Mimosa Bush)*	Y		
309.	7660	*Velleia glabrata (Pee the Bed)*			
310.	6081	*Verticordia forrestii (Forrest's Featherflower)*			
311.	5106	*Waltheria indica*			
312.	4386	*Zygophyllum aurantiacum (Shrubby Twinleaf)*			
313.	4393	*Zygophyllum kochii*			
314.	4395	*Zygophyllum retivalve*			

Monocotyledon

315.	1211	*Acanthocarpus verticillatus*			
316.	126	*Amphibolis antarctica (Sea Nymph)*			
317.	207	*Aristida contorta (Bunched Kerosene Grass)*			
318.	12063	*Aristida holathera var. holathera*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
319.	240	*Bothriochloa ewartiana (Desert Bluegrass)*			
320.	750	*Bulbostylis barbata*			
321.	258	*Cenchrus ciliaris (Buffel Grass)*	Y		
322.	29721	*Cenchrus setiger (Birdwood Grass)*	Y		
323.	269	*Chloris pectinata (Comb Chloris)*			
324.	273	*Chrysopogon fallax (Golden Beard Grass)*			
325.	275	*Chrysopogon pallidus (Ribbongrass)*			
326.	1286	*Corynotheca pungens*			
327.	1491	*Crinum flaccidum (Native Crinum)*		P2	
328.	281	*Cymbopogon obtectus (Silkyheads)*			
329.	46555	*Cynodon prostratus*			
330.	798	*Cyperus iria*			
331.	814	*Cyperus squarrosus*			
332.	290	*Dactyloctenium radulans (Button Grass)*			
333.	11636	*Dianella revoluta var. divaricata*			
334.	303	*Dichanthium fecundum (Curly Bluegrass)*			
335.	13741	*Dichanthium sericeum subsp. humilius*			
336.	323	*Diplachne fusca (Brown Beetle Grass)*			
337.	357	*Enneapogon caerulescens (Limestone Grass)*			
338.	365	*Enneapogon polyphyllus (Leafy Nineawn)*			
339.	370	*Eragrostis barrelieri*	Y		
340.	378	*Eragrostis dielsii (Mallee Lovegrass)*			
341.	380	*Eragrostis eriopoda (Woollybutt Grass, Wangurnu)*			
342.	381	*Eragrostis falcata (Sickle Lovegrass)*			
343.	393	*Eragrostis setifolia (Neverfail Grass)*			
344.	395	*Eragrostis speciosa (Handsome Lovegrass)*			
345.	399	*Eragrostis xerophila (Knotty-butt Neverfail)*			
346.	400	*Eriachne aristidea*			
347.	409	*Eriachne gardneri*			
348.	16485	*Eriachne pulchella subsp. dominii*			
349.	464	*Iseilema membranaceum (Small Flinders Grass)*			
350.	503	*Panicum decompositum (Native Millet, Kaltu-kaltu)*			
351.	11232	*Paractaenum novae-hollandiae subsp. novae-hollandiae*			
352.	514	*Paractaenum refractum*			
353.	515	*Paraneurachne muelleri (Northern Mulga Grass)*			
354.	10975	*Paspalidium basicladum*			
355.	518	*Paspalidium clementii (Clements Paspalidium)*			
356.	522	*Paspalidium jubiflorum (Warrego Grass)*			
357.	606	*Setaria dielsii (Diels' Pigeon Grass)*			
358.	613	*Setaria verticillata (Whorled Pigeon Grass)*	Y		
359.	619	*Sorghum plumosum (Plume Canegrass)*			
360.	629	*Sporobolus australasicus (Fairy Grass)*			
361.	630	*Sporobolus caroli (Fairy Grass)*			
362.	633	*Sporobolus mitchellii (Ratstail Couch)*			
363.	673	*Themeda triandra*			
364.	1352	*Thysanotus speckii*			
365.	678	*Tragus australianus (Small Burrgrass)*			
366.	1360	*Tricoryne corynothecoides*			
367.	679	*Triodia angusta*			
368.	13131	*Triodia epactia*			
369.	48467	*Triodia glabra*			
370.	17873	*Triodia schinzii*			
371.	706	*Triraphis mollis (Needle Grass)*			
372.	732	*Yakirra australiensis*			

Pteridophyte (Fern)

373.	1	*Psilotum nudum*			

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
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.

NatureMap
Mapping Western Australia's biodiversity

Minilya Fauna

Created By 360 Enviro on 06/09/2018

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Method	'By Line'
Vertices	22° 49' 12" S,113° 57' 39" E 22° 40' 18" S,114° 00' 42" E 22° 40' 45" S,114° 04' 18" E 22° 39'
Group By	24" S,114° 10' 12" E 22° 39' 33" S,114° 15' 35" E 22° 41' 52" S,114° 19' 10" E 22° 43' 08" S,114° 22' 28" E 22° 48' 31" S,114° 26' 30" E Species Group

Species Group	Species	Records
Amphibian	4	9
Bird	137	952
Fish	1	1
Invertebrate	10	13
Mammal	21	117
Reptile	85	847
TOTAL	**258**	**1939**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Amphibian					
1.	25375	*Cyclorana maini (Sheep Frog)*			
2.	25392	*Litoria rubella (Little Red Tree Frog)*			
3.	25422	*Neobatrachus aquilonius (Northern Burrowing Frog)*			
4.	25430	*Notaden nichollsi (Desert Spadefoot)*			
Bird					
5.	24559	*Acanthagenys rufogularis (Spiny-cheeked Honeyeater)*			
6.	24265	*Acanthiza uropygialis (Chestnut-rumped Thornbill)*			
7.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
8.	25536	*Accipiter fasciatus (Brown Goshawk)*			
9.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
10.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
11.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
12.	24312	*Anas gracilis (Grey Teal)*			
13.	24316	*Anas superciliosa (Pacific Black Duck)*			
14.	25670	*Anthus australis (Australian Pipit)*			
15.	24285	*Aquila audax (Wedge-tailed Eagle)*			
16.	41324	*Ardea modesta (great egret, white egret)*			
17.	24341	*Ardea pacifica (White-necked Heron)*			
18.	24610	*Ardeotis australis (Australian Bustard)*			
19.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
20.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
21.	25567	*Artamus leucorynchus (White-breasted Woodswallow)*			
22.	24356	*Artamus personatus (Masked Woodswallow)*			
23.		*Barnardius zonarius*			
24.	24359	*Burhinus grallarius (Bush Stone-curlew)*			
25.	47897	*Butorides striata (Striated Heron, Mangrove Heron)*			
26.	25716	*Cacatua sanguinea (Little Corella)*			
27.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
28.	24269	*Calamanthus campestris (Rufous Fieldwren)*			
29.	25738	*Calidris canutus (Red Knot, knot)*		IA	
30.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
31.	24790	*Calidris tenuirostris (Great Knot)*		T	
32.	24564	*Certhionyx variegatus (Pied Honeyeater)*			
33.	25575	*Charadrius leschenaultii (Greater Sand Plover)*		IA	
34.	25576	*Charadrius mongolus (Lesser Sand Plover)*		T	
35.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
36.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
37.	24288	*Circus approximans (Swamp Harrier)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
38.	24289	*Circus assimilis (Spotted Harrier)*			
39.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
40.	24399	*Columba livia (Domestic Pigeon)*	Y		
41.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
42.	24416	*Corvus bennetti (Little Crow)*			
43.	25593	*Corvus orru (Torresian Crow)*			
44.	24671	*Coturnix pectoralis (Stubble Quail)*			
45.	25701	*Coturnix ypsilophora (Brown Quail)*			
46.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
47.	25595	*Cracticus tibicen (Australian Magpie)*			
48.	25596	*Cracticus torquatus (Grey Butcherbird)*			
49.	25547	*Dacelo leachii (Blue-winged Kookaburra)*			
50.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
51.	24470	*Dromaius novaehollandiae (Emu)*			
52.		*Egretta novaehollandiae*			
53.		*Elanus axillaris*			
54.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
55.	24631	*Emblema pictum (Painted Finch)*			
56.		*Eolophus roseicapillus*			
57.	25578	*Ephippiorhynchus asiaticus (Black-necked Stork)*			
58.	24568	*Epthianura aurifrons (Orange Chat)*			
59.	24570	*Epthianura tricolor (Crimson Chat)*			
60.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
61.	24368	*Eurostopodus argus (Spotted Nightjar)*			
62.	25621	*Falco berigora (Brown Falcon)*			
63.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
64.	24473	*Falco hypoleucos (Grey Falcon)*		T	
65.	25623	*Falco longipennis (Australian Hobby)*			
66.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
67.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
68.	24401	*Geopelia cuneata (Diamond Dove)*			
69.	24402	*Geopelia humeralis (Bar-shouldered Dove)*			
70.	25585	*Geopelia striata (Zebra Dove)*			
71.	25530	*Gerygone fusca (Western Gerygone)*			
72.	24276	*Gerygone tenebrosa (Dusky Gerygone)*			
73.	24481	*Glareola maldivarum (Oriental Pratincole)*		IA	
74.	24443	*Grallina cyanoleuca (Magpie-lark)*			
75.	24484	*Grus rubicunda (Brolga)*			
76.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
77.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
78.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
79.	25541	*Haliastur indus (Brahminy Kite)*			
80.	24295	*Haliastur sphenurus (Whistling Kite)*			
81.	24297	*Hamirostra melanosternon (Black-breasted Buzzard)*			
82.	47965	*Hieraaetus morphnoides (Little Eagle)*			
83.	25734	*Himantopus himantopus (Black-winged Stilt)*			
84.	24491	*Hirundo neoxena (Welcome Swallow)*			
85.	48587	*Hydroprogne caspia (Caspian Tern)*		IA	
86.	25637	*Larus novaehollandiae (Silver Gull)*			
87.	25661	*Lichmera indistincta (Brown Honeyeater)*			
88.	30932	*Limosa lapponica (Bar-tailed Godwit)*		IA	
89.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
90.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
91.	25652	*Malurus leucopterus (White-winged Fairy-wren)*			
92.	24583	*Manorina flavigula (Yellow-throated Miner)*			
93.	47997	*Melanodryas cucullata (Hooded Robin)*			
94.	24736	*Melopsittacus undulatus (Budgerigar)*			
95.	24598	*Merops ornatus (Rainbow Bee-eater)*			
96.	25542	*Milvus migrans (Black Kite)*			
97.	25545	*Mirafra javanica (Horsfield's Bushlark, Singing Bushlark)*			
98.	25685	*Neochmia ruficauda (Star Finch)*			
99.	24798	*Numenius madagascariensis (Eastern Curlew)*		T	
100.	25742	*Numenius phaeopus (Whimbrel)*		IA	
101.	24742	*Nymphicus hollandicus (Cockatiel)*			
102.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
103.	24618	*Oreoica gutturalis (Crested Bellbird)*			
104.	24620	*Pachycephala lanioides (White-breasted Whistler)*			
105.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
106.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
107.	24648	*Pelecanus conspicillatus (Australian Pelican)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
108.	48060	*Petrochelidon ariel (Fairy Martin)*			
109.	48061	*Petrochelidon nigricans (Tree Martin)*			
110.	24659	*Petroica goodenovii (Red-capped Robin)*			
111.	24743	*Pezoporus occidentalis (Night Parrot)*		T	
112.	25699	*Phalacrocorax varius (Pied Cormorant)*			
113.	24409	*Phaps chalcoptera (Common Bronzewing)*			
114.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
115.	24842	*Platalea regia (Royal Spoonbill)*			
116.	24748	*Platycercus varius (Mulga Parrot)*			
117.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
118.	24683	*Pomatostomus superciliosus (White-browed Babbler)*			
119.	25706	*Pomatostomus temporalis (Grey-crowned Babbler)*			
120.	24769	*Porzana fluminea (Australian Spotted Crake)*			
121.	24390	*Psophodes occidentalis (Western Wedgebill, Chiming Wedgebill)*			
122.		*Ptilonorhynchus guttatus*			
123.	24278	*Pyrrholaemus brunneus (Redthroat)*			
124.	48096	*Rhipidura albiscapa (Grey Fantail)*			
125.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
126.	25640	*Sterna dougallii (Roseate Tern)*		IA	
127.	48593	*Sternula albifrons (Little Tern)*		IA	
128.	25656	*Stipiturus ruficeps (Rufous-crowned Emu-wren)*			
129.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
130.	30870	*Taeniopygia guttata (Zebra Finch)*			
131.	48597	*Thalasseus bergii (Crested Tern)*		IA	
132.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
133.	25548	*Todiramphus chloris (Collared Kingfisher)*			
134.	42351	*Todiramphus pyrrhopygius (Red-backed Kingfisher)*			
135.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
136.	24803	*Tringa brevipes (Grey-tailed Tattler)*		P4	
137.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
138.	24851	*Turnix velox (Little Button-quail)*			
139.	24386	*Vanellus tricolor (Banded Lapwing)*			
140.	41351	*Xenus cinereus (Terek Sandpiper)*		IA	
141.	24857	*Zosterops luteus (Yellow White-eye)*			
Fish					
142.	42358	*Rhincodon typus (Whale Shark)*		S	
Invertebrate					
143.		*Austracantha minax*			
144.		*Cyrtobill darwini*			
145.		*Idiommata blackwalli*			
146.		*Isopedella tindalei*			
147.		*Latrodectus hasseltii*			
148.		*Notsodipus meedo*			
149.		*Pediana tenuis*			
150.		*Scolopendra morsitans*			
151.		*Urodacus hartmeyeri*			
152.		*Urodacus varians*			
Mammal					
153.	24181	*Chaerephon jobensis (Greater Northern Freetail-bat, Northern Mastiff Bat)*			
154.	30903	*Dasycercus blythi (Brush-tailed Mulgara, Ampurta)*		P4	
155.	24091	*Dasykaluta rosamondae (Little Red Kaluta)*			
156.	24084	*Dugong dugon (Dugong)*		S	
157.	24217	*Leggadina lakedownensis (Northern Short-tailed Mouse, Lakeland Downs Mouse, Kerakenga)*		P4	
158.	24136	*Macropus rufus (Red Kangaroo, Marlu)*			
159.	24168	*Macrotis lagotis (Bilby, Dalgyte, Ninu)*		T	
160.	24183	*Mormopterus loriae (Little Northern Freetail-bat)*			
161.	24223	*Mus musculus (House Mouse)*	Y		
162.	24095	*Ningaui timealeyi (Pilbara Ningaui)*			
163.	24224	*Notomys alexis (Spinifex Hopping-mouse)*			
164.	24192	*Nyctophilus arnhemensis (Arnhem Land Long-eared Bat)*			
165.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
166.		*Nyctophilus geoffroyi subsp. pallescens*			
167.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
168.	24105	*Pseudantechinus roryi (Rory's Pseudantechinus)*			
169.	24234	*Pseudomys delicatulus (Delicate Mouse)*			
170.	24237	*Pseudomys hermannsburgensis (Sandy Inland Mouse)*			
171.	24116	*Sminthopsis macroura (Stripe-faced Dunnart)*			
172.	24120	*Sminthopsis youngsoni (Lesser Hairy-footed Dunnart)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
173.	30954	*Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)*			
Reptile					
174.		*Acanthophis sp.*			
175.	30833	*Amphibolurus longirostris (Long-nosed Dragon)*			
176.	24992	*Aprasia rostrata (Ningaloo worm-lizard, Monte Bello Worm-lizard)*		P3	
177.	25331	*Brachyurophis approximans (North-western Shovel-nosed Snake)*			
178.	25015	*Carlia munda (Shaded-litter Rainbow Skink)*			
179.	24919	*Crenadactylus ocellatus subsp. horni (Clawless Gecko)*			
180.	24868	*Ctenophorus clayi (Collared Dragon)*			
181.	24872	*Ctenophorus femoralis (Dune Dragon)*			
182.	24876	*Ctenophorus isolepis subsp. isolepis (Crested Dragon, Military Dragon)*			
183.	24877	*Ctenophorus maculatus subsp. badius (Spotted Military Dragon)*			
184.	24882	*Ctenophorus nuchalis (Central Netted Dragon)*			
185.	30897	*Ctenophorus parviceps (Western Heath Dragon, Northern Heath Dragon)*			
186.	24886	*Ctenophorus reticulatus (Western Netted Dragon)*			
187.	24885	*Ctenophorus rubens (Red Dragon)*			
188.	24889	*Ctenophorus scutulatus (Lozenge-marked Dragon)*			
189.	25032	*Ctenotus calurus*			
190.	25036	*Ctenotus duricola*			
191.	25043	*Ctenotus grandis subsp. titan*			
192.	25044	*Ctenotus hanloni*			
193.	25045	*Ctenotus helenae*			
194.	25046	*Ctenotus iapetus*			
195.	25053	*Ctenotus maryani*			
196.	25064	*Ctenotus pantherinus subsp. ocellifer (Leopard Ctenotus)*			
197.	25069	*Ctenotus rufescens*			
198.	25073	*Ctenotus saxatilis (Rock Ctenotus)*			
199.	25074	*Ctenotus schomburgkii*			
200.	25077	*Ctenotus serventyi*			
201.	25080	*Ctenotus uber subsp. uber (Spotted Ctenotus)*			
202.	25090	*Cyclodomorphus melanops subsp. melanops (Slender Blue-tongue)*			
203.	25001	*Delma nasuta*			
204.	25004	*Delma tincta*			
205.	25292	*Demansia calodera (Black-necked Whipsnake)*			
206.	25295	*Demansia psammophis subsp. cupreiceps (Yellow-faced Whipsnake)*			
207.	24926	*Diplodactylus conspicillatus (Fat-tailed Gecko)*			
208.	25231	*Diplodactylus klugei*			
209.	42400	*Diporiphora adductus (Carnarvon Dragon)*			
210.	25092	*Egernia depressa (Southern Pygmy Spiny-tailed Skink)*			
211.	25362	*Ephalophis greyae*			
212.	43381	*Eremiascincus pallidus (Western Narrow-banded Skink, Narrow-banded Sand Swimmer)*			
213.	25301	*Furina ornata (Moon Snake)*			
214.	24956	*Gehyra pilbara*			
215.	24959	*Gehyra variegata*			
216.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
217.	25125	*Lerista bipes*			
218.	30928	*Lerista clara*			
219.	25133	*Lerista elegans*			
220.	25148	*Lerista lineopunctulata*			
221.	25151	*Lerista macropisthopus subsp. fusciceps*			
222.	25155	*Lerista muelleri*			
223.	25158	*Lerista onsloviana*			
224.	25161	*Lerista petersoni (Phantom Mole Slider, skink)*			
225.	25163	*Lerista planiventralis subsp. planiventralis*			
226.	30924	*Lerista rolfei*			
227.	25176	*Lerista uniduo (Spotted Broad-blazed Slider, skink)*			
228.	25005	*Lialis burtonis*			
229.		*Liopholis sp.*			
230.	42415	*Lucasium squarrosum*			
231.	30933	*Lucasium stenodactylum*			
232.	25184	*Menetia greyii*			
233.	25491	*Menetia surda*			
234.	24904	*Moloch horridus (Thorny Devil)*			
235.	25191	*Morethia lineoocellata*			
236.	25193	*Morethia ruficauda subsp. exquisita*			
237.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
238.	24968	*Nephrurus levis subsp. occidentalis*			
239.	25197	*Notoscincus ornatus subsp. ornatus*			
240.	25510	*Pogona minor (Dwarf Bearded Dragon)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
241.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
242.	25261	*Pseudechis australis (Mulga Snake)*			
243.	42416	*Pseudonaja mengdeni (Western Brown Snake)*			
244.	25263	*Pseudonaja modesta (Ringed Brown Snake)*			
245.	25009	*Pygopus nigriceps*			
246.	24982	*Rhynchoedura ornata (Western Beaked Gecko)*			
247.	25305	*Simoselaps anomalus (Desert Banded Snake)*			
248.	25517	*Strophurus ciliaris*			
249.	24941	*Strophurus rankini*			
250.	24946	*Strophurus strophurus*			
251.	25269	*Suta fasciata (Rosen's Snake)*			
252.	25307	*Suta punctata (Spotted Snake)*			
253.	25209	*Varanus acanthurus (Spiny-tailed Monitor)*			
254.	25210	*Varanus brevicauda (Short-tailed Pygmy Monitor)*			
255.	25211	*Varanus caudolineatus*			
256.	25212	*Varanus eremius (Pygmy Desert Monitor)*			
257.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
258.	25223	*Varanus panoptes subsp. rubidus*			

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
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 F

Vegetation Condition Scale

Vegetation Condition Scale (EPA, 2016a)

VEGETATION CONDITION	EREMAEAN AND NORTHERN BOTANICAL PROVINCES (TRUDGEN 1988)
Pristine	
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.
Good	More obvious signs of damage caused by human activity since European settlement, including some obvious impact on the vegetation structure such as that caused by low levels of grazing or slightly aggressive weeds.
Poor	Still retains basic vegetation structure or ability to regenerate it after very obvious impacts of human activities since European settlement, such as grazing, partial clearing, frequent fires or aggressive weeds.
Degraded	Severely impacted by grazing, very frequent fires, clearing or a combination of these activities. Scope for some regeneration but not to a state approaching good condition without intensive management. Usually with a number of weed species present including very aggressive species.
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation; i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.

APPENDIX G

Threatened and Priority Flora Report Form

Department of Biodiversity, Conservation and Attractions

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.3 August 2017

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at http://dpaw.wa.gov.au/ under *Standard Report Forms*

TAXON: Acacia startii **TPFL Pop. No:**

OBSERVATION DATE: 13 / 9 / 18 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: Sophie fox, catharina kreus **PHONE:** 9381 2360

ROLE: **ORGANISATION:** 360 Environmental

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Road reserve. Burkett Road Near Minilya - Exmouth road

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM: GDA94 / MGA94 ☐ AGD84 / AMG84 ☐ WGS84 ☐ Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required) DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: -22.6606617

Long / Easting: 114.23324436

ZONE: 50k

METHOD USED: GPS ☐ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐ Timber reserve ☐ Private property ☐ Rail reserve ☐ Shire road reserve ☐

National park ☐ State forest ☐ Pastoral lease ☐ MRWA road reserve ☐ Other Crown reserve ☐

Conservation park ☐ Water reserve ☐ UCL ☐ SLK/Pole _____ to _____ Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☐ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	two			
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. EMQopp 23 Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐

Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: %

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Road reserve, road clearing			
•			
•			

Please return completed form to **Species And Communities Branch** DBCA,

Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

Record entered by: **Sheet No.:** **Record Entered in Database** ☐

Department of Biodiversity, Conservation and Attractions

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.3 August 2017

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at http://dpaw.wa.gov.au/ under *Standard Report Forms*

TAXON: Acacia startii **TPFL Pop. No:**

OBSERVATION DATE: 13 / 9 / 18 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: Sophie Fox, Catherine Krens **PHONE:** 9381 2360

ROLE: **ORGANISATION:** 360 Environmental

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Burkett Road near Exmouth / Minilya Road

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: -22.65911182

Long / Easting: 114.23776273

ZONE: 50K

METHOD USED:
GPS ☒ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☒	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole _____ to _____	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☐ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	one			
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. EMQopp19 Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: %

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme. Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• Clearing of vegetation, road reserve, road widenings			
•			
•			

Please return completed form to **Species And Communities Branch** DBCA,

Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

Record entered by: **Sheet No.:** **Record Entered in Database** ☐

Department of Biodiversity, Conservation and Attractions

GOVERNMENT OF WESTERN AUSTRALIA

Threatened and Priority Flora Report Form

Version 1.3 August 2017

Please complete as much of the form as possible, with emphasis on those sections bordered in black. For information on how to complete the form please refer to the Threatened & Priority Flora Report Form (TPRF) manual on the DBCA website at http://dpaw.wa.gov.au/ under *Standard Report Forms*

TAXON: Acacia startii **TPFL Pop. No:**

OBSERVATION DATE: 13 / 9 / 18 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: Sophie Fox, Andrew Hide, Catherine **PHONE:**

ROLE: Botanist. **ORGANISATION:** Karens . 360 Environmental

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place): Road verge. Burkett Road SLK 45-78

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, Zone is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: -22.66073334

Long / Easting: 114.2343406

ZONE: 50K

METHOD USED:
GPS ☒ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐ Timber reserve ☐ Private property ☐ Rail reserve ☐ Shire road reserve ☐
National park ☐ State forest ☐ Pastoral lease ☐ MRWA road reserve ☒ Other Crown reserve ☐
Conservation park ☐ Water reserve ☐ UCL ☐ SLK/Pole _____ to _____ Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☒ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☐ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive				
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: %

CONDITION OF PLANTS: Healthy ☐ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
• Clearing			
•			
•			

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GOVERNMENT OF WESTERN AUSTRALIA

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Version 1.3 August 2017

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TAXON: Acacia startii **TPFL Pop. No:**

OBSERVATION DATE: 13 / a / 18 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: Sophie Fox, Catherine Kiers **PHONE:** 9381 2360

ROLE: **ORGANISATION:** 360 Environmental

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Burkett Road near Exmouth - Minilya road

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: -22.6607 334

Long / Easting: 114.234340 6

ZONE: 50K

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☐	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole ____ to ____	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☐ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	three			
Dead				

Area of pop (m²):

Note: PIs record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. EMQopp21 Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: %

CONDITION OF PLANTS: Healthy ☐ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
•			
•			
•			

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TAXON: Acacia startii **TPFL Pop. No:**

OBSERVATION DATE: 13 / 9 / 18 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: Sophie Fox, Catherine Kreis **PHONE:** 9381 2360

ROLE: **ORGANISATION:** 360 Environmental

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place)**:**

Burkett Road, near Minilya-Exmouth Road

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM:

GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)

DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: -22.6610125

Long / Easting: 114.2363717

ZONE: 50K

METHOD USED:

GPS ☐ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐ Timber reserve ☐ Private property ☐ Rail reserve ☐ Shire road reserve ☐
National park ☐ State forest ☐ Pastoral lease ☐ MRWA road reserve ☐ Other Crown reserve ☐
Conservation park ☐ Water reserve ☐ UCL ☐ SLK/Pole _____ to _____ Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☐ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	two			
Dead				

Area of pop (m²):

Note: PIs record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. EMQ approx Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: %

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
•			
•			
•			

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Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

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TAXON: Acacia Starkii **TPFL Pop. No:**

OBSERVATION DATE: 13 / 9 / 18 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: Sophie Fox, Catherine Ferns **PHONE:** 9381 2360

ROLE: **ORGANISATION:** 360 Environmental

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place): Burkett Road near Minilya - Exmouth road

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: -22.657552

Long / Easting: 114.2351209

ZONE: 50K

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐ Timber reserve ☐ Private property ☐ Rail reserve ☐ Shire road reserve ☐
National park ☐ State forest ☐ Pastoral lease ☐ MRWA road reserve ☐ Other Crown reserve ☐
Conservation park ☐ Water reserve ☐ UCL ☐ SLK/Pole _____ to _____ Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☐ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☒ Extrapolation ☐ Estimate ☐ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	**Mature:**	**Juveniles:**	**Seedlings:**	**Totals:**
Alive	one			
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. EMRopp22 Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: %

CONDITION OF PLANTS: Healthy ☐ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	**Current impact (N-E)**	**Potential Impact (L-E)**	**Potential Threat Onset (S-L)**
•			
•			
•			

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TAXON: Acacia Startii **TPFL Pop. No:**

OBSERVATION DATE: 13 / 9 / 18 **CONSERVATION STATUS:** P3 New population ☐

OBSERVER/S: Sophie Fox, Catherine Kreus **PHONE:** 9381 2360

ROLE: **ORGANISATION:** 360 Environmental

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place): Burkett Road, near Minilya - Exmouth Road

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, **Zone** is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: -22.65788896

Long / Easting: 114.18555099

ZONE: 50K

METHOD USED:
GPS ☐ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:
Nature reserve ☐ Timber reserve ☐ Private property ☐ Rail reserve ☐ Shire road reserve ☐
National park ☐ State forest ☐ Pastoral lease ☐ MRWA road reserve ☐ Other Crown reserve ☐
Conservation park ☐ Water reserve ☐ UCL ☐ SLK/Pole _____ to _____ Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☐ Area observed (m²):

EFFORT: Time spent surveying (minutes): No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual [Extrapolation] Estimate ☒ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☒ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	1000			
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. EHQopp31 Size Data attached ☐ Total area of quadrats (m²):

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☐ Dehisced fruit ☐ Percentage in flower: %

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme. Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
•			
•			
•			

Please return completed form to **Species And Communities Branch** DBCA,

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TAXON: Sclerolaena stylosa **TPFL Pop. No:**

OBSERVATION DATE: 13 / 09 / 18 **CONSERVATION STATUS:** P1 New population ☑

OBSERVER/S: Sophie Fox, Catherine Krens **PHONE:** 0450505331

ROLE: Botanist **ORGANISATION:** 360 Environmental

DESCRIPTION OF LOCATION (Provide at least nearest town/named locality, and the distance and direction to that place):

Burkett Road SLK 45-78. Plain. Loam, Sand, Medium clay on limestone. Light brown soils.

Reserve No:

DBCA DISTRICT: **LGA:** Land manager present: ☐

DATUM:
GDA94 / MGA94 ☐
AGD84 / AMG84 ☐
WGS84 ☐
Unknown ☐

COORDINATES: (If UTM coords provided, Zone is also required)
DecDegrees ☐ DegMinSec ☐ UTMs ☐

Lat / Northing: 7491344

Long / Easting: 218793

ZONE: 50K

METHOD USED:
GPS ☒ Differential GPS ☐ Map ☐

No. satellites: Map used:

Boundary polygon captured: ☐ Map scale:

LAND TENURE:

Nature reserve ☐	Timber reserve ☐	Private property ☐	Rail reserve ☐	Shire road reserve ☐
National park ☐	State forest ☐	Pastoral lease ☐	MRWA road reserve ☒	Other Crown reserve ☐
Conservation park ☐	Water reserve ☐	UCL ☐	SLK/Pole ____ to ____	Specify other:

AREA ASSESSMENT: Edge survey ☐ Partial survey ☐ Full survey ☒ Area observed (m²):

EFFORT: Time spent surveying (minutes): 1 hr No. of minutes spent / 100 m²:

POP'N COUNT ACCURACY: Actual ☐ Extrapolation ☐ Estimate ☒ Count method: (Refer to field manual for list)

WHAT COUNTED: Plants ☐ Clumps ☐ Clonal stems ☐

TOTAL POP'N STRUCTURE:	Mature:	Juveniles:	Seedlings:	Totals:
Alive	40			
Dead				

Area of pop (m²):

Note: Pls record count as numbers (not percentages) for database.

QUADRATS PRESENT: No. 1 Size 30x30m Data attached ☐ Total area of quadrats (m²): 900

Summary Quad. Totals: Alive				

REPRODUCTIVE STATE: Clonal ☐ Vegetative ☐ Flowerbud ☐ Flower ☐
Immature fruit ☐ Fruit ☒ Dehisced fruit ☐ Percentage in flower: %

CONDITION OF PLANTS: Healthy ☒ Moderate ☐ Poor ☐ Senescent ☐

COMMENT:

THREATS - type, agent and supporting information: Eg clearing, too frequent fire, weed, disease. Refer to field manual for list of threats & agents. **Specify agent** where relevant. Rate current and potential threat impact: N=Nil, L=Low, M=Medium, H=High, E=Extreme. Estimate time to potential impact: S=Short (<12mths), M=Medium (<5yrs), L=Long (5yrs+)	Current impact (N-E)	Potential Impact (L-E)	Potential Threat Onset (S-L)
• clearing, weeds			
•			
•			

Please return completed form to **Species And Communities Branch** DBCA,

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HABITAT INFORMATION:

LANDFORM:
- Crest ☐
- Hill ☐
- Ridge ☐
- Outcrop ☐
- Slope ☐
- Flat ☒
- Open depression ☐
- Drainage line ☐
- Closed depression ☐
- Wetland ☐

ROCK TYPE:
- Granite ☐
- Dolerite ☐
- Laterite ☐
- Ironstone ☐
- Limestone ☒
- Quartz ☐

Specify other: _____

LOOSE ROCK: (on soil surface; eg gravel, quartz fields)
- 0-10% ☒
- 10-30% ☐
- 30-50% ☐
- 50-100% ☐

SOIL TYPE:
- Sand ☒
- Sandy loam ☒
- Loam ☐
- Clay loam ☒
- Light clay ☐
- Peat ☐

Specify other: _____

SOIL COLOUR:
- Red ☐
- Brown ☒
- Yellow ☐
- White ☐
- Grey ☐
- Black ☐

Specify other: _____

DRAINAGE:
- Well drained ☒
- Seasonally inundated ☐
- Permanently inundated ☐
- Tidal ☐

Specific **Landform** Element: _____
(Refer to field manual for additional values)

CONDITION OF SOIL: Dry ☒ Moist ☐ Waterlogged ☐ Inundated ☐

VEGETATION CLASSIFICATION*:
Eg: 1. Banksia woodland (B. attenuata, B. ilicifolia); 2. Open shrubland (Hibbertia sp., Acacia spp.) ; 3. Isolated clumps of sedges (Mesomelaena tetragona)

1. Acacia cuspidifolia tall open shrubland
2. A. synchronicia, Maireana polypterygia Mid clumps of shrubs
3. Cenchrus ciliaris low grassland
4. Maireana georgei, Sclerolaena stylosa low isolated clumps of shrubs

ASSOCIATED SPECIES:

Other (non-dominant) spp

* Please record up to four of the most representative vegetation layers (with up to three dominant species in each layer). Structural Formations should follow 2009 *Australian Soil and Land Survey Field Handbook* guidelines – refer to field manual for further information and structural formation table.

CONDITION OF HABITAT: Pristine ☐ Excellent ☐ Very good ☐ Good ☒ Degraded ☐ Completely degraded ☐

COMMENT: _____

FIRE HISTORY: **Last Fire:** Season/Month: _____ Year: _____ **Fire Intensity:** High ☐ Medium ☐ Low ☐ No signs of fire ☐

FENCING: Not required ☐ Present ☐ Replace / repair ☐ Required ☐ Length req'd: _____

ROADSIDE MARKERS: Not required ☐ Present ☐ Replace / reposition ☐ Required ☐ Quantity req'd: _____

OTHER COMMENTS: (Please include recommended management actions and/or implemented actions - include date. Also include details of additional data available, and how to locate it.)

DRF PERMIT/ LICENCE No: Note if only observing plants (i.e. no specimens or plant matieral is taken) then no permit/licence is required. For further information on permit and licening requirements see the Threatened Flora and Wildlife Licensing pages on DBCA's website. Any actions carried out under licence/permit should be recorded above in the OTHER COMMENTS section.

SPECIMEN: Collectors No: _____ WA Herb. ☐ Regional Herb. ☐ District Herb. ☐ Other: _____

ATTACHED: Map ☐ Mudmap ☐ Photo ☐ GIS data ☐ Field notes ☐ Other: _____

COPY SENT TO: Regional Office ☐ District Office ☐ Other:

Submitter of Record: _____ Role: _____ Signed: _____ Date: / /

Please return completed form to **Species And Communities Branch** DBCA,
Locked Bag 104, BENTLEY DELIVERY CENTRE WA 6983 **OR** email to: flora.data@dbca.wa.gov.au

RECORDS: Please forward to **Flora Administrative Officer,** Species and Communities Branch.

Record entered by: Sheet No : Record Entered in Database ☐

APPENDIX H

Vegetation Community Dendrogram

Group average

Resemblance: S17 Bray Curtis similarity

Similarity

0
20
40
60
80
100

EMQ27
EMQ28
EMQ01
EMQ02
EMQ24
EMQ23
EMQ25
EMQ26
EMQ32
EMQ31
EMQ03
EMQ05
EMQ29
EMQ30
EMR01
EMQ04
EMQ06
EMQ15
EMQ16
EMQ10
EMQ11
EMQ07
EMQ17
EMQ19
EMQ20
EMQ08
EMQ09
EMQ21
EMQ18
EMQ22
EMQ14
EMQ12
EMQ13

Samples

APPENDIX I

Flora and Fauna Likelihood Assessments

Appendix I. Assessment of the Likely Occurrence of Priority Flora (as per DBCA and EPBC Database Searches) in the Survey Area

1Closest record to Survey Area based on DBCA 2018. High Likelihood = Suitable habitat present and records less than 10 km from the Survey Area, Medium Likelihood = Suitable habitat present and records between 10 km and 20 km from the Survey Area, and Low Likelihood = No suitable habitat present and/or records outside of species known distribution. En = Listed as Endangered under the EBPC Act, Vu = Listed as Vulnerable under the EBPC, Ce= Critically Endangered under the EBPC Act, P = Listed as Priority by the DBCA DRF = Declared Rare Flora as listed by the State. Post-survey Likelihood based on knowledge of the Survey Area post field-survey, and flowering period of flora taxa.

FAMILY	SPECIES	Conservation Code	Source		Distance to Closest Record	Habitat Information	Habitat occurs within the Survey Area	Flowering period	Likelihood of Occurrence (Pre-field Survey)	Likelihood of occurrence (Post- field Survey)
		DBCA	DBCA	NatureMap						
Chenopodiaceae	*Sclerolaena stylosa*	P1	+	+	1 km	Flat plain. Red/orange sandy clay.	Yes	n/a	High	Recorded within the Survey Area
Amaryllidaceae	*Crinum flaccidum*	P2	+	+	7 km	Loam, clay, sandstone. Swamps, creeks.	No	Oct - Dec or Jan or May	Medium	Low
Fabaceae	*Acacia startii*	P3	+	+	<1km	Calcareous loam with limestone pebbles. Stony hills & watercourses.	Yes	Jul - Aug	High	Recorded within the Survey Area
Scrophulariaceae	*Eremophila youngii subsp. lepidota*	P4	+	+	5 km	Stony red sandy loam. Flats plains, floodplains, sometimes semi-saline, clay flats.	Yes	Jan or mar or Jun or Aug - Sept	High	High

Appendix I. Assessment of the Likely Occurrence of Priority Fauna (as per DBCA and EPBC Database Searches) in the Survey Area

CR = Critically Endangered, EN = Listed as Endangered, VU = Listed as Vulnerable, IA = International Agreement, Mi = Listed as Migratory under the EBPC Act, Ma = Listed as Marine under the EBPC Act, P = Listed as Priority by the DBCA. OS = Listed as Other VSpecially Protected Species by the DBCA

FAMILY	SPECIES	COMMON NAME	CONSERVATION CODES		naturemap	PMST	DBCA	CLOSEST RECORD	DBCA RECORDS IN 15 YEARS	HABITAT PREFERENCE	LIKELIHOOD OF OCCURRENCE	REASONING
			DBCA	EPBC								
AVIAN												
MARINE & COASTAL BIRDS												
Charadriidae	*Charadrius leschenaultii*	Greater Sand Plover	IA (& VU at subsp. level)	VU, MI & MA	X					Tidal flats, preferring sandy substrates where it mainly forages for small crustaceans. Roosts on beaches at high tide, usually in association with other small waders, but more tolerant of hot dry sand[1]	Low	No appropriate habitat
	Charadrius mongolus	Lesser Sand Plover	EN & IA	EN, MI & MA	X					Tidal flats, tolerates muddy substrates[1]	Low	No appropriate habitat
	Pluvialis squatarola	Grey Plover	IA	MI & MA	X		X	20 km	0	Strictly coastal, restricted to large tidal flat systems[1]	Low	No appropriate habitat. No recent or close records
Diomedeidae	*Thalassarche melanophris impavida*	Campbell Island Albatross	VU & IA	VU & MA		X				Sub-Antarctic and subtropical waters from pelagic to shelf-break water habitats	Low	No appropriate habitat
Glareolidae	*Glareola maldivarum*	Oriental Pratincole	IA	MI & MA	X		X	13 km	2	Sometimes around bushfires; on open plains, open areas around tidal flats, beaches, wetlands[2]	Low	No appropriate habitat
Laridae	*Sterna albifrons*	Little tern		MA	X					Forage over sheltered waters and roost on exposed sandbars, spits or beaches. Nests in colonies in open sandy setting, sloe to tideline[1]	Low	No appropriate habitat
	Sterna bergii	Greater Crested Tern	IA	MI & MA	X					Coastal - ocean beaches, offshore islands, extending out to the deeper pelagic waters; inshore on estuaries, bays, harbours, coastal lagoons; inland on major rivers, occasionally on saline lakes, salt ponds near coast[2]	Low	No appropriate habitat
	Sterna caspia	Caspian Tern	IA	MI & MA	X					Occurs in sheltered coastal waters; also uses inland water bodies, including large rivers, fresh to saline lakes, reservoirs and temporary wetlands[1]	Low	No appropriate habitat
	Sterna dougallii	Roseate Tern	IA	MI & MA	X					Restricted to tropical and subtropical seas and coastlines, mainly associated with coral reefs and sparsely vegetated islands where colonies usually nests on beahes just above high water mark[1]	Low	No appropriate habitat
	Sterna nereis nereis	Australian Fairy Tern	VU	VU & MA		X				Marine, sheltered coasts, bays, inlets, estuaries, coastal lagoons, ocean beaches. Also near coastal wetlands, including salt ponds, lakes[2]	Low	No appropriate habitat
	Sterna nilotica	Gull-billed Tern		MA	X					Strictly coastal, at high tide often roosts with other terns/shorebirds[1]	Low	No appropriate habitat
Pandionidae	*Pandion haliaetus cristatus*	Eastern Osprey		MA	X					Patrols beaches and inshore habitats including coastal reaches of rivers and large, inland waterbodies[1]	Medium	Common species in the area, but will not be dependent on habitat
Procellariidae	*Macronectes giganteus*	Southern Giant Petrel	IA	EN, MI & MA		X				Southern oceans, will enter bays and harbours. Routinely ashore to feed and rest[1]	Low	No appropriate habitat
	Pterodroma mollis	Soft-plumaged Petrel		MA		X				Pelagic waters off sw WA to Exmouth and extending to Vic[1]	Low	No appropriate habitat
	Arenaria interpres	Ruddy Turnstone	IA	MI & MA	X		X	22 km	0	Broad range of coastal habitats, including tidal flats, ocean beaches and rocky shorelines[1]	Low	No appropriate habitat. No recent or close records
	Calidris acuminata	Sharp-tailed Sandpiper	IA	MI & MA			X	21 km	0	Fresh or salt wetlands – muddy edges of lagoons, swaps, lakes, dams, soaks, sewage farms, temporary floodwaters[2]	Low	No appropriate habitat. No recent or close records

FAMILY	SPECIES	COMMON NAME	CONSERVATION CODES		naturemap	PMST	DBCA	CLOSEST RECORD	DBCA RECORDS IN 15 YEARS	HABITAT PREFERENCE	LIKELIHOOD OF OCCURRENCE	REASONING
			DBCA	EPBC								
Scolopacidae	*Calidris canutus*	Red Knot	IA (& VU at subsp. level)	EN, MI & MA	X	X				Restricted to coastal sites with extensive, firm tidal flats[1]	Low	No appropriate habitat
	Calidris ferruginea	Curlew Sandpiper	VU & IA	CR, MI & MA		X				Inter-tidal mudflats of estuaries, lagoons, mangrove channels; around lakes, dams, floodwaters, flooded saltbush surrounds of inland lakes[2]	Low	No appropriate habitat
	Calidris ruficollis	Red-necked Stint	IA	MI & MA	X					Diverse – tidal and inland on mudflats, salt marshes, beaches, salt fields, temporary floodwaters[2]	Low	No appropriate habitat
	Calidris tenuirostris	Great Knot	VU & IA	CR, MI & MA	X					Restricted to large tidal-flat systems, typically follow tide edge when foraging. At high tide gather with other shore birds on beaches or open sites with a damp substrate[1]	Low	No appropriate habitat
	Limosa lapponica	Bar-tailed Godwit	IA	MI & MA	X	X	X			Shallow inland wetalnds and. Especially before wet season rains begin, on coast. Prefer sites with muddy substrates[1]	Low	No appropriate habitat
	Limosa lapponica menzbieri	-	VU	CR, MI & MA		X				Shallow inland wetalnds and. Especially before wet season rains begin, on coast. Prefer sites with muddy substrates[1]	Low	No appropriate habitat
	Numenius madagascariensis	Far Eastern Curlew (Eastern Curlew)	VU & IA	CR, MI & MA	X	X				Widespread but patchily distributed along coast, most numerous at sites with extensive tidal flats[1]	Low	No appropriate habitat
	Numenius phaeopus	Whimbrel	IA	MI & MA	X					Widespread along Australian coast, but more common in north, especially at sites with combination of large tidal flas and mangroves[1]	Low	No appropriate habitat
	Tringa brevipes	Grey-tailed Tattler	IA & P4	MI	X					Coastal in Australia, most numerous on large tidal flat systems, but some use rocky shorelines[1]	Low	No appropriate habitat
	Tringa cinerea	Terek Sandpiper	IA	MI & MA	X					Preferring large tidal-flat systems[1]	Low	No appropriate habitat
	Tringa hypoleucos	Common Sandpiper	IA	MI & MA	X					Varied coastal and interior wetlands – narrow muddy edges of billabongs, river pools, mangroves, among rocks and snags, reefs or rocky beaches; avoids wide open mudflats. Perches on branches, posts, boats[2]	Low	No appropriate habitat
	Tringa nebularia	Common Greenshank	IA	MI & MA	X					Diverse inland and coastal spots. Away from the coast - uses both permanent and temporary wetlands – billabongs, swamps, lakes, floodplains, sewage farms and salt works ponds, flooded irrigated crops. On the coast – uses sheltered estuaries and bays with extensive mudflats, mangrove swamps, muddy shallows of harbours and lagoons, occasionally rocky tidal ledges. Prefers wet and flooded mud and clay rather than sand[2]	Low	No appropriate habitat
LAND BIRDS												
Falconidae	*Falco hypoleucos*	Grey Falcon	VU		X		X	0.5 km	1	Open plains with treed watercourses in arid inland[1]	Medium	On outer extent of species distribution. Limited appropriate habitat
	Falco peregrinus	Peregrine Falcon	OS		X					Most environments with suitable nest sites: cliff faces preferred, including man-made ones, commonly uses stick nests built by other species[1]	Medium	Limited appropriate habitat
Meropidae	*Merops ornatus*	Rainbow Bee-eater		MA			X	3 km	12	Open country of woodlands, open forest, semi-arid scrub, grasslands, clearings in heaver forests, farmlands; avoids heavy forests that would hinder its aerial pursuit of insects. Breeding – requires open clearing or paddock with loamy soil soft enough for nest tunnelling[2]	High	Species has been recorded in close proximity on numerous occasions. Is also a common species distributed throughout most of Australia

FAMILY	SPECIES	COMMON NAME	CONSERVATION CODES DBCA	CONSERVATION CODES EPBC	naturemap	PMST	DBCA	CLOSEST RECORD	DBCA RECORDS IN 15 YEARS	HABITAT PREFERENCE	LIKELIHOOD OF OCCURRENCE	REASONING
Psittacidae	*Pezoporus occidentalis*	Night Parrot	CR	EN	X	X	X	6 km	0	Appears often to have been associated with spinifex, or among samphire bushes on margins of salt lakes[2]. habitat includes areas of old-growth dense spinifex (Triodia), clumps, often >50 years unburnt and especially humocks that are ring forming [5]	Low	Known preferred habitat for the species does not occur, Survey Are is on the margin of the species predicted distribution where it may occur
MAMMALIAN												
Dasyuridae	*Dasycercus blythi*	Brush-tailed Mulgara	P4		X		X	5 km	2	Spinifex grasslands of the arid zone; lives in burrows it figs on the flats between low sand dunes[4]	High	Species has been recorded in close proximity on two occassions.
	Dasyurus hallucatus	Northern Quoll	EN	EN		X				Dissected rocky excarpement but also in eucalypt forest and woodland, and around human settlements; occasionally in rainforest patches or on beaches[4]	Low	No recent records in close proximity. Most habitat is not appropriate, the Major Drainage Line is the only habitat that may be appropriate for the species.
Macropodidae	*Petrogale lateralis lateralis*	Black-footed Rock-wallaby	EN	VU		X				Temperate rocky islands in the Southern Ocean to spinifex-clad rocky hills in the central desert and pandanus-lined sandstone gorges in tropical NW Australia[4]	Low	No appropriate habitat
Muridae	*Leggadina lakedownensis*	Short-tailed Mouse	P4		X		X	0.5 km	6	Monsoon tropical coast to semi arid areas in spinifex and tussock grasslands, samphire, sedgelands, *Acacia* shrublands, tropical *Eucalyptus* and *Melaleuca* woodlands and stony ranges[4]	High	Appropriate habitat occurs within Survey Area and has been recorded on numerous occasions within close proximity
	Pseudomys fieldi	Shark Bay Mouse	VU	VU		X	X	15 km	0	Coastal fringes dominated by *Spinifex longifoliu* s, where it tunnels in storm-washed seagrass heaps; at lower densities in open steppe comprising *Triodia* and *Acacia*[4]	Low	Only occurs on offshore Islands
Rhinonycteridae	*Rhinonicteris aurantia (Pilbara form)*	Pilbara Leaf-nosed Bat	VU	VU		X				Forages in gorges and gullies, often over pools; also spinifex hummock grasslands. Roosts in relatively deep, warm and humid caves and mine adits[4]	Low	No appropriate habitat, Survey Area on western extent of species likely distribution
Thylacomyidae	*Macrotis lagotis*	Bilby, Dalgyte	VU	VU	X		X	17 km	0	Acacia shrubland and hummock grassland from Tanami Desert to near Broome and to Warburton. Also clay and stony downs in the southwest[1]	Low	Appropriate habitat present however Survey Area outside of species distribution
REPTILIAN												
Pygopodidae	*Aprasia rostrata*	Ningaloo Worm Lizard	P3		X		X	Previously Recorded	6	Variety of sandy habitats including white coastal dunes and red dunes vegetated with *Triodia*[3]	High	Species has been previously recorded within Survey Area, also numerous nearby records, and Survey Area contains approrpaite habitat, proimarily within the Dune and Triodia Grassland habitat

APPENDIX J

Flora Site Species Matrix

NAME	EMQ01	EMQ02	EMQ03	EMQ04	EMQ05	EMQ06	EMQ07	EMQ08	EMQ09	EMQ10	EMQ11	EMQ12	EMQ13	EMQ14	EMQ15	EMQ16	EMQ17	EMQ18	EMQ19	EMQ20	EMQ21	EMQ22	EMQ23	EMQ24	EMQ25	EMQ26	EMQ27	EMQ28	EMQ29	EMQ30	EMQ31	EMQ32	EMR01
Abutilon cunninghamii	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Abutilon geranioides	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Abutilon lepidum	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Abutilon sp.	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Abutilon sp. Dioicum (A.A. Mitchell PRP 1618)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0
Acacia ancistrocarpa	0	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1
Acacia bivenosa	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	0	1	0	1	1	1	1	1	0	0	0	1	1	1	1	1
Acacia citrinoviridis	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia coriacea subsp. *coriacea*	1	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0
Acacia cuspidifolia	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia gregorii	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Acacia ligulata	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Acacia inaequilatera	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1
Acacia sclerosperma	0	1	0	0	0	0	0	1	1	1	0	0	1	1	1	0	1	0	1	1	1	0	1	0	0	0	0	1	0	0	1	0	0
Acacia startii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acacia synchronicia	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0
Acacia tetragonophylla	0	0	0	0	0	0	1	1	1	0	0	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	0
Acacia xiphophylla	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthocarpus verticillatus	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aerva javanica	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alectryon oleifolius subsp. *oleifolius*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Aristida contorta	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Atriplex ? bunburyana	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bonamia erecta	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Brachyscome iberidifolia	0	0	0	1	0	0	0	1	0	0	0	1	1	1	0	0	1	1	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0
Bulbostylis barbata	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Calandrinia polyandra	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
Calotis plumulifera	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Capparis lasiantha	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Capparis mitchellii	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Capparis spinosa subsp. *nummularia*	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cenchrus ciliaris	0	1	1	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	1	0	1
Chrysopogon fallax	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Codonocarpus cotinifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
Commicarpus australis	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Convolvulus clementii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corchorus crozophorifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Corchorus elachocarpus	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	0
Corynotheca micrantha	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0
Cucumis variabilis	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Cullen martinii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cymbopogon ambiguus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Dampiera incana var. *incana*	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
Datura leichhardtii	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Decazesia hecatocephala	0	0	1	1	1	1	0	1	0	0	0	1	0	0	1	1	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	1	1
Dianella revoluta	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dichanthium sericeum subsp. *humilius*	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicladanthera forrestii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diplopeltis eriocarpa	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Dissocarpus paradoxus	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Duperreya commixta	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Duppereya commixta	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dysphania plantaginella	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	1	1	1	1	0	1	1	0	1
Enchylaena tomentosa	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Eragrostis eriopoda	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0
Eremophila cuneifolia	0	0	1	0	1	0	0	1	1	1	1	1	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0
Eremophila forrestii subsp. *forrestii*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Eremophila latrobei subsp. *latrobei*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eremophila longifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Eremophila setacea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Eremophila miniata	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eriachne aristidea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Eriachne helmsii	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Eriachne mucronata	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0
Eriachne pulchella	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Erodium cygnorum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Eucalyptus victrix	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Euphorbia biconvexa	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	1	1	1	1	1	0	0	0	0	0
Euphorbia tannensis subsp. *eremophila*	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0
Evolvulus alsinoides var. *villosicalyx*	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exocarpos aphyllus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Flaveria trinervia	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Goodenia forrestii	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0

NAME	EMQ01	EMQ02	EMQ03	EMQ04	EMQ05	EMQ06	EMQ07	EMQ08	EMQ09	EMQ10	EMQ11	EMQ12	EMQ13	EMQ14	EMQ15	EMQ16	EMQ17	EMQ18	EMQ19	EMQ20	EMQ21	EMQ22	EMQ23	EMQ24	EMQ25	EMQ26	EMQ27	EMQ28	EMQ29	EMQ30	EMQ31	EMQ32	EMR01
Goodenia microptera	1	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	1	1	1	0
Grevillea stenobotrya	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Hakea lorea	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Hakea stenophylla subsp. *stenophylla*	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Haloragis gossei var. *gossei*	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Haloragis gossei var. *inflata*	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0
Hannafordia quadrivalvis subsp. *quadrivalvis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0
Heliotropium crispatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Heliotropium inexplicitum	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heliotropium pachyphyllum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Hibiscus sturtii	0	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Hypochaeris glabra	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Indigofera chamaeclada subsp. *pubens*	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0
Indigofera colutea	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Indigofera linifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Indigofera monophylla	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0
Ixiochlamys cuneifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Labichea cassioides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Lepidium platypetalum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lobelia heterophylla subsp. *pilbarensis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Lotus australis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maireana georgei	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Maireana polypterygia	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Malvastrum americanum	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Marsdenia australis	0	0	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Marsilea drummondii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Melaleuca cardiophylla	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
Nicotiana occidentalis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Nicotiana occidentalis subsp. *occidentalis*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0
Olearia sp. Kennedy Range (G. Byrne 66)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Panicum decompositum	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paractaenum refractum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Phyllanthus erwinii	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pimelea ammocharis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0
Podolepis aristata subsp. *aristata*	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0
Pterocaulon sphacelatum	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Ptilotus appendiculatus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ptilotus axillaris	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Ptilotus divaricatus	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Ptilotus helipteroides	0	0	0	0	0	1	1	1	1	0	0	0	0	1	0	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	1	1	1
Ptilotus latifolius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ptilotus macrocephalus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Ptilotus nobilis	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ptilotus obovatus	0	0	1	0	0	0	1	1	1	1	1	1	1	0	1	0	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	1
Ptilotus polystachyus	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Ptilotus villosiflorus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Quoya loxocarpa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
Rhagodia eremaea	0	0	0	0	0	0	1	1	0	1	1	0	0	1	1	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Rhodanthe floribunda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodanthe humboldtiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Rhynchosia minima	0	1	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Salsola australis	0	0	1	0	0	0	0	0	0	1	1	1	0	1	0	1	1	1	1	1	0	0	0	1	1	0	0	0	1	0	0	0	0
Scaevola cunninghamii	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Scaevola pulchella	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Scaevola sericophylla	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Scaevola spinescens	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Schenkia clementii	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schoenia ayersii	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Sclerolaena costata	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sclerolaena diacantha	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sclerolaena stylosa	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Senna artemisioides subsp. *helmsii*	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senna artemisioides subsp. *oligophylla*	0	0	1	0	1	0	1	1	1	1	1	0	0	0	0	1	1	1	1	0	0	0	1	0	0	0	1	0	1	0	0	1	0
Senna ferraria	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Senna glutinosa	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Senna glutinosa subsp. *pruinosa*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Senna sp. Meekatharra (E. Bailey 1-26)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sida arenicola	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sida arsiniata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Sida fibulifera	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sida rohlenae subsp. *rohlenae*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Solanum lasiophyllum	0	0	1	1	1	1	0	1	0	0	0	0	1	0	0	1	1	1	0	0	0	1	0	1	1	1	0	1	0	1	0	0	1
Stackhousia sp. Mid west coastal (D. & B. Bellairs 6561)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NAME	EMQ01	EMQ02	EMQ03	EMQ04	EMQ05	EMQ06	EMQ07	EMQ08	EMQ09	EMQ10	EMQ11	EMQ12	EMQ13	EMQ14	EMQ15	EMQ16	EMQ17	EMQ18	EMQ19	EMQ20	EMQ21	EMQ22	EMQ23	EMQ24	EMQ25	EMQ26	EMQ27	EMQ28	EMQ29	EMQ30	EMQ31	EMQ32	EMR01
Stylobasium spathulatum	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Swainsona pterostylis	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tephrosia uniovulata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0
Thryptomene dampieri	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	0
Trianthema pilosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Tribulus sp.	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trichodesma zeylanicum	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Tricoryne corynothecoides	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Trigastrotheca molluginea	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Triodia epactia	1	1	1	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	1	0	1	1	1	1	1	1	1	0	1	0	0
Triodia glabra	0	0	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1
Vachellia farnesiana	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
Verticordia forrestii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
Vigna lanceolata var. *lanceolata*	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Vittadinia eremaea	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wurmbea odorata	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zygophyllum aurantiacum	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zygophyllum retivalve	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX K

Systematic Flora Species List

Family	Species	Comments
Acanthaceae	*Dicladanthera forrestii*	
Aizoaceae	*Trianthema pilosum*	
Amaranthaceae	**Aerva javanica*	weed
	Ptilotus appendiculatus	
	Ptilotus axillaris	
	Ptilotus divaricatus	
	Ptilotus helipteroides	
	Ptilotus latifolius	
	Ptilotus macrocephalus	
	Ptilotus nobilis	
	Ptilotus obovatus	
	Ptilotus polystachyus	
	Ptilotus villosiflorus	
Apocynaceae	*Marsdenia australis*	
Asparagaceae	*Acanthocarpus verticillatus*	
Asteraceae	*Brachyscome iberidifolia*	
	Calotis plumulifera	
	Decazesia hecatocephala	
	**Flaveria trinervia*	weed
	**Hypochaeris glabra*	weed
	Ixiochlamys cuneifolia	
	Olearia sp. Kennedy Range (G. Byrne 66)	
	Podolepis aristata subsp. *aristata*	
	Pterocaulon sphacelatum	
	Rhodanthe floribunda	
	Rhodanthe humboldtiana	
	Rhodanthe psammophila	
	Schoenia ayersii	
	Vittadinia eremaea	
Boraginaceae	*Trichodesma zeylanicum*	
	Heliotropium crispatum	
	Heliotropium inexplicitum	
	Heliotropium pachyphyllum	
Brassicaceae	*Lepidium platypetalum*	
Campanulaceae	*Lobelia heterophylla* subsp. *pilbarensis*	
Capparaceae	*Capparis lasiantha*	
	Capparis mitchellii	
	Capparis spinosa subsp. *nummularia*	
Celastraceae	*Stackhousia* sp. Mid west coastal (D. & B. Bellairs 6561)	
Chenopodiaceae	*Atriplex ? bunburyana*	
	Dissocarpus paradoxus	
	Dysphania plantaginella	
	Enchylaena tomentosa	
	Maireana georgei	
	Maireana polypterygia	

Family	Species	Comments
Chenopodiaceae	*Rhagodia eremaea*	
	Salsola australis	
	Sclerolaena costata	
	Sclerolaena diacantha	
	Sclerolaena stylosa	P1
Colchicaceae	*Wurmbea odorata*	
Convolvulaceae	*Bonamia erecta*	
	Convolvulus clementii	
	Duperreya commixta	
	Evolvulus alsinoides var. *villosicalyx*	
Cucurbitaceae	*Cucumis variabilis*	
Cyperaceae	*Bulbostylis barbata*	
Euphorbiaceae	*Euphorbia biconvexa*	
	Euphorbia tannensis subsp. *eremophila*	
Fabaceae	*Acacia ? citrinoviridis*	
	Acacia ancistrocarpa	
	Acacia bivenosa	
	Acacia citrinoviridis	
	Acacia cuspidifolia	
	Acacia gregorii	
	Acacia ligulata	
	Acacia inaequilatera	
	Acacia sclerosperma	
	Acacia spathulifolia	
	Acacia startii	P3
	Acacia stellaticeps	
	Acacia synchronicia	
	Acacia tetragonophylla	
	Acacia xiphophylla	
	Cullen martinii	
	Indigofera chamaeclada subsp. pubens	
	Indigofera colutea	
	Indigofera linifolia	
	Indigofera monophylla	
	Labichea cassioides	
	Lotus australis	
	Rhynchosia minima	
	Senna artemisioides subsp. helmsii	
	Senna artemisioides subsp. oligophylla	
	Senna ferraria	
	Senna glutinosa	
	Senna glutinosa subsp. pruinosa	
	Senna sp. Meekatharra (E. Bailey 1-26)	
	Swainsona pterostylis	
	Tephrosia uniovulata	
	**Vachellia farnesiana*	weed

Family	Species	Comments
Fabaceae	*Vigna lanceolata var. lanceolata*	
Gentianaceae	*Schenkia clementii*	
Geraniaceae	*Erodium cygnorum*	
Goodeniaceae	*Dampiera incana* var. *incana*	
	Goodenia forrestii	
	Goodenia microptera	
	Scaevola cunninghamii	
	Scaevola pulchella	
	Scaevola sericophylla	
	Scaevola spinescens	
	Scaevola tomentosa	
Gyrostemonaceae	*Codonocarpus cotinifolius*	
Haloragaceae	*Haloragis gossei* var. *gossei*	
	Haloragis gossei var. *inflata*	
Hemerocallidaceae	*Corynotheca micrantha*	
	Dianella revoluta	
	Tricoryne corynothecoides	
Lamiaceae	*Quoya loxocarpa*	
Malvaceae	*Abutilon cunninghamii*	
	Abutilon geranioides	
	Abutilon lepidum	
	Abutilon sp.	
	Abutilon sp. Dioicum (A.A. Mitchell PRP 1618)	
	Corchorus ? elachocarpus	
	Corchorus crozophorifolius	
	Corchorus elachocarpus	
	Hannafordia quadrivalvis subsp. *quadrivalvis*	
	Hibiscus sturtii	
	**Malvastrum americanum*	weed
	Sida arenicola	
	Sida arsiniata	
	Sida fibulifera	
	Sida rohlenae subsp. *rohlenae*	
Marsileaceae	*Marsilea drummondii*	
Molluginaceae	*Trigastrotheca molluginea*	
Montiaceae	*Calandrinia polyandra*	
Myrtaceae	*Corymbia zygophylla*	
	Eucalyptus victrix	
	Melaleuca cardiophylla	
	Thryptomene dampieri	
	Verticordia forrestii	
Nyctaginaceae	*Commicarpus australis*	
Papaveraceae	*Argemone ochroleuca*	weed
Phyllanthaceae	*Phyllanthus erwinii*	
Poaceae	*Aristida contorta*	
	**Cenchrus ciliaris*	weed

Family	Species	Comments
Poaceae	*Chrysopogon fallax*	
	Cymbopogon ambiguus	
	Dichanthium sericeum subsp. *humilius*	
	Eragrostis eriopoda	
	Eragrostis xerophila	
	Eriachne aristidea	
	Eriachne helmsii	
	Eriachne mucronata	
	Eriachne pulchella	
	Panicum decompositum	
	Paractaenum refractum	
	Paspalidium basicladum	
	Triodia epactia	
	Triodia glabra	
Proteaceae	*Grevillea stenobotrya*	
	Hakea lorea	
	Hakea stenophylla subsp. *stenophylla*	
Santalaceae	*Exocarpos aphyllus*	
Sapindaceae	*Alectryon oleifolius* subsp. *oleifolius*	
	Diplopeltis eriocarpa	
Scrophulariaceae	*Eremophila cuneifolia*	
	Eremophila forrestii subsp. *forrestii*	
	Eremophila latrobei subsp. *glabra*	
	Eremophila latrobei subsp. *latrobei*	
	Eremophila longifolia	
	Eremophila maculata subsp. *brevifolia*	
	Eremophila miniata	
	Eremophila setacea	
Solanaceae	**Datura leichhardtii*	weed
	Nicotiana occidentalis	
	Nicotiana occidentalis subsp. *occidentalis*	
	Solanum elatius	
	Solanum lasiophyllum	
Surianaceae	*Stylobasium spathulatum*	
Thymelaeaceae	*Pimelea ammocharis*	
Zygophyllaceae	*Tribulus* sp.	sterile
	Zygophyllum aurantiacum	
	Zygophyllum retivalve	

APPENDIX L

Flora and Fauna Site Data Sheets

Fauna Habitat Assessment - Grassland with low Shrubs 5

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-16 **Quadrat Size:** 50x50 **Latitude:** -22.671274 **Longitude:** 114.011657

Vegetation

Vegetation Description: McTdTe. Melaleuca cardiophylla shrubland over T

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	1.5	2	Sparse
Midstorey	*Mertacea*	0.5	10	Sparse
Understorey	*Triodia*	0.3	60	Dense

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Light brown orange	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	20-50%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Major Drainage 1

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-15 **Quadrat Size:** 50x50 **Latitude:** -22.677177 **Longitude:** 114.046690

Vegetation

Vegetation Description: EvAcAt. Eucalyptus victrix woodland over Acacia

Botanical Province: Eremaean and Northern
Vegetation Condition: Degraded

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*White Eucalyptus*	8	30	Moderate
Midstorey	*Acacia shrubs*	2	15	Sparse
Understorey	*Buffle*	0.3	40	Moderate

Soil				Water			
Soil Texture	Clay	Soil Colour	Brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	20-50%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	<2%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	10-20%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	Rare	Cattle Disturbance	Heavy	Other Disturbance	0
Peeling Bark	None	Termite Mounds	None				

Fauna Habitat Assessment - Major Drainage 2

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-15 **Quadrat Size:** 50x50 **Latitude:** -22.668836 **Longitude:** 114.121250

Vegetation

Vegetation Description: EvAcAt. Eucalyptus victrix woodland over Acacia

Botanical Province: Eremaean and Northern
Vegetation Condition: Poor

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*White Eucalyptus*	8	15	Sparse
Midstorey	*Acacia shrubs*	2	20	Moderate
Understorey	*Buffle and herbs*	0.2	25	Moderate

Soil

Soil Texture	Clay	Soil Colour	Light brown

Water

Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	2-10%	Rocks (20-60cm)	2-10%	Bare Ground	50-90%	Hummock Grass	0%
Small Stones (0.6-2cm)	2-10%	Big Rocks (60cm-2m)	<2%	Leaf Litter	<2%	Tussock Grass	20-50%
Stones (2-6cm)	2-10%	Boulders (>2m)	<2%	Logs >10cm	<2%	Herbs	<2%
Small Rocks (6-20cm)	2-10%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	No damage
Rock Crevices	<2%	Tree Hollows	Rare	Cattle Disturbance	Heavy	Other Disturbance	0
Peeling Bark	None	Termite Mounds	None				

Fauna Habitat Assessment - Major Drainage 3

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-14 **Quadrat Size:** 50x50 **Latitude:** -22.656009 **Longitude:** 114.168989

Vegetation

Vegetation Description: EvAcAt. Eucalyptus victrix woodland over Acacia

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*White Eucalyptus*	10	30	Moderate
Midstorey	*Acacia*	3	30	Moderate
Understorey	*Buffle*	0.4	70	Dense

Soil

Soil Texture	Clay-loam	Soil Colour	Light brown

Water

Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	2-10%	Rocks (20-60cm)	<2%	Bare Ground	10-20%	Hummock Grass	0%
Small Stones (0.6-2cm)	<2%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	<2%	Boulders (>2m)	0%	Logs >10cm	<2%	Herbs	2-10%
Small Rocks (6-20cm)	<2%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	Rare	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	None	Termite Mounds	None				

Fauna Habitat Assessment - Minor Drainage 1

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-13 **Quadrat Size:** 0 **Latitude:** -22.660612 **Longitude:** 114.241833

Vegetation

Vegetation Description: AcVfCc. Acacia coriacea subsp. coriacea shrublar

Botanical Province: Eremaean and Northern
Vegetation Condition:

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	0	0	0	Sparse
Midstorey	0	0	0	Sparse
Understorey	0	0	0	Sparse

Soil

Soil Texture	Loam	Soil Colour	Pale brown

Water

Water Prescence	0	Water Distance	0

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	0%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	0	Tussock Grass	0%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0	Herbs	0%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	0	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	0	Last Fire	0	Fire Intensity	0
Rock Crevices	0%	Tree Hollows	0	Cattle Disturbance	0	Other Disturbance	0
Peeling Bark	0	Termite Mounds	0				

Fauna Habitat Assessment - Minor Drainage 2

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-14 **Quadrat Size:** 50x50 **Latitude:** -22.660836 **Longitude:** 114.247148

Vegetation

Vegetation Description: AcVfCc. Acacia coriacea subsp. coriacea shrublar

Botanical Province: Eremaean and Northern
Vegetation Condition: Poor

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia tetragonaphyla, mimosa bush, A. Coriacea, A. Zyphophila*	4	30	Moderate
Midstorey	*Acacia*	1.5	20	Moderate
Understorey	*Buffle grass*	0.5	90	Dense

Soil

Soil Texture	Clay-loam	Soil Colour	Pale brown

Water

Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	<2%	Rocks (20-60cm)	0%	Bare Ground	2-10%	Hummock Grass	0%
Small Stones (0.6-2cm)	<2%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	<2%	Boulders (>2m)	0%	Logs >10cm	<2%	Herbs	2-10%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	10-20%	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Minor Drainage 3

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-13 **Quadrat Size:** 50x50 **Latitude:** -22.661182 **Longitude:** 114.263435

Vegetation

Vegetation Description: AcVfCc. Acacia coriacea subsp. coriacea shrublar

Botanical Province: Eremaean and Northern

Vegetation Condition:

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	0	0	0	Sparse
Midstorey	0	0	0	Sparse
Understorey	0	0	0	Sparse

Soil

Soil Texture	0	Soil Colour	0

Water

Water Presence	0	Water Distance	0

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	0%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	0	Tussock Grass	0%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0	Herbs	0%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	0	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	0	Last Fire	0	Fire Intensity	0
Rock Crevices	0%	Tree Hollows	0	Cattle Disturbance	0	Other Disturbance	0
Peeling Bark	0	Termite Mounds	0				

Fauna Habitat Assessment - Acacia Shrubland 21

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-17 **Quadrat Size:** 50x50 **Latitude:** -22.858492 **Longitude:** 114.487510

Vegetation

Vegetation Description: AaSaTg. Acacia ancistrocarpa shrubland over Tric

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia bivenosa and Acacia ancistrocarpa*	1.8	50	Moderate
Midstorey	*Triodia epactia and wiseana*	0.4	0	Sparse
Understorey	*None*	0	0	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Orange	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 22

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-12 **Quadrat Size:** 50x50 **Latitude:** -22.862954 **Longitude:** 114.487915

Vegetation

Vegetation Description: AaSaTg. Acacia ancistrocarpa shrubland over Tric

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia shrubs*	1.5	40	Moderate
Midstorey	*Triodia*	0.3	30	Moderate
Understorey	*Limited*	0.1	0	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Pale red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	<2%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	>90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	<2%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	Rare	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Previous Disturbance Revegetation 1

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-12 **Quadrat Size:** 0 **Latitude:** -22.769051 **Longitude:** 114.413435

Vegetation

Vegetation Description: Previous disturbance, revegetation

Botanical Province: Eremaean and Northern
Vegetation Condition:

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*0*	0	0	Sparse
Midstorey	*0*	0	0	Sparse
Understorey	*0*	0	0	Sparse

Soil				Water			
Soil Texture	0	Soil Colour	0	Water Prescence	0	Water Distance	0

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	0%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	0	Tussock Grass	0%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0	Herbs	0%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	0	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	0	Last Fire	0	Fire Intensity	0
Rock Crevices	0%	Tree Hollows	0	Cattle Disturbance	0	Other Disturbance	0
Peeling Bark	0	Termite Mounds	0				

Fauna Habitat Assessment - Dune 1

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-16 **Quadrat Size:** 50x50 **Latitude:** -22.673367 **Longitude:** 114.018100

Vegetation

Vegetation Description: CcVfTe. Codonocarpus cotinifolius, Acacia spp., \

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	1.5	20	Moderate
Midstorey	*Verticordia small shrubs*	0.8	20	Moderate
Understorey	*Triodia epactia and herbs*	0.3	60	Dense

Soil				Water			
Soil Texture	Sand	Soil Colour	Red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	10-20%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Medium	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Dune 2

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-19 **Quadrat Size:** 50x50 **Latitude:** -22.673778 **Longitude:** 114.021351

Vegetation

Vegetation Description: CcVfTe. Codonocarpus cotinifolius, Acacia spp., \

Botanical Province: 0

Vegetation Condition:

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*0*	0	0	Sparse
Midstorey	*0*	0	0	Sparse
Understorey	*0*	0	0	Sparse

Soil

Soil Texture	Sand	Soil Colour	Red

Water

Water Prescence	0	Water Distance	0

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	0	Tussock Grass	0%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0	Herbs	0%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	0	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	0	Last Fire	0	Fire Intensity	0
Rock Crevices	0%	Tree Hollows	0	Cattle Disturbance	0	Other Disturbance	0
Peeling Bark	0	Termite Mounds	0				

Fauna Habitat Assessment - Dune 3

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-16 **Quadrat Size:** 50x50 **Latitude:** -22.673689 **Longitude:** 114.033976

Vegetation

Vegetation Description: CcVfTe. Codonocarpus cotinifolius, Acacia spp., \

Botanical Province: Eremaean and Northern

Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	1.5	30	Moderate
Midstorey	*Triodia*	0.3	40	Moderate
Understorey	*Herbs*	0.1	2	Sparse

Soil

Soil Texture	Sand	Soil Colour	Red

Water

Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	<2%	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	No damage
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Medium	Other Disturbance	0
Peeling Bark	None	Termite Mounds	None				

Fauna Habitat Assessment - Grassland with low Shrubs 1

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-11 **Quadrat Size:** 50x50 **Latitude:** -22.788140 **Longitude:** 113.949057

Vegetation

Vegetation Description: McTdTe. Melaleuca cardiophylla shrubland over T

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia coriacea, erimophila and Melaleuca calliophila*	1	5	Sparse
Midstorey	*Triodia epactia*	0.3	60	Dense
Understorey	*Herbs*	0.1	5	Sparse

Soil				Water			
Soil Texture	Sand	Soil Colour	Pale orange	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	<2%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	>90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	<2%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	1-3 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	Roadside runoff
Peeling Bark	None	Termite Mounds	None				

Fauna Habitat Assessment - Grassland with low Shrubs 2

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-11 **Quadrat Size:** 50x50 **Latitude:** -22.721347 **Longitude:** 113.979423

Vegetation

Vegetation Description: McTdTe. Melaleuca cardiophylla shrubland over T

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*0*	0	0	Sparse
Midstorey	*0*	0	0	Sparse
Understorey	*0*	0	0	Sparse

Soil				Water			
Soil Texture	Sand	Soil Colour	Light orange	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	<2%	Tussock Grass	>90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	1-3 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	None	Termite Mounds	None				

Fauna Habitat Assessment - Grassland with low Shrubs 3

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-16 **Quadrat Size:** 50x50 **Latitude:** -22.679041 **Longitude:** 114.002056

Vegetation

Vegetation Description: McTdTe. Melaleuca cardiophylla shrubland over T

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	3	1	Sparse
Midstorey	*Mertacae and Melaleuca*	0.6	20	Moderate
Understorey	*Triodia*	0.4	70	Dense

Soil				Water			
Soil Texture	Sand	Soil Colour	Light brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	10-20%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	2-10%	Woody Debris	10-20%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	2-10%	Tree Hollows	None	Cattle Disturbance	None	Other Disturbance	0
Peeling Bark	None	Termite Mounds	None				

Fauna Habitat Assessment - Grassland with low Shrubs 4

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-16 **Quadrat Size:** 50x50 **Latitude:** -22.659671 **Longitude:** 114.012248

Vegetation

Vegetation Description: McTdTe. Melaleuca cardiophylla shrubland over T

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	3	2	Sparse
Midstorey	*Mertacae and Melaleuca*	0.6	5	Sparse
Understorey	*Triodia epactia grassland*	0.4	70	Dense

Soil				Water			
Soil Texture	Sand	Soil Colour	Light brown red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	10-20%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	None	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 11

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-17 **Quadrat Size:** 50x50 **Latitude:** -22.703992 **Longitude:** 114.314635

Vegetation

Vegetation Description: AbAtTg. Acacia bivenosa shrubland over Triodia g

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia bivenosa*	2	30	Moderate
Midstorey	*Triodia epactia grassland*	0.4	70	Dense
Understorey	*NA*	0	0	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Red brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	Rare	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 12

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-12 **Quadrat Size:** 50x50 **Latitude:** -22.714195 **Longitude:** 114.302278

Vegetation

Vegetation Description: AbAtTg. Acacia bivenosa shrubland over Triodia g

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	2	30	Moderate
Midstorey	*Triodia*	0.3	0.3	Sparse
Understorey	*Herbs*	0.1	2	Sparse

Soil				Water			
Soil Texture	Clay	Soil Colour	Red brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	<2%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	<2%	Big Rocks (60cm-2m)	0%	Leaf Litter	<2%	Tussock Grass	20-50%
Stones (2-6cm)	<2%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	0%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 13

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-13 **Quadrat Size:** 50x50 **Latitude:** -22.713561 **Longitude:** 114.299667

Vegetation

Vegetation Description: AxAcCc. Acacia xiphophylla shrubland over *Cen

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	0	0	0	Sparse
Midstorey	0	0	0	Sparse
Understorey	0	0	0	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Brown red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	<2%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	<2%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 14

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-13 **Quadrat Size:** 50x50 **Latitude:** -22.717146 **Longitude:** 114.296821

Vegetation

Vegetation Description: AbAtTg. Acacia bivenosa shrubland over Triodia g

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	0	0	0	Sparse
Midstorey	0	0	0	Sparse
Understorey	0	0	0	Sparse

Soil				Water			
Soil Texture	Clay-loam	Soil Colour	Brown red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	2-10%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	2-10%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	2-10%	Boulders (>2m)	0%	Logs >10cm	<2%	Herbs	2-10%
Small Rocks (6-20cm)	<2%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 15

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-17 **Quadrat Size:** 50x50 **Latitude:** -22.729942 **Longitude:** 114.371055

Vegetation

Vegetation Description: AbAtTg. Acacia bivenosa shrubland over Triodia g

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	1.8	10	Sparse
Midstorey	*Triodia epactia grassland*	0.4	60	Dense
Understorey	*Herbs*	0.3	1	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Orange	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	No damage
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 16

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-12 **Quadrat Size:** 50x50 **Latitude:** -22.756748 **Longitude:** 114.396221

Vegetation

Vegetation Description: AiHlTg. Acacia inaequilatera shrubland over Triodi

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*0*	0	0	Sparse
Midstorey	*0*	0	0	Sparse
Understorey	*0*	0	0	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Light red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	20-50%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	<2%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	1-3 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 17

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-12 **Quadrat Size:** 50x50 **Latitude:** -22.766624 **Longitude:** 114.412682

Vegetation

Vegetation Description: AiHITg. Acacia inaequilatera shrubland over Triodi

Botanical Province:	Eremaean and Northern
Vegetation Condition:	Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	0	0	0	Sparse
Midstorey	0	0	0	Sparse
Understorey	0	0	0	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Light red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	50-90%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	<2%	Tussock Grass	20-50%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 18

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-17 **Quadrat Size:** 50x50 **Latitude:** -22.771379 **Longitude:** 114.416386

Vegetation

Vegetation Description: AiHITg. Acacia inaequilatera shrubland over Triodi

Botanical Province:	Eremaean and Northern
Vegetation Condition:	Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia inequilatera and Hakea*	4	5	Sparse
Midstorey	*Acacia ancistrocarpa*	1.5	10	Sparse
Understorey	*Triodia wiseana and native geasses*	0.4	50	Moderate

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Orange	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	4-5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 19

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-12 **Quadrat Size:** 50x50 **Latitude:** -22.855260 **Longitude:** 114.487626

Vegetation

Vegetation Description: AiHlTg. Acacia inaequilatera shrubland over Triodi

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*0*	0	0	Sparse
Midstorey	*0*	0	0	Sparse
Understorey	*0*	0	0	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Light red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	<2%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 20

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-12 **Quadrat Size:** 50x50 **Latitude:** -22.856389 **Longitude:** 114.486606

Vegetation

Vegetation Description: AaSaTg. Acacia ancistrocarpa shrubland over Tric

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	2	50	Moderate
Midstorey	*Triodia wiseana*	0.3	60	Dense
Understorey	*Herbs*	0	0	Sparse

Soil				Water			
Soil Texture	Sandy-clay	Soil Colour	Light red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	>90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 1

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-15 **Quadrat Size:** 50x50 **Latitude:** -22.675387 **Longitude:** 114.027021

Vegetation

Vegetation Description: McTdTe. Melaleuca cardiophylla shrubland over T

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia shrubs*	1.5	20	Moderate
Midstorey	*Senna acacia*	0.5	20	Moderate
Understorey	*Triodia epactia*	0.3	70	Dense

Soil				Water			
Soil Texture	Sand	Soil Colour	Light red	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	10-20%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	None	Termite Mounds	None				

Fauna Habitat Assessment - Acacia Shrubland 2

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-15 **Quadrat Size:** 50x50 **Latitude:** -22.655258 **Longitude:** 114.121305

Vegetation

Vegetation Description: AxAcCc. Acacia xiphophylla shrubland

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia zyphophila, Acacia tetragonaphyla*	2	25	Moderate
Midstorey	*Senna and Acacia*	0.5	10	Sparse
Understorey	*Buffle and annuals*	0.3	25	Moderate

Soil				Water			
Soil Texture	Clay	Soil Colour	Brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	10-20%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	<2%	Big Rocks (60cm-2m)	0%	Leaf Litter	<2%	Tussock Grass	20-50%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	20-50%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Heavy	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 3

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-14 **Quadrat Size:** 50x50 **Latitude:** -22.665503 **Longitude:** 114.134269

Vegetation

Vegetation Description: AxAcCc. Acacia xiphophylla shrubland

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia zyphophila*	3	20	Moderate
Midstorey	*Acacia tetragonaphyla*	1.8	20	Moderate
Understorey	*Triodia epactia, Buffle and chenopod*	0.4	10	Sparse

Soil

Soil Texture	Clay	Soil Colour	Brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	<2%	Rocks (20-60cm)	0%	Bare Ground	50-90%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	<2%	Tussock Grass	10-20%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	<2%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	<2%	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	No	Last Fire	4-5 years	Fire Intensity	Major
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 4

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-18 **Quadrat Size:** 50x50 **Latitude:** -22.652713 **Longitude:** 114.169499

Vegetation

Vegetation Description: AbAtTg. Acacia bivenosa shrubland over Triodia g

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia bivenosa*	1.5	20	Moderate
Midstorey	*Triodia wiseana*	0.3	60	Dense
Understorey	*Isolated herbd*	0.1	0.1	Sparse

Soil

Soil Texture	Clay	Soil Colour	Brown	Water Prescence	Moderate	Water Distance	<500m

Ground Cover

Pebbles (<0.6cm)	10-20%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	10-20%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	10-20%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	<2%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats

Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Medium	Other Disturbance	Farming
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 5

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-14 **Quadrat Size:** 0 **Latitude:** -22.648801 **Longitude:** 114.199142

Vegetation

Vegetation Description: AxAcCc. Acacia xiphophylla shrubland

Botanical Province: Eremaean and Northern
Vegetation Condition: Degraded

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*0*	0	0	Sparse
Midstorey	*0*	0	0	Sparse
Understorey	*0*	0	0	Sparse

Soil				Water			
Soil Texture	0	Soil Colour	0	Water Prescence	0	Water Distance	0

Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	0%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	0	Tussock Grass	0%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0	Herbs	0%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	0	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	0	Last Fire	0	Fire Intensity	0
Rock Crevices	0%	Tree Hollows	0	Cattle Disturbance	0	Other Disturbance	0
Peeling Bark	0	Termite Mounds	0				

Fauna Habitat Assessment - Acacia Shrubland 6

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-14 **Quadrat Size:** 50x50 **Latitude:** -22.648101 **Longitude:** 114.199262

Vegetation

Vegetation Description: AbAtTg. Acacia bivenosa shrubland over Triodia g

Botanical Province: Eremaean and Northern
Vegetation Condition: Very Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	2	2	Sparse
Midstorey	*Senna*	1	2	Sparse
Understorey	*Triodia*	0.4	70	Dense

Soil				Water			
Soil Texture	Clay	Soil Colour	Brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	<2%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	<2%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	<2%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	<2%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 7

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-14 **Quadrat Size:** 50x50 **Latitude:** -22.660885 **Longitude:** 114.224626

Vegetation

Vegetation Description: AcMpSs. Acacia cuspidifolia shrubland over Maire

Botanical Province: Eremaean and Northern
Vegetation Condition: Degraded

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	2	10	Sparse
Midstorey	*Chenopod shrub*	1	10	Sparse
Understorey	*Buffle*	0.3	60	Dense

Soil				Water			
Soil Texture	Clay-loam	Soil Colour	Light brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	2-10%	Rocks (20-60cm)	0%	Bare Ground	20-50%	Hummock Grass	0%
Small Stones (0.6-2cm)	<2%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 8

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-14 **Quadrat Size:** 50x50 **Latitude:** -22.660237 **Longitude:** 114.234691

Vegetation

Vegetation Description: AcMpSs. Acacia cuspidifolia shrubland over Maire

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	2	30	Moderate
Midstorey	*Buffle grassland*	0.4	50	Moderate
Understorey	*Chenopod and herbs*	0.1	10	Sparse

Soil				Water			
Soil Texture	Clay-loam	Soil Colour	Light brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	10-20%	Rocks (20-60cm)	<2%	Bare Ground	50-90%	Hummock Grass	0%
Small Stones (0.6-2cm)	10-20%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	20-50%
Stones (2-6cm)	2-10%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	2-10%	Outcrop	0%	Woody Debris	2-10%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 9

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-13 **Quadrat Size:** 50x50 **Latitude:** -22.661711 **Longitude:** 114.263668

Vegetation

Vegetation Description: AcMpSs. Acacia cuspidifolia shrubland over Maire

Botanical Province: Eremaean and Northern
Vegetation Condition: Good

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	2	20	Moderate
Midstorey	*Senna*	0.5	30	Moderate
Understorey	*Sclerolena*	0.2	30	Moderate

Soil				Water			
Soil Texture	Clay-loam	Soil Colour	Light orange brown	Water Prescence	None	Water Distance	>5 km

Ground Cover

Pebbles (<0.6cm)	2-10%	Rocks (20-60cm)	0%	Bare Ground	50-90%	Hummock Grass	0%
Small Stones (0.6-2cm)	<2%	Big Rocks (60cm-2m)	0%	Leaf Litter	2-10%	Tussock Grass	2-10%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	0%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	<2%	Other:	Chenopods

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

Fauna Habitat Assessment - Acacia Shrubland 10

Project: 2891 Minilya Exmouth Biological Survey 2018 **Date:** 2018-09-13 **Quadrat Size:** 50x50 **Latitude:** -22.679577 **Longitude:** 114.287974

Vegetation

Vegetation Description: AcVfCc. Acacia coriacea subsp. coriacea, Acacia

Botanical Province: Eremaean and Northern
Vegetation Condition:

Stratum	Vegetation Species	Height (m)	% Cover	Description
Overstorey	*Acacia*	2.5	40	Moderate
Midstorey	*Kapok*	1	10	Sparse
Understorey	*Buffle*	0.5	80	Dense

Soil				Water			
Soil Texture	Clay-loam	Soil Colour	Light brown/orange	Water Prescence	None	Water Distance	>5 km

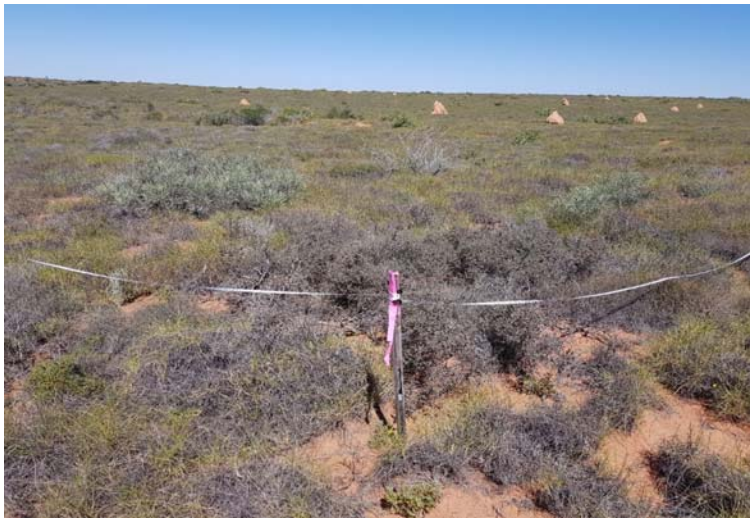
Ground Cover

Pebbles (<0.6cm)	0%	Rocks (20-60cm)	0%	Bare Ground	10-20%	Hummock Grass	0%
Small Stones (0.6-2cm)	0%	Big Rocks (60cm-2m)	0%	Leaf Litter	20-50%	Tussock Grass	50-90%
Stones (2-6cm)	0%	Boulders (>2m)	0%	Logs >10cm	<2%	Herbs	<2%
Small Rocks (6-20cm)	0%	Outcrop	0%	Woody Debris	10-20%	Other:	0

Microhabitats				Disturbance			
Exfoliating Slabs	0%	Caves	No	Last Fire	>5 years	Fire Intensity	Minor
Rock Crevices	0%	Tree Hollows	None	Cattle Disturbance	Mild	Other Disturbance	0
Peeling Bark	Rare	Termite Mounds	Rare				

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ01 **MGA** 49K 802774 **mE** 7476922 **mN**



Described by: SF
Date: 2018-09-11
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand
Habitat: Plain
Vegetation: McTdTe

Melaleuca cardiophylla, *Acacia coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *Acacia sclerosperma*, *Thryptomene dampieri*, *Acacia gregorii* low isolated shrubs over *Triodia epactia* tall closed grassland

Veg Condition: Very Good
Fire Age: 1-5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** - %
Total PFC: 75 % **Bareground:** 10 % **Leaf Litter:** 5 % **Logs:** 0 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Acacia coriacea subsp. *coriacea*	1	5	
Acacia gregorii	0.4	0.5	
Corynotheca micrantha	0.2	0.1	
Dampiera incana var. *incana*	0.2	0.5	
Dianella revoluta	1	0.1	
Diplopeltis eriocarpa	0.4	3	
Eremophila miniata	1	0.5	
Eriachne mucronata	0.3	5	
Goodenia microptera	0.1	0.1	
Hakea stenophylla subsp. *stenophylla*	0.5	2	
Haloragis gossei var. *inflata*	0.1	0.1	
Indigofera chamaeclada subsp. *pubens*	0.1	0.1	
Melaleuca cardiophylla	0.6	7	
Podolepis aristata subsp. *aristata*	0.1	0.1	
Ptilotus nobilis	0.7	0.1	
Scaevola cunninghamii	0.5	0.5	
Senna ferraria	0.3	0.1	
Swainsona pterostylis	0.1	0.1	
Thryptomene dampieri	0.1	10	
Triodia epactia	0.5	60	
Wurmbea odorata	0.1	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ02 **MGA** 49K 806033 **mE** 7484277 **mN**

Described by: SF
Date: 2018-09-11
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand
Habitat: Plain
Vegetation: McTdTe

Melaleuca cardiophylla, *Acacia coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *Acacia sclerosperma*, *Thryptomene dampieri*, *Acacia gregorii* low isolated shrubs over *Triodia epactia* tall closed grassland

Veg Condition: Good
Fire Age: 1-5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** - %
Total PFC: 60 % **Bareground:** 38 % **Leaf Litter:** 2 % **Logs:** 0 %
Disturbance Type: Weeds

SPECIES LIST

Name	Height	Cover	Notes
Acacia coriacea subsp. *coriacea*	1.7	0.1	
Acacia sclerosperma	0.5	0.5	
Acanthocarpus verticillatus	0.5	0.1	
Cenchrus ciliaris	0.2	5	
Chrysopogon fallax	1	0.1	
Dysphania plantaginella	0.05	0.1	
Eragrostis eriopoda	0.2	0.1	
Eriachne helmsii	0.3	1	
Euphorbia tannensis subsp. *eremophila*	0.1	0.1	
Goodenia microptera	0.1	0.1	
Hakea stenophylla subsp. *stenophylla*	0.5	0	Just outside
Haloragis gossei var. *inflata*	0.05	0.1	
Hibiscus sturtii	1	0.1	
Indigofera chamaeclada subsp. *pubens*	0.1	0.1	
Indigofera colutea	0.1	0.1	
Melaleuca cardiophylla	0.6	4	
Podolepis aristata subsp. *aristata*	0.1	0.1	
Ptilotus axillaris	0.05	0.1	
Ptilotus nobilis	1	0.1	
Rhynchosia minima	0.1	0.1	
Scaevola cunninghamii	0.3	0.1	
Sclerolaena diacantha	0.2	0	Just outside
Stackhousia sp. Mid west coastal (D. & B. Bellairs 6561)	0.1	0.1	
Swainsona pterostylis	0.1	0.1	
Thryptomene dampieri	0.2	1	
Triodia epactia	0.5	50	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ03 **MGA** 50K 242122 **mE** 7469707 **mN**

Described by: SF
Date: 2018-09-12
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand,Medium Clay
Habitat: Plain
Vegetation: AaSaTg

Acacia ancistrocarpa, Acacia bivenosa tall open shrubland over *Senna artemisioides* subsp. *oligophylla, Eremophila cuneifolia* mid sparse shrubland over *Triodia epactia* and *Triodia glabra* tall open tussock grassland

Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** - %
Total PFC: 40 % **Bareground:** 55 % **Leaf Litter:** 5 % **Logs:** 0 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Acacia ancistrocarpa	1.9	1	
Acacia bivenosa	1.8	15	
Cenchrus ciliaris	1	0.1	
Decazesia hecatocephala	0.05	0.1	
Eremophila cuneifolia	1.5	5	
Hibiscus sturtii	0.3	0.1	
Maireana georgei	0.5	0.1	
Ptilotus obovatus	0.6	0	Just outside
Ptilotus polystachyus	0.05	0.1	
Salsola australis	0.1	0.1	
Sclerolaena costata	0.5	0.1	
Senna artemisioides subsp. *oligophylla*	1.4	3	
Solanum lasiophyllum	0.8	0.1	
Stylobasium spathulatum	1.5	0.1	
Triodia epactia	0.5	1	
Triodia glabra	0.5	15	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ04 **MGA** 50K 242493 **mE** 7470032 **mN**

Described by: SF
Date: 2018-09-12
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Medium Clay
Habitat: Plain
Vegetation: AiHlTg

Acacia inaequilatera tall sparse shrubland over *Acacia ancistrocarpa, Hakea lorea* and *Acacia bivenosa* mid open shrubland over *Triodia glabra* tall grassland

Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** - %
Total PFC: 75 % **Bareground:** 15 % **Leaf Litter:** 10 % **Logs:** 0 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Acacia ancistrocarpa	2.2	30	
Acacia bivenosa	0.1	1	
Acacia inaequilatera	2.3	5	
Aristida contorta	0.5	0.1	
Brachyscome iberidifolia	0.05	0.1	
Bulbostylis barbata	0.05	0.1	
Decazesia hecatocephala	0.1	0.1	
Dysphania plantaginella	0.1	0.1	
Euphorbia tannensis subsp. *eremophila*	0.1	0.1	
Goodenia microptera	0.1	0.1	
Hakea lorea	0.5	1	
Haloragis gossei var. *gossei*	0.1	0.1	
Hibiscus sturtii	0.3	0.1	
Phyllanthus erwinii	0.05	0.1	
Ptilotus polystachyus	0.4	0.1	
Ptilotus polystachyus	0.05	0.1	
Solanum lasiophyllum	0.4	0.1	
Triodia glabra	0.5	65	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ05 **MGA** 50K 242034 **mE** 7470202 **mN**

Described by: SF
Date: 2018-09-12
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Soft Clay
Habitat: Plain
Vegetation: AaSaTg

Acacia ancistrocarpa, Acacia bivenosa tall open shrubland over *Senna artemisioides* subsp. *oligophylla, Eremophila cuneifolia* mid sparse shrubland over *Triodia epactia* and *Triodia glabra* tall open tussock grassland

Veg Condition: Excellent
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** 0<1 % **Outcropping:** 0 %
Total PFC: 50 % **Bareground:** 45 % **Leaf Litter:** 5 % **Logs:** 0 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Acacia ancistrocarpa	2	2	
Acacia bivenosa	2.2	20	
Bonamia erecta	0.2	0.1	
Decazesia hecatocephala	0.05	0.1	
Dysphania plantaginella	0.05	0.1	
Eremophila cuneifolia	0.5	0.5	
Senna artemisioides subsp. *oligophylla*	1.5	0	
Solanum lasiophyllum	0.5	0.5	
Triodia glabra	0.5	40	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ06 **MGA** 50K 234251 **mE** 7479811 **mN**

Described by: SF
Date: 2018-09-12
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Soft Clay
Habitat: Plain
Vegetation: AiHlTg

Acacia inaequilatera tall sparse shrubland over *Acacia ancistrocarpa, Hakea lorea* and *Acacia bivenosa* mid open shrubland over *Triodia glabra* tall grassland

Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** - %
Total PFC: 40 % **Bareground:** 56 % **Leaf Litter:** 4 % **Logs:** 0 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Acacia ancistrocarpa	1.5	1	
Acacia bivenosa	0.5	0.1	
Acacia citrinoviridis	2.1	0.1	
Acacia inaequilatera	3	2	
Aristida contorta	0.05	0.1	
Bulbostylis barbata	0.05	0.1	
Calandrinia polyandra	0.1	0.1	
Decazesia hecatocephala	0.05	0.1	
Dysphania plantaginella	0.05	0.1	
Eriachne pulchella	0.05	0.1	
Euphorbia tannensis subsp. *eremophila*	0.05	0.1	
Goodenia forrestii	0.05	0.1	
Goodenia microptera	0.1	0.1	
Hakea lorea	2	2	
Haloragis gossei var. *gossei*	0.1	0.1	
Ptilotus axillaris	0.05	0.1	
Ptilotus helipteroides	0.1	0.1	
Ptilotus polystachyus	0.15	0.1	
Solanum lasiophyllum	1	1	
Trigastrotheca molluginea	0.1	0.1	
Triodia glabra	0.6	35	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ07 **MGA** 50K 222912 **mE** 7485614 **mN**

Described by: SF
Date: 2018-09-12
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Medium Clay
Habitat: Plain
Vegetation: AbAtTg

Acacia bivenosa, Acacia synchronicia, Acacia sclerosperma tall open shrubland over *Acacia tetragonophylla, Senna artemisioides* subsp. *oligophylla, Solanum lasiophyllum* low isolated clumps of shrubs over **Cenchrus ciliaris, Triodia epactia* grassland

Veg Condition: Very Good
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 0<1 % **Outcropping:** - %
Total PFC: 75 % **Bareground:** 15 % **Leaf Litter:** 10 % **Logs:** 0 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Abutilon cunninghamii	0.2	0.1	
Abutilon lepidum	0.2	0.1	
Abutilon sp.	0.05	0.1	Sterile
Acacia bivenosa	2.5	50	
Acacia tetragonophylla	1	0.1	
Cenchrus ciliaris	0.2	1	
Chrysopogon fallax	1.2	2	
Corchorus elachocarpus	0.2	0.1	
Duperreya commixta	1.5	1	
Dysphania plantaginella	0.05	0.1	
Euphorbia biconvexa	0.05	0.1	
Flaveria trinervia	0.2	0.5	
Goodenia forrestii	0.2	0.1	
Goodenia microptera	0.1	0.1	
Haloragis gossei var. *gossei*	0.1	0.1	
Heliotropium inexplicitum	0.05	0.1	
Hibiscus sturtii	0.6	0.1	
Indigofera monophylla	1	2	
Ptilotus helipteroides	0.1	0.1	
Ptilotus obovatus	1	0.5	
Rhagodia eremaea	0.5	0.1	
Rhynchosia minima	0.1	0.1	
Senna artemisioides subsp. *helmsii*	0.3	0.1	
Senna artemisioides subsp. *oligophylla*	1.2	5	
Triodia epactia	0.5	20	
Triodia glabra	0.5	10	
Vittadinia eremaea	0.1	0.1	
Zygophyllum retivalve	0.2	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ08 **MGA** 50K 222637 **mE** 7485641 **mN**

Described by: SF
Date: 2018-09-13
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Medium Clay
Habitat: Plain
Vegetation: AbAtTg

Acacia bivenosa, Acacia synchronicia, Acacia sclerosperma tall open shrubland over *Acacia tetragonophylla, Senna artemisioides* subsp. *oligophylla, Solanum lasiophyllum* low isolated clumps of shrubs over **Cenchrus ciliaris, Triodia epactia* grassland

Veg Condition: Very Good
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** - %
Total PFC: 60 % **Bareground:** 20 % **Leaf Litter:** 20 % **Logs:** 0 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Abutilon lepidum	0.2	0.1	
Acacia bivenosa	2	8	
Acacia sclerosperma	2.2	2	
Acacia synchronicia	2.5	2	
Acacia tetragonophylla	2	12	
Brachyscome iberidifolia	0.1	0.1	
Calotis plumulifera	0.1	0.1	
Cenchrus ciliaris	0.5	5	
Decazesia hecatocephala	0.05	0.1	
Dichanthium sericeum subsp. *humilius*	0.05	0.1	
Duperreya commixta	0.1	0.1	
Dysphania plantaginella	0.05	0.1	
Enchylaena tomentosa	1	0.1	
Eremophila cuneifolia	1.7	5	
Euphorbia biconvexa	0.05	0.1	
Evolvulus alsinoides var. *villosicalyx*	0.1	0.1	
Flaveria trinervia	0.1	0.1	
Goodenia forrestii	0.2	0.1	
Indigofera colutea	0.05	0.1	
Maireana georgei	0.7	0.1	
Malvastrum americanum	0.6	0.1	
Nicotiana occidentalis	0.1	0.1	
Panicum decompositum	0.5	0.1	
Pterocaulon sphacelatum	0.6	0.1	
Ptilotus helipteroides	0.05	0.1	
Ptilotus obovatus	0.5	0.1	
Rhagodia eremaea	1.5	1	
Rhynchosia minima	0.1	0.1	
Schoenia ayersii	0.4	0.1	
Sclerolaena costata	0.2	0.1	
Senna artemisioides subsp. *oligophylla*	1	2	
Sida fibulifera	0.1	0.1	

Solanum lasiophyllum	0.4	0.1
Trichodesma zeylanicum	0.2	0.1
Triodia epactia	0.5	40
Zygophyllum retivalve	0.1	0.1

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ09 **MGA** 50K 222344 **mE** 7485242 **mN**

Described by: SF
Date: 2018-09-13
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Medium Clay
Habitat: Plain
Vegetation: AbAtTg

Acacia bivenosa, Acacia synchronicia, Acacia sclerosperma tall open shrubland over *Acacia tetragonophylla, Senna artemisioides* subsp. *oligophylla, Solanum lasiophyllum* low isolated clumps of shrubs over **Cenchrus ciliaris, Triodia epactia* grassland

Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** Burnt Trunks
Notes
Rock Type Limestone **Rock Cover:** 0<1 % **Outcropping:** - % **Logs:** 0 %
Total PFC: 70 % **Bareground:** 15 % **Leaf Litter:** 15 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Abutilon cunninghamii	0.4	0.1	
Acacia ligulata	2	1	
Acacia sclerosperma	3.2	5	
Acacia tetragonophylla	2	10	
Acacia xiphophylla	2.1	2	
Cenchrus ciliaris	0.5	15	
Dichanthium sericeum subsp. *humilius*	0.05	0.1	
Duperreya commixta	0.1	0.1	
Dysphania plantaginella	0.05	0.1	
Eragrostis eriopoda	0.1	0.1	
Eremophila cuneifolia	1	2	
Euphorbia tannensis subsp. *eremophila*	0.1	0.1	
Evolvulus alsinoides var. *villosicalyx*	0.05	0.1	
Exocarpos aphyllus	1.1	0	Just outside
Flaveria trinervia	0.05	0.1	
Goodenia forrestii	0.1	0.1	
Goodenia forrestii	0.1	0.1	
Indigofera colutea	0.2	0.1	
Indigofera monophylla	0.5	0.1	
Maireana georgei	0.4	0.1	
Marsdenia australis	1	0.1	
Ptilotus helipteroides	0.05	0.1	
Ptilotus obovatus	1	3	
Rhynchosia minima	0.1	0.1	
Schoenia ayersii	0.2	0.1	
Senna artemisioides subsp. *oligophylla*	1	1	
Sida arenicola	1	0.5	
Stylobasium spathulatum	1	1	
Triodia glabra	0.6	20	
Zygophyllum retivalve	0.05	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ10 **MGA** 50K 221317 **mE** 7489518 **mN**

Described by: SF
Date: 2018-09-13
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Heavy Clay
Habitat: Plain
Vegetation: AcMpSs

Acacia cuspidifolia tall open shrubland over *Acacia synchronicia, Maireana polypterygia, Eremophila cuneifolia* mid isolated clumps of shrubs over **Cenchrus ciliaris* low grassland over *Maireana georgei, Sclerolaena stylosa* (P1) low isolated clumps of chenopods

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 1-5 % **Outcropping:** <2 % **Logs:** 7 %
Total PFC: 30 % **Bareground:** 60 % **Leaf Litter:** 5 %
Disturbance Type: Weeds, Clearing

SPECIES LIST

Name	Height	Cover	Notes
Acacia sclerosperma	1.2	15	
Acacia synchronicia	1.1	0.1	
Acacia xiphophylla	2	5	
Capparis lasiantha	1	0.1	
Cenchrus ciliaris	0.3	2	
Enchylaena tomentosa	0.6	0.1	
Eremophila cuneifolia	1	0.5	
Goodenia forrestii	0.05	0.1	
Maireana georgei	1	0.5	
Maireana polypterygia	1	1	
Ptilotus divaricatus	0.3	0.1	
Ptilotus obovatus	0.5	0.1	
Rhagodia eremaea	1.2	0.1	
Salsola australis	0.1	0.1	
Sclerolaena costata	0.1	0.1	
Senna artemisioides subsp. *helmsii*	1.2	1	
Senna artemisioides subsp. *oligophylla*	0.6	3	
Sida fibulifera	0.1	0.1	
Tribulus sp.	0.05	0.1	
Triodia glabra	0.6	5	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ11 **MGA** 50K 218793 **mE** 7491344 **mN**

Described by: SF
Date: 2018-09-13
Type: Quadrat 30 x 30
Soil Colour: Light Brown,Orange
Soil Type: Loam,Sand,Medium Clay
Habitat: Plain
Vegetation: AcMpSs

Acacia cuspidifolia tall open shrubland over *Acacia synchronicia, Maireana polypterygia, Eremophila cuneifolia* mid isolated clumps of shrubs over **Cenchrus ciliaris* low grassland over *Maireana georgei, Sclerolaena stylosa* (P1) low isolated clumps of chenopods

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 0<1 % **Outcropping:** 0 %
Total PFC: 35 % **Bareground:** 50 % **Leaf Litter:** 15 % **Logs:** 0 %
Disturbance Type: Vehicle tracks,Weeds,Litter,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Acacia cuspidifolia	2.2	15	
Acacia synchronicia	1	0.1	
Aerva javanica	0.6	0.1	
Atriplex ? bunburyana	0.5	0.1	
Cenchrus ciliaris	0.2	0.1	
Commicarpus australis	1	0.1	
Enchylaena tomentosa	0.6	0.1	
Eremophila cuneifolia	1	0.1	
Maireana polypterygia	1	1	
Marsdenia australis	0.8	0.1	
Ptilotus obovatus	0.6	0.1	
Rhagodia eremaea	1.1	0.1	
Salsola australis	0.05	0.1	
Sclerolaena stylosa	0.1	10	
Senna artemisioides subsp. *oligophylla*	1	0.5	
Senna glutinosa	0.5	0.1	
Zygophyllum aurantiacum	1	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ12 **MGA** 50K 216569 **mE** 7491376 **mN**

Described by: SF
Date: 2018-09-13
Type: Quadrat 30 x 30
Soil Colour: Light Brown
Soil Type: Heavy Clay
Habitat: Drainage line
Vegetation: AcVfCc

Acacia coriacea subsp. *coriacea, Acacia sclerosperma, Acacia xiphophylla* tall shrubland over **Vachellia farnesiana, Acacia tetragonophylla, Abutilon geranioides* mid sparse shrubland over **Cenchrus ciliaris* tall closed grassland

Veg Condition: Degraded
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** - %
Total PFC: 70 % **Bareground:** 20 % **Leaf Litter:** 10 % **Logs:** 0 %
Disturbance Type: Weeds,Litter,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Acacia coriacea subsp. *coriacea*	1.8	7	
Acacia cuspidifolia	0.3	0.1	
Acacia synchronicia	0.7	0.1	
Acacia tetragonophylla	2	1	
Acacia xiphophylla	4	30	
Atriplex ? bunburyana	0.2	0.1	
Brachyscome iberidifolia	0.05	0.1	
Capparis mitchellii	1	0.5	
Cenchrus ciliaris	0.3	35	
Cucumis variabilis	0.5	0.1	
Decazesia hecatocephala	0.05	0.1	
Dissocarpus paradoxus	0.2	0.1	
Eremophila cuneifolia	0.4	0.5	
Maireana polypterygia	0.6	7	
Malvastrum americanum	0.4	0.1	
Marsdenia australis	1.5	0.1	
Ptilotus obovatus	0.4	0.1	
Salsola australis	0.1	0.1	
Scaevola spinescens	1.5	0.1	
Senna artemisioides subsp. *helmsii*	1.2	1	
Vachellia farnesiana	2.2	2	Dense outside of quadrat
Vigna lanceolata var. *lanceolata*	0.5	0.5	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ13 **MGA** 50K 217080 **mE** 7491409 **mN**

Described by: SF
Date: 2018-09-14
Type: Quadrat 30 x 30
Soil Colour: Light Brown,Orange
Soil Type: Loam,Medium Clay
Habitat: Drainage line
Vegetation: AcVfCc

Acacia coriacea subsp. *coriacea, Acacia sclerosperma, Acacia xiphophylla* tall shrubland over **Vachellia farnesiana, Acacia tetragonophylla, Abutilon geranioides* mid sparse shrubland over* *Cenchrus ciliaris* tall closed grassland

Veg Condition: Degraded
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 0<1 % **Outcropping:** 0
Total PFC: 90 % **Bareground:** 5 % **Leaf Litter:** 4 % **Logs:** 1 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Abutilon geranioides	2	0.5	
Acacia coriacea subsp. *coriacea*	3	3	
Acacia inaequilatera	1.8	1	
Acacia sclerosperma	2.5	5	
Acacia tetragonophylla	2	1	
Acacia xiphophylla	4	2	
Brachyscome iberidifolia	0.05	0.1	
Calotis plumulifera	0.05	0.1	
Cenchrus ciliaris	0.6	80	
Cucumis variabilis	0.6	0.1	
Duperreya commixta	1	0.1	
Flaveria trinervia	1.2	0.5	
Hypochaeris glabra	0.6	0.1	
Maireana polypterygia	0.8	1	
Malvastrum americanum	0.4	0.1	
Marsdenia australis	0.5	0.1	
Pterocaulon sphacelatum	0.1	0.1	
Ptilotus obovatus	1	0.1	
Rhynchosia minima	0.1	0.1	
Schenkia clementii	0.1	0.1	
Sida fibulifera	0.1	0.1	
Solanum lasiophyllum	0.5	0.1	
Vachellia farnesiana	2.5	5	
Vigna lanceolata var. *lanceolata*	0.5	0.5	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ14 **MGA** 50K 216595 **mE** 7491419 **mN**

Described by: SF
Date: 2018-09-14
Type: Quadrat 30 x 30
Soil Colour: Light Brown,Orange
Soil Type: Loam,Medium Clay
Habitat: Drainage line
Vegetation: AcVfCc

Acacia coriacea subsp. *coriacea, Acacia sclerosperma, Acacia xiphophylla* tall shrubland over **Vachellia farnesiana, Acacia tetragonophylla, Abutilon geranioides* mid sparse shrubland over **Cenchrus ciliaris* tall closed grassland

Veg Condition: Degraded
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** -
Total PFC: 80 % **Bareground:** 2 % **Leaf Litter:** 5 % **Logs:** 2 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Abutilon geranioides	1.2	1	
Acacia coriacea subsp. *coriacea*	4	15	
Acacia sclerosperma	2	15	
Brachyscome iberidifolia	0.1	0.1	
Capparis spinosa subsp. *nummularia*	1	0.1	
**Cenchrus ciliaris*	0.6	70	
Cucumis variabilis	1	0.1	
**Datura leichhardtii*	0.5	0.1	
Hypochaeris glabra	0.1	0.1	
Maireana polypterygia	0.6	1	
Ptilotus divaricatus	1	0.1	
Ptilotus helipteroides	0.1	0.1	
Rhagodia eremaea	0.5	0.1	
Salsola australis	0.1	0.1	
Vachellia farnesiana	0.2	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ15 **MGA** 50K 215875 **mE** 7491442 **mN**

Described by: SF
Date: 2018-09-14
Type: Quadrat 30 x 30
Soil Colour: Light Brown,Orange
Soil Type: Loam,Medium Clay
Habitat: Plain
Vegetation: AcMpSs

Acacia cuspidifolia tall open shrubland over *Acacia synchronicia, Maireana polypterygia, Eremophila cuneifolia* mid isolated clumps of shrubs over **Cenchrus ciliaris* low grassland over *Maireana georgei, Sclerolaena stylosa* (P1) low isolated clumps of chenopods

Veg Condition: Degraded
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 0<1 % **Outcropping:** 0
Total PFC: 55 % **Bareground:** 20 % **Leaf Litter:** 25 % **Logs:** 2 %
Disturbance Type: Weeds,Litter,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Acacia cuspidifolia	2.5	10	
Acacia sclerosperma	0.1	0.5	
Acacia xiphophylla	1	0.5	
Cenchrus ciliaris	0.5	40	
Decazesia hecatocephala	0.05	0.1	
Eremophila cuneifolia	1	0.1	
Maireana georgei	0.2	0.5	
Maireana polypterygia	0.7	8	
Ptilotus obovatus	0.5	0.1	
Rhagodia eremaea	1	1	
Rhodanthe floribunda	0.1	0.1	
Sclerolaena stylosa	0.2	0.5	P1

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ16 **MGA** 50K 214510 **mE** 7491377 **mN**

Described by: SF
Date: 2018-09-14
Type: Quadrat 30 x 30
Soil Colour: Light Brown,Orange
Soil Type: Loam,Medium Clay
Habitat: Plain
Vegetation: AcMpSs

Acacia cuspidifolia tall open shrubland over *Acacia synchronicia, Maireana polypterygia, Eremophila cuneifolia* mid isolated clumps of shrubs over **Cenchrus ciliaris* low grassland over *Maireana georgei, Sclerolaena stylosa* (P1) low isolated clumps of chenopods

Veg Condition: Good
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 0<1 % **Outcropping:** 0
Total PFC: 30 % **Bareground:** 50 % **Leaf Litter:** 15 % **Logs:** 5 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

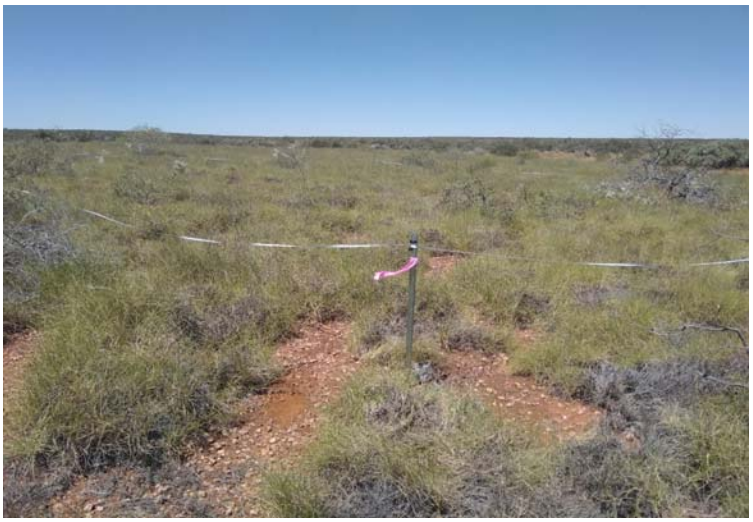
Name	Height	Cover	Notes
Acacia cuspidifolia	2	5	
Cenchrus ciliaris	0.5	2	
Decazesia hecatocephala	0.05	2	
Dissocarpus paradoxus	0.6	0.1	
Enchylaena tomentosa	1	0.1	
Eremophila latrobei subsp. *latrobei*	0.5	0.1	
Maireana georgei	0.1	0.1	
Maireana polypterygia	0.7	20	
Ptilotus helipteroides	0.05	0.1	
Rhagodia eremaea	1	0.1	
Rhodanthe floribunda	0.05	0.1	
Rhodanthe humboldtiana	0.05	0.1	
Salsola australis	0.1	0.1	
Sclerolaena diacantha	0.1	0.1	
Sclerolaena stylosa	0.1	0.1	
Senna artemisioides subsp. *oligophylla*	0.5	0.1	
Solanum lasiophyllum	0.3	0	
Triodia epactia	0.5	0	
Zygophyllum retivalve	0.5	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ17 **MGA** 50K 212142 **mE** 7492715 **mN**

Described by: AH
Date: 2018-09-14
Type: Quadrat 30 x 30
Soil Colour: Brown
Soil Type: Clay
Habitat: Hill
Vegetation: AbAtTg

Acacia bivenosa, Acacia synchronicia, Acacia sclerosperma tall open shrubland over *Acacia tetragonophylla, Senna artemisioides* subsp. *oligophylla, Solanum lasiophyllum* low isolated clumps of shrubs over **Cenchrus ciliaris* , *Triodia epactia* grassland



Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type calcrete **Rock Cover:** 21-50 % **Outcropping:** 0
Total PFC: 70 % **Bareground:** 27 % **Leaf Litter:** 3 % **Logs:** 0 %
Disturbance Type: Grazing Light,Weeds

SPECIES LIST

Name	Height	Cover	Notes
Acacia bivenosa	1.2	2	
Acacia sclerosperma	1.8	0.1	
Acacia synchronicia	1	3	
Acacia tetragonophylla	0.8	1	
Brachyscome iberidifolia	0.1	0.1	
Capparis spinosa subsp. *nummularia*	0.2	0.1	
Cenchrus ciliaris	0.5	3	
Duperreya commixta	0.6	0.1	
Goodenia microptera	0.1	0.1	
Indigofera monophylla	0.2	0.1	
Lepidium platypetalum	0.4	0.1	
Melaleuca cardiophylla	0.6	0.1	
Ptilotus helipteroides	0.1	0.1	
Ptilotus obovatus	0.5	0.1	
Salsola australis	0.1	0.1	
Senna artemisioides subsp. *oligophylla*	0.6	2	
Senna glutinosa subsp. *pruinosa*	1.5	1	
Sida fibulifera	0.1	0.1	
Solanum lasiophyllum	0.7	2	
Triodia epactia	0.4	65	
Zygophyllum retivalve	0.3	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ18 **MGA** 50K 209088 **mE** 7491693 **mN**

Described by: SF
Date: 2018-09-14
Type: Quadrat 30 x 30
Soil Colour: Light Brown,Orange
Soil Type: Loam,Medium Clay
Habitat: Drainage line
Vegetation: EvAcAt

Eucalyptus victrix low woodland over *Acacia coriacea* subsp. *coriacea* tall open shrubland over *Acacia tetragonophylla, Acacia inaequilatera, Acacia bivenosa* mid sparse shrubland over *Acacia sclerosperma, Abutilon lepidum, *Vachellia farnesiana* low isolated clumps of shrubs over **Cenchrus ciliaris* tall grassland

Veg Condition: Degraded
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** -
Total PFC: 70 % **Bareground:** 15 % **Leaf Litter:** 10 % **Logs:** 4 %
Disturbance Type: Weeds,Cattle tracks/scats, clearing

SPECIES LIST

Name	Height	Cover	Notes
Acacia coriacea subsp. *coriacea*	2.5	20	
Acacia inaequilatera	1	0.5	
Acacia tetragonophylla	2	1	
Alectryon oleifolius subsp. *oleifolius*	0.5	0.1	
Brachyscome iberidifolia	0.1	0.1	
Cenchrus ciliaris	0.6	65	
Commicarpus australis	0.4	0.1	
Convolvulus clementii	0.05	0.1	
Decazesia hecatocephala	0.05	0.1	
Duppereya commixta	0.5	0.1	
Eucalyptus victrix	8	20	
Euphorbia biconvexa	0.05	0.1	
Goodenia microptera	0.05	0.1	
Hypochaeris glabra	0.2	0.1	
Indigofera linifolia	0.05	0.1	
Indigofera monophylla	0.4	0.1	
Lotus australis	0.1	0.1	
Malvastrum americanum	0.1	0.1	
Nicotiana occidentalis subsp. *occidentalis*	1	0.1	
Pterocaulon sphacelatum	0.1	0.1	
Ptilotus helipteroides	0.1	0.1	
Ptilotus nobilis	0.2	0.1	
Rhynchosia minima	0.2	0.1	
Salsola australis	0.15	0.1	
Schenkia clementii	0.1	0.1	
Senna artemisioides subsp. *oligophylla*	0.1	0.5	
Solanum lasiophyllum	0.2	0.1	
Trichodesma zeylanicum	0.1	0.1	
Vachellia farnesiana	1	0.1	
Vigna lanceolata var. *lanceolata*	0.5	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ19 **MGA** 50K 205551 **mE** 7490683 **mN**

Described by: SF
Date: 2018-09-14
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Medium Clay
Habitat: Plain
Vegetation: AxAcCc

Acacia xiphophylla, Acacia synchronicia, Acacia tetragonophylla tall open shrubland over *Acacia coriacea* subsp. *coriacea, Acacia sclerosperma, Alectryon oleifolius* subsp. *oleifolius* mid isolated clumps of shrubs over **Cehchrus ciliaris* open grassland

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 0<1 % **Outcropping:** 0
Total PFC: 65 % **Bareground:** 20 % **Leaf Litter:** 15 % **Logs:** 2 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Abutilon cunninghamii	0.1	0.1	
Acacia bivenosa	1.1	3	
Acacia coriacea subsp. *coriacea*	1	0.1	
Acacia sclerosperma	1.2	0.1	
Acacia startii	1.2	0.1	
Acacia tetragonophylla	1.6	1	
Acacia xiphophylla	2.2	25	
Cenchrus ciliaris	0.6	30	
Cullen martinii	0.3	0.1	
Dicladanthera forrestii	0.2	0.1	
Dysphania plantaginella	0.05	0.1	
Enchylaena tomentosa	0.6	0.1	
Eremophila cuneifolia	1	0.5	
Erodium cygnorum	0.2	0.1	
Evolvulus alsinoides var. *villosicalyx*	0.1	0.1	
Hypochaeris glabra	0.1	0.1	
Maireana georgei	0.5	0.1	
Maireana polypterygia	1	0.5	
Marsdenia australis	1.2	0.1	
Ptilotus appendiculatus	0.1	0.1	
Ptilotus divaricatus	0.2	0.1	
Ptilotus helipteroides	0.2	1	
Ptilotus nobilis	0.2	0.1	
Ptilotus obovatus	1.7	0.5	
Rhagodia eremaea	1.7	0.5	
Rhodanthe floribunda	0.05	0.1	
Salsola australis	0.1	0.1	
Sclerolaena diacantha	0.1	0.1	
Senna artemisioides subsp. oligophylla	1	0.1	
Senna sp. Meekatharra (E. Bailey 1-26)	1	1	
Trichodesma zeylanicum	0.3	0.1	
Zygophyllum retivalve	0.1	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ20 **MGA** 50K 204057 **mE** 7491772 **mN**

Described by: SF
Date: 2018-09-15
Type: Quadrat 30 x 30
Soil Colour: Light Brown,Orange
Soil Type: Loam,Medium Clay
Habitat: Plain
Vegetation: AxAcCc

Acacia xiphophylla, Acacia synchronicia, Acacia tetragonophylla tall open shrubland over *Acacia coriacea* subsp. *coriacea, Acacia sclerosperma, Alectryon oleifolius* subsp. *oleifolius* mid isolated clumps of shrubs over **Cehchrus ciliaris* open grassland

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** 0<1 % **Outcropping:** 0
Total PFC: 68 % **Bareground:** 20 % **Leaf Litter:** 10 % **Logs:** 2 %
Disturbance Type: -

SPECIES LIST

Name	Height	Cover	Notes
Acacia coriacea subsp. *coriacea*	1.7	2	
Acacia inaequilatera	2	5	
Acacia sclerosperma	2	15	
Acacia synchronicia	2.5	0.5	
Acacia tetragonophylla	2.2	7	
Acacia xiphophylla	2.5	1	
Alectryon oleifolius subsp. *oleifolius*	1.7	0.5	
Brachyscome iberidifolia	0.1	0.1	
Cenchrus ciliaris	0.5	35	
Corchorus crozophorifolius	0.5	0.1	
Cucumis variabilis	0.2	0.1	
Decazesia hecatocephala	0.05	0.1	
Dysphania plantaginella	0.05	0.1	
Eremophila cuneifolia	1.7	0.5	
Euphorbia biconvexa	0.05	0.1	
Flaveria trinervia	0.2	0.1	
Goodenia forrestii	0.05	0.1	
Indigofera monophylla	0.1	0.1	
Malvastrum americanum	0.1	0.1	
Nicotiana occidentalis	0.2	0.1	
Ptilotus divaricatus	1	0.1	
Ptilotus helipteroides	0.1	0.1	
Ptilotus macrocephalus	0.2	0.1	
Ptilotus obovatus	0.6	0.1	
Rhodanthe floribunda	0.1	0.1	
Salsola australis	0.2	0.1	
Schoenia ayersii	0.1	0.1	
Trichodesma zeylanicum	0.1	0.1	
Zygophyllum retivalve	0.2	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ21 **MGA** 50K 204180 **mE** 7490275 **mN**

Described by: SF
Date: 2018-09-15
Type: Quadrat 30 x 30
Soil Colour: Light Brown,Orange
Soil Type: Loam,Sand,Medium Clay
Habitat: Drainage line
Vegetation: EvAcAt

Eucalyptus victrix low woodland over *Acacia coriacea* subsp. *coriacea* tall open shrubland over *Acacia tetragonophylla, Acacia inaequilatera, Acacia bivenosa* mid sparse shrubland over *Acacia sclerosperma, Abutilon lepidum, *Vachellia farnesiana* low isolated clumps of shrubs over **Cenchrus ciliaris* tall grassland

Veg Condition: Degraded
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type Laterite,Limestone **Rock Cover:** 6-20 % **Outcropping:** 20-50
Total PFC: 15 % **Bareground:** 80 % **Leaf Litter:** 3 % **Logs:** 2 %
Disturbance Type: Weeds, flooding, erosion

SPECIES LIST

Name	Height	Cover	Notes
Abutilon lepidum	1	0.1	
Abutilon sp. Dioicum (A.A. Mitchell PRP 1618)	0.2	0.1	
Acacia bivenosa	2	2	
Acacia coriacea subsp. *coriacea*	3	5	
Acacia inaequilatera	2	2	
Acacia sclerosperma	1	0.5	
Acacia synchronicia	0.5	0.1	
Acacia tetragonophylla	0.5	0.1	
Cenchrus ciliaris	0.6	3	
Cymbopogon ambiguus	0.2	0.1	
Eucalyptus victrix	10	10	
Euphorbia biconvexa	0.05	0.1	
Goodenia forrestii	0.05	0.1	
Indigofera monophylla	1	0.1	
Rhynchosia minima	0.05	0.1	
Triodia epactia	0.5	0.5	
Vachellia farnesiana	1	0.1	
Vigna lanceolata var. *lanceolata*	0.05	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ22 **MGA** 50K 196556 **mE** 7489249 **mN**

Described by: SF
Date: 2018-09-15
Type: Quadrat 30 x 30
Soil Colour: Orange

Soil Type: Gravel,Loam,Sand,Soft Clay
Habitat: Drainage line
Vegetation: EvAcAt

Eucalyptus victrix low woodland over *Acacia coriacea* subsp. *coriacea* tall open shrubland over *Acacia tetragonophylla, Acacia inaequilatera, Acacia bivenosa* mid sparse shrubland over *Acacia sclerosperma, Abutilon lepidum, *Vachellia farnesiana* low isolated clumps of shrubs over **Cenchrus ciliaris* tall grassland

Veg Condition: Good
Fire Age: >10 years **Fire Evidence:** -
Notes
Rock Type Laterite **Rock Cover:** 1-5 % **Outcropping:** 0
Total PFC: 70 % **Bareground:** 10 % **Leaf Litter:** 20 % **Logs:** 2 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Acacia bivenosa	1	0.1	
Acacia coriacea subsp. *coriacea*	2	1	
Acacia tetragonophylla	2	10	
Alectryon oleifolius subsp. *oleifolius*	0.4	0.1	
Brachyscome iberidifolia	0.1	0.1	
Calandrinia polyandra	0.05	0.1	
Calotis plumulifera	0.1	0.1	
Capparis lasiantha	1.5	0.5	
Cenchrus ciliaris	0.5	40	
Dysphania plantaginella	0.05	0.1	
Eucalyptus victrix	10	20	
Exocarpos aphyllus	2.5	1	
Hypochaeris glabra	0.2	0.1	
Malvastrum americanum	0.1	0.1	
Marsilea drummondii	0.05	0.1	
Ptilotus helipteroides	0.1	0.1	
Ptilotus macrocephalus	0.2	0.5	
Ptilotus obovatus	0.3	0.1	
Rhagodia eremaea	0.1	0.1	
Rhynchosia minima	0.1	0.1	
Scaevola spinescens	1	0.5	
Sclerolaena stylosa	0.1	0.1	P1
Solanum lasiophyllum	0.7	0.1	
Vachellia farnesiana	1.7	0.5	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ23 **MGA** 50K 194505 **mE** 7489382 **mN**

Described by: SF
Date: 2018-09-15
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand
Habitat: sand dunes
Vegetation: CcVfTe

Acacia bivenosa, *Codonocarpus cotinifolius*, *Acacia coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *Verticordia forrestii*, *Dampiera incana* var. *incana*, *Quoya loxocarpa* low isolated clumps of shrubs over *Triodia epactia* tall tussock grassland

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 0<1 % **Outcropping:** 0
Total PFC: 65 % **Bareground:** 25 % **Leaf Litter:** 10 % **Logs:** 0 %
Disturbance Type:

SPECIES LIST

Name	Height	Cover	Notes
Acacia bivenosa	0.5	0.1	
Acacia coriacea subsp. *coriacea*	2	1	
Acacia sclerosperma	0.5	3	
Brachyscome iberidifolia	0.1	0.1	
Calotis plumulifera	0.1	0.1	
Cenchrus ciliaris	0.2	0.1	
Codonocarpus cotinifolius	1.5	1	
Corchorus elachocarpus	0.5	0.5	
Corynotheca micrantha	0.2	0.1	
Dysphania plantaginella	0.05	0.1	
Euphorbia biconvexa	0.05	0.1	
Euphorbia tannensis subsp. *eremophila*	0.1	0.1	
Hakea stenophylla subsp. *stenophylla*	2	2	
Nicotiana occidentalis subsp. *occidentalis*	0.1	0.1	
Podolepis aristata subsp. *aristata*	0.2	0.1	
Pterocaulon sphacelatum	0.1	0.1	
Ptilotus helipteroides	0.1	0.1	
Rhodanthe humboldtiana	0.1	0.1	
Scaevola cunninghamii	0.5	0	Just outside
Scaevola sericophylla	0.6	1	
Senna artemisioides subsp. *oligophylla*	1.1	0.1	
Thryptomene dampieri	0.5	0	Just outside
Triodia epactia	0.5	60	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ24 **MGA** 50K 195238 **mE** 7489524 **mN**

Described by: SF
Date: 2018-09-16
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand
Habitat: Mid slope
Vegetation: CcVfTe

Acacia bivenosa, Codonocarpus cotinifolius, Acacia coriacea subsp. *coriacea* mid isolated clumps of shrubs over *Verticordia forrestii, Dampiera incana* var. *incana, Quoya loxocarpa* low isolated clumps of shrubs over *Triodia epactia* tall tussock grassland

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** 0<1 % **Outcropping:** 0
Total PFC: 50 % **Bareground:** 47 % **Leaf Litter:** 3 % **Logs:** 0 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Abutilon sp. Dioicum (A.A. Mitchell PRP 1618)	1.5	0.1	
Acacia bivenosa	1.2	0.1	
**Cenchrus ciliaris*	0.3	1	
Codonocarpus cotinifolius	1.2	0.5	
Cucumis variabilis	1.1	0.1	
Enchylaena tomentosa	1	0.1	
Euphorbia biconvexa	0.05	0.1	
Grevillea stenobotrya	2	2	
Nicotiana occidentalis subsp. *occidentalis*	0.1	0.1	
Paractaenum refractum	0.1	0.1	
Ptilotus latifolius	0.2	0.1	
Quoya loxocarpa	1	0.1	
Salsola australis	0.3	0.5	
Solanum lasiophyllum	0.1	0.1	
Trianthema pilosum	0.05	0.1	
Triodia epactia	0.5	3	
Verticordia forrestii	1.2	30	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ25 **MGA** 50K 193593 **mE** 7489583 **mN**

Described by: SF
Date: 2018-09-16
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand
Habitat: Upper slope
Vegetation: CcVfTe

Acacia bivenosa, Codonocarpus cotinifolius, Acacia coriacea subsp. *coriacea* mid isolated clumps of shrubs over *Verticordia forrestii, Dampiera incana* var. *incana, Quoya loxocarpa* low isolated clumps of shrubs over *Triodia epactia* tall tussock grassland

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** 0<1 % **Outcropping:** 0
Total PFC: 45 % **Bareground:** 40 % **Leaf Litter:** 15 % **Logs:** 0 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Abutilon sp. Dioicum (A.A. Mitchell PRP 1618)	0.3	0.1	
Acacia bivenosa	1.8	1.5	
Acacia coriacea subsp. *coriacea*	1.5	0.1	
Brachyscome iberidifolia	0.1	0.1	
Cenchrus ciliaris	0.3	0.5	
Codonocarpus cotinifolius	1.5	1	
Corynotheca micrantha	0.2	0.1	
Dampiera incana var. incana	0.5	1	
Dysphania plantaginella	0.05	0.1	
Eriachne mucronata	0.2	0.1	
Euphorbia biconvexa	0.05	0.1	
Hannafordia quadrivalvis subsp. *quadrivalvis*	0.2	0.1	
Indigofera chamaeclada subsp. *pubens*	0.5	0.5	
Nicotiana occidentalis subsp. *occidentalis*	0.1	0.1	
Olearia sp. Kennedy Range (G. Byrne 66)	1.5	1	
Podolepis aristata subsp. *aristata*	0.2	0.1	
Ptilotus villosiflorus	0.1	0.1	
Quoya loxocarpa	1	1	
Salsola australis	0.1	0.1	
Sida rohlenae subsp. *rohlenae*	1	0.1	
Solanum lasiophyllum	0.2	0.1	
Tephrosia uniovulata	0.2	0.1	
Tricoryne corynothecoides	0.2	0.1	
Triodia epactia	0.5	35	
Verticordia forrestii	0.7	2	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ26 **MGA** 50K 193952 **mE** 7489574 **mN**

Described by: SF
Date: 2018-09-16
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand
Habitat: Upper slope
Vegetation: CcVfTe

Acacia bivenosa, Codonocarpus cotinifolius, Acacia coriacea subsp. *coriacea* mid isolated clumps of shrubs over *Verticordia forrestii, Dampiera incana* var. *incana, Quoya loxocarpa* low isolated clumps of shrubs over *Triodia epactia* tall tussock grassland

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** 0<1 % **Outcropping:** 0 %
Total PFC: 55 % **Bareground:** 35 % **Leaf Litter:** 10 % **Logs:** 0 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Acacia coriacea subsp. *coriacea*	2	1	
Cenchrus ciliaris	0.3	2	
Codonocarpus cotinifolius	1.1	1	
Corynotheca micrantha	0.1	0.1	
Dampiera incana var. *incana*	0.5	0.1	
Dysphania plantaginella	0.05	0.1	
Eragrostis eriopoda	0.3	0.5	
Eremophila setacea	1.5	1	
Eriachne mucronata	0.6	0.1	
Euphorbia biconvexa	0.05	0.1	
Haloragis gossei var. *inflata*	0.05	0.1	
Labichea cassioides	2	0.1	
Nicotiana occidentalis subsp. *occidentalis*	0.1	0.1	
Podolepis aristata subsp. *aristata*	0.1	0.1	
Pterocaulon sphacelatum	0.05	0.1	
Ptilotus villosiflorus	1.5	2	
Quoya loxocarpa	0.4	1	
Senna ferraria	0.3	0.1	
Sida rohlenae subsp. *rohlenae*	0.5	0.1	
Solanum lasiophyllum	0.1	0.1	
Thryptomene dampieri	0.5	0.1	
Triodia epactia	0.5	35	
Verticordia forrestii	0.6	2	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ27 **MGA** 50K 191949 **mE** 7488908 **mN**

Described by: SF
Date: 2018-09-16
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Soft Clay
Habitat: Plain
Vegetation: McTdTe

Melaleuca cardiophylla, Acacia coriacea subsp. *coriacea* mid isolated clumps of shrubs over *Acacia sclerosperma, Thryptomene dampieri, Acacia gregorii* low isolated shrubs over *Triodia epactia* tall closed grassland

Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 1-5 % **Outcropping:** 2-10 %
Total PFC: 70 % **Bareground:** 15 % **Leaf Litter:** 15 % **Logs:** 0 %
Disturbance Type:

SPECIES LIST

Name	Height	Cover	Notes
Acacia gregorii	0.6	1	
Cenchrus ciliaris	0.2	0.1	
Chrysopogon fallax	1	0.1	
Corchorus elachocarpus	0.4	0.1	
Corynotheca micrantha	0.1	0.1	
Dampiera incana var. *incana*	0.3	0.1	
Decazesia hecatocephala	0.05	0.1	
Diplopeltis eriocarpa	0.4	0.5	
Dysphania plantaginella	0.05	0.1	
Eriachne mucronata	0.3	0.5	
Euphorbia biconvexa	0.05	0.1	
Goodenia microptera	0.1	0.1	
Haloragis gossei var. *inflata*	0.05	0.1	
Hannafordia quadrivalvis subsp. *quadrivalvis*	0.8	0.1	
Heliotropium pachyphyllum	0.3	0.1	
Indigofera chamaeclada subsp. *pubens*	0.2	0.1	
Indigofera monophylla	0.3	0.1	
Lobelia heterophylla subsp. *pilbarensis*	0.2	0.1	
Melaleuca cardiophylla	0.6	2	
Nicotiana occidentalis subsp. *occidentalis*	0.1	0.1	
Podolepis aristata subsp. *aristata*	0.2	0.1	
Ptilotus nobilis	0.6	0	
Scaevola cunninghamii	0.5	5	
Senna artemisioides subsp. *oligophylla*	0.5	0.1	
Tephrosia uniovulata	0.5	0.1	
Thryptomene dampieri	0.5	0.2	
Triodia epactia	0.5	50	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ28 **MGA** 50K 192966 **mE** 7491102 **mN**

Described by: SF
Date: 2018-09-16
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand
Habitat: Plain
Vegetation: McTdTe

Melaleuca cardiophylla, *Acacia coriacea* subsp. *coriacea* mid isolated clumps of shrubs over *Acacia sclerosperma*, *Thryptomene dampieri*, *Acacia gregorii* low isolated shrubs over *Triodia epactia* tall closed grassland

Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** - %
Total PFC: 75 % **Bareground:** 20 % **Leaf Litter:** 5 % **Logs:** 0 %
Disturbance Type:

SPECIES LIST

Name	Height	Cover	Notes
Acacia sclerosperma	0.7	0.5	
Cenchrus ciliaris	0.4	0.1	
Chrysopogon fallax	0.7	0.5	
Corchorus elachocarpus	0.5	0	
Corynotheca micrantha	0.1	0.1	
Diplopeltis eriocarpa	0.5	0.1	
Dysphania plantaginella	0.05	0.1	
Eragrostis eriopoda	0.3	0.5	
Eriachne helmsii	0.4	1	
Euphorbia biconvexa	0.05	0.1	
Goodenia microptera	0.3	0.1	
Haloragis gossei var. *inflata*	0.1	0.1	
Hannafordia quadrivalvis subsp. *quadrivalvis*	0.05	0.1	
Heliotropium crispatum	0.05	0.1	
Heliotropium pachyphyllum	0.4	0.1	
Indigofera chamaeclada subsp. *pubens*	0.1	0.5	
Lobelia heterophylla subsp. *pilbarensis*	0.1	0.1	
Melaleuca cardiophylla	1.2	3	
Nicotiana occidentalis subsp. *occidentalis*	0.2	0.1	
Podolepis aristata subsp. *aristata*	0.3	0.1	
Solanum lasiophyllum	0.5	0.1	
Tephrosia uniovulata	0.6	0.1	
Thryptomene dampieri	0.3	0.5	
Triodia epactia	0.6	70	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ29 **MGA** 50K 242191 **mE** 7469962 **mN**

Described by: SF
Date: 2018-09-17
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Soft Clay
Habitat: Plain
Vegetation: AaSaTg

Acacia ancistrocarpa, Acacia bivenosa tall open shrubland over *Senna artemisioides* subsp. *oligophylla, Eremophila cuneifolia* mid sparse shrubland over *Triodia epactia* and *Triodia glabra* tall open tussock grassland

Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** 0 %
Total PFC: 60 % **Bareground:** 38 % **Leaf Litter:** 2 % **Logs:** 0 %
Disturbance Type:

SPECIES LIST

Name	Height	Cover	Notes
Acacia ancistrocarpa	2.2	1	
Acacia bivenosa	2	35	
Acacia ligulata	1.1	0.1	
Bonamia erecta	0.2	0.1	
Eremophila cuneifolia	1	0	Just outside
Salsola australis	0.1	0	Just outside
Senna artemisioides subsp. *oligophylla*	0.5	0	Just outside
Triodia epactia	0.6	30	
Triodia glabra	0.5	5	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ30 **MGA** 50K 234447 **mE** 7479333 **mN**

Described by: SF
Date: 2018-09-17
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Soft Clay
Habitat: Plain
Vegetation: AiHlTg

Acacia inaequilatera tall sparse shrubland over *Acacia ancistrocarpa, Hakea lorea* and *Acacia bivenosa* mid open shrubland over *Triodia glabra* tall grassland

Veg Condition: Very Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** - % **Outcropping:** 0 %
Total PFC: 30 % **Bareground:** 68 % **Leaf Litter:** 2 % **Logs:** 0 %
Disturbance Type:

SPECIES LIST

Name	Height	Cover	Notes
Acacia bivenosa	1.2	2	
Acacia inaequilatera	3.5	5	
Bulbostylis barbata	0.05	0.1	
Decazesia hecatocephala	0.05	0.1	
Dysphania plantaginella	0.05	0.1	
Eriachne aristidea	0.05	0.1	
Eriachne pulchella	0.05	0.1	
Goodenia microptera	0.1	0.1	
Hakea lorea	2	1	
Indigofera colutea	0.3	0.1	
Ixiochlamys cuneifolia	0.6	20	
Pimelea ammocharis	1	0.1	
Ptilotus axillaris	0.01	0.1	
Ptilotus polystachyus	0.6	1	
Sida arsiniata	1	0.1	
Solanum lasiophyllum	0.6	0.1	
Trigastrotheca molluginea	0.05	0.1	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ31 **MGA** 50K 229721 **mE** 7483937 **mN**

Described by: SF
Date: 2018-09-17
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Sand,Soft Clay
Habitat: Plain
Vegetation: AbAtTg

Acacia bivenosa, Acacia synchronicia, Acacia sclerosperma tall open shrubland over *Acacia tetragonophylla, Senna artemisioides* subsp. *oligophylla, Solanum lasiophyllum* low isolated clumps of shrubs over **Cenchrus ciliaris, Triodia epactia* grassland

Veg Condition: Degraded
Fire Age: > 5 years **Fire Evidence:** Burnt Trunks
Notes
Rock Type Limestone **Rock Cover:** 1-5 % **Outcropping:** <2 %
Total PFC: 40 % **Bareground:** 58 % **Leaf Litter:** 2 % **Logs:** 0 %
Disturbance Type: Weeds,Cattle tracks/scats, clearing

SPECIES LIST

Name	Height	Cover	Notes
Acacia ancistrocarpa	0.5	0.1	
Acacia bivenosa	0.1	0	Just outside
Acacia sclerosperma	1.5	2	
Acacia synchronicia	2.5	1	
Cenchrus ciliaris	0.3	0.1	
Corchorus elachocarpus	0.4	3	
Dysphania plantaginella	0.05	0.1	
Eragrostis eriopoda	0.3	0.5	
Goodenia microptera	0.05	0.1	
Hibiscus sturtii	0.3	0.1	
Indigofera colutea	0.1	0.1	
Pimelea ammocharis	0.8	0.1	
Ptilotus helipteroides	0.05	0.1	
Triodia epactia	0.6	25	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMQ32 **MGA** 50K 209124 **mE** 7492169 **mN**

Described by: SF
Date: 2018-09-18
Type: Quadrat 30 x 30
Soil Colour: Orange
Soil Type: Loam,Sand,Medium Clay
Habitat: Plain
Vegetation: AbAtTg

Acacia bivenosa, Acacia synchronicia, Acacia sclerosperma tall open shrubland over *Acacia tetragonophylla, Senna artemisioides* subsp. *oligophylla, Solanum lasiophyllum* low isolated clumps of shrubs over **Cenchrus ciliaris* , *Triodia epactia* grassland

Veg Condition: Good
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type Limestone **Rock Cover:** 6-20 % **Outcropping:** 0 %
Total PFC: 55 % **Bareground:** 33 % **Leaf Litter:** 5 % **Logs:** 2 %
Disturbance Type: Cattle tracks/scats, near track and water bore

SPECIES LIST

Name	Height	Cover	Notes
Abutilon sp.	0.5	0.1	
Acacia bivenosa	1.7	8	
Acacia tetragonophylla	1	1	
Decazesia hecatocephala	0.05	0.1	
Eremophila forrestii subsp. *forrestii*	0.5	0.1	
Euphorbia tannensis subsp. *eremophila*	0.2	0.1	
Goodenia microptera	0.05	0.1	
Haloragis gossei var. *gossei*	0.05	0.1	
Ptilotus helipteroides	0.05	0.1	
Rhagodia eremaea	1.2	0.5	
Scaevola pulchella	0.5	0.1	
Senna artemisioides subsp. *oligophylla*	0.5	0.1	
Senna glutinosa subsp. *pruinosa*	1.5	0.1	
Stylobasium spathulatum	1.1	0.5	
Triodia glabra	0.5	50	

FLORA SITE SHEET - MINILYA EXMOUTH BIOLOGICAL SURVEY

Project Name 2891 Minilya Exmouth Biological Survey 2018
Site: EMR01 **MGA** 50K 232520 **mE** 7481228 **mN**

Described by: SF
Date: 2018-09-17
Type: Releve 30 x 30
Soil Colour: Orange,Red
Soil Type: Loam,Sand,Soft Clay
Habitat: Plain
Vegetation: AiHlTg

Acacia inaequilatera tall sparse shrubland over *Acacia ancistrocarpa, Hakea lorea* and *Acacia bivenosa* mid open shrubland over *Triodia glabra* tall grassland

Veg Condition: Degraded
Fire Age: > 5 years **Fire Evidence:** -
Notes
Rock Type - **Rock Cover:** 0<1 % **Outcropping:** 0 %
Total PFC: 55 % **Bareground:** 40 % **Leaf Litter:** 5 % **Logs:** 0 %
Disturbance Type: Weeds,Cattle tracks/scats

SPECIES LIST

Name	Height	Cover	Notes
Acacia ancistrocarpa	2	0.5	
Acacia bivenosa	1	0.1	
Acacia inaequilatera	4	2	
Aristida contorta	0.1	0.1	
Calandrinia polyandra	0.1	0.1	
Cenchrus ciliaris	0.2	30	
Decazesia hecatocephala	0.05	2	
Dysphania plantaginella	0.05	0.1	
Eremophila longifolia	1.4	0.5	
Hakea lorea	1.5	0.5	
Ptilotus axillaris	0.01	0.1	
Ptilotus helipteroides	0.1	0.1	
Ptilotus obovatus	1	0.1	
Ptilotus polystachyus	0.6	2	
Solanum lasiophyllum	0.5	0.5	
Triodia glabra	0.6	5	

APPENDIX M

Priority Flora Species Locations and Counts

Appendix M. Priority flora locations and counts within the Survey Area

Family	Genus	Species	Status	Estimated number of individuals / population size	Easting	Northing
Chenopodiaceae	*Sclerolaena*	*stylosa*	P1	40	218793	7491344
Chenopodiaceae	*Sclerolaena*	*stylosa*	P1	5	215875	7491442
Chenopodiaceae	*Sclerolaena*	*stylosa*	P1	5	214510	7491377
Fabaceae	*Acacia*	*startii*	P3	-	210771.3469	7491655.976
Fabaceae	*Acacia*	*startii*	P3	-	210751.8143	7491718.923
Fabaceae	*Acacia*	*startii*	P3	-	205397.7437	7490622.523
Fabaceae	*Acacia*	*startii*	P3	1	216124.0975	7491577.225
Fabaceae	*Acacia*	*startii*	P3	1	215755.5289	7491432.991
Fabaceae	*Acacia*	*startii*	P3	1	215782.3334	7491443.487
Fabaceae	*Acacia*	*startii*	P3	1	215847.0154	7491434.883
Fabaceae	*Acacia*	*startii*	P3	1	216482.6352	7491397.236
Fabaceae	*Acacia*	*startii*	P3	1	215737.308	7491361.979
Fabaceae	*Acacia*	*startii*	P3	1	215683.1912	7491440.101
Fabaceae	*Acacia*	*startii*	P3	1	215690.6449	7491439.176
Fabaceae	*Acacia*	*startii*	P3	1	215704.0495	7491432.421
Fabaceae	*Acacia*	*startii*	P3	1	215709.0668	7491419.271
Fabaceae	*Acacia*	*startii*	P3	1	215721.0119	7491420.746
Fabaceae	*Acacia*	*startii*	P3	1	215909.4982	7491420.086
Fabaceae	*Acacia*	*startii*	P3	1	215828.1648	7491471.204
Fabaceae	*Acacia*	*startii*	P3	1	215820.0132	7491544.451
Fabaceae	*Acacia*	*startii*	P3	1	215804.6154	7491636.204
Fabaceae	*Acacia*	*startii*	P3	1	215795.1427	7491643.365
Fabaceae	*Acacia*	*startii*	P3	1	215863.157	7491745.946
Fabaceae	*Acacia*	*startii*	P3	1	215886.08	7492115.562
Fabaceae	*Acacia*	*startii*	P3	1	215751.0916	7491758.711
Fabaceae	*Acacia*	*startii*	P3	1	215694.9381	7491705.268
Fabaceae	*Acacia*	*startii*	P3	1	215709.2833	7491608.209
Fabaceae	*Acacia*	*startii*	P3	1	215719.8675	7491551.841
Fabaceae	*Acacia*	*startii*	P3	1	215003.0027	7491401.81
Fabaceae	*Acacia*	*startii*	P3	1	214930.231	7491315.326
Fabaceae	*Acacia*	*startii*	P3	1	213906.1712	7491225.534
Fabaceae	*Acacia*	*startii*	P3	1	213864.1782	7491220.956
Fabaceae	*Acacia*	*startii*	P3	1	213846.1302	7491215.287
Fabaceae	*Acacia*	*startii*	P3	1	207200.0244	7491242.527
Fabaceae	*Acacia*	*startii*	P3	1	219415.9617	7491366.604
Fabaceae	*Acacia*	*startii*	P3	1	219430.4701	7491367.945
Fabaceae	*Acacia*	*startii*	P3	1	219441.9791	7491384.192
Fabaceae	*Acacia*	*startii*	P3	1	215463.671	7491308.896
Fabaceae	*Acacia*	*startii*	P3	1	215467.4166	7491254.163
Fabaceae	*Acacia*	*startii*	P3	1	214369.6301	7491278.019
Fabaceae	*Acacia*	*startii*	P3	1	213767.0563	7491060.421
Fabaceae	*Acacia*	*startii*	P3	1	219378.1787	7491352.899
Fabaceae	*Acacia*	*startii*	P3	1	219378.632	7491288.498
Fabaceae	*Acacia*	*startii*	P3	1	219444.3972	7491253.146
Fabaceae	*Acacia*	*startii*	P3	1	215373.623	7491403.126
Fabaceae	*Acacia*	*startii*	P3	1	215396.0163	7491421.264
Fabaceae	*Acacia*	*startii*	P3	1	213831.7748	7491426.963
Fabaceae	*Acacia*	*startii*	P3	1	213822.626	7491455.208
Fabaceae	*Acacia*	*startii*	P3	1	213818.2412	7491514.096
Fabaceae	*Acacia*	*startii*	P3	1	213747.5605	7491291.65

Family	Genus	Species	Status	Estimated number of individuals / population size	Easting	Northing
Fabaceae	*Acacia*	*startii*	P3	1	205136.8487	7490603.199
Fabaceae	*Acacia*	*startii*	P3	1	205103.8759	7490587.522
Fabaceae	*Acacia*	*startii*	P3	1	213174.4126	7491164.25
Fabaceae	*Acacia*	*startii*	P3	1	212926.8735	7491184.622
Fabaceae	*Acacia*	*startii*	P3	1	210391.3449	7491961.126
Fabaceae	*Acacia*	*startii*	P3	1	207136.5332	7491222.334
Fabaceae	*Acacia*	*startii*	P3	1	206610.7492	7491048.629
Fabaceae	*Acacia*	*startii*	P3	1	206503.7451	7491016.293
Fabaceae	*Acacia*	*startii*	P3	1	206065.3446	7490869.783
Fabaceae	*Acacia*	*startii*	P3	1	205585.1709	7490659.134
Fabaceae	*Acacia*	*startii*	P3	1	205393.0125	7490609.176
Fabaceae	*Acacia*	*startii*	P3	1	205302.2008	7490565.783
Fabaceae	*Acacia*	*startii*	P3	1	199332.6123	7489311.265
Fabaceae	*Acacia*	*startii*	P3	1	199273.4585	7489343.085
Fabaceae	*Acacia*	*startii*	P3	1	199003.3548	7489391.871
Fabaceae	*Acacia*	*startii*	P3	2	215789.4836	7491391.998
Fabaceae	*Acacia*	*startii*	P3	2	215647.5638	7491391.373
Fabaceae	*Acacia*	*startii*	P3	2	215793.2568	7491361.137
Fabaceae	*Acacia*	*startii*	P3	2	215816.1235	7491618.609
Fabaceae	*Acacia*	*startii*	P3	2	219361.2026	7491377.821
Fabaceae	*Acacia*	*startii*	P3	2	219468.9789	7491403.173
Fabaceae	*Acacia*	*startii*	P3	2	219532.4551	7491433.098
Fabaceae	*Acacia*	*startii*	P3	2	219500.2225	7491305.856
Fabaceae	*Acacia*	*startii*	P3	2	213738.7018	7491063.558
Fabaceae	*Acacia*	*startii*	P3	2	219397.4169	7491287.713
Fabaceae	*Acacia*	*startii*	P3	2	215266.5858	7491400.055
Fabaceae	*Acacia*	*startii*	P3	2	213665.855	7491338.583
Fabaceae	*Acacia*	*startii*	P3	2	205510.3212	7490705.394
Fabaceae	*Acacia*	*startii*	P3	2	205123.496	7490597.411
Fabaceae	*Acacia*	*startii*	P3	2	205195.503	7490543.938
Fabaceae	*Acacia*	*startii*	P3	2	205446.6252	7490625.628
Fabaceae	*Acacia*	*startii*	P3	3	215676.5415	7491397.841
Fabaceae	*Acacia*	*startii*	P3	3	215644.3555	7491424.472
Fabaceae	*Acacia*	*startii*	P3	3	215823.0784	7491718.015
Fabaceae	*Acacia*	*startii*	P3	3	215778.7373	7492041.319
Fabaceae	*Acacia*	*startii*	P3	3	205401.6377	7490593.438
Fabaceae	*Acacia*	*startii*	P3	3	215376.1698	7491377.96
Fabaceae	*Acacia*	*startii*	P3	3	219363.7128	7491299.439
Fabaceae	*Acacia*	*startii*	P3	3	219493.9661	7491233.854
Fabaceae	*Acacia*	*startii*	P3	3	213625.6445	7491518.665
Fabaceae	*Acacia*	*startii*	P3	3	205222.6441	7490559.592
Fabaceae	*Acacia*	*startii*	P3	3	199268.9483	7489370.994
Fabaceae	*Acacia*	*startii*	P3	4	215692.5802	7491723.078
Fabaceae	*Acacia*	*startii*	P3	4	215704.0192	7491642.345
Fabaceae	*Acacia*	*startii*	P3	4	209041.105	7491730.54
Fabaceae	*Acacia*	*startii*	P3	4	205412.5172	7490576.546
Fabaceae	*Acacia*	*startii*	P3	4	215416.3255	7491429.81
Fabaceae	*Acacia*	*startii*	P3	4	213577.3005	7491415.022
Fabaceae	*Acacia*	*startii*	P3	4	199217.3809	7489457.819
Fabaceae	*Acacia*	*startii*	P3	5	215665.5907	7491428.591
Fabaceae	*Acacia*	*startii*	P3	5	215780.8312	7492068.089

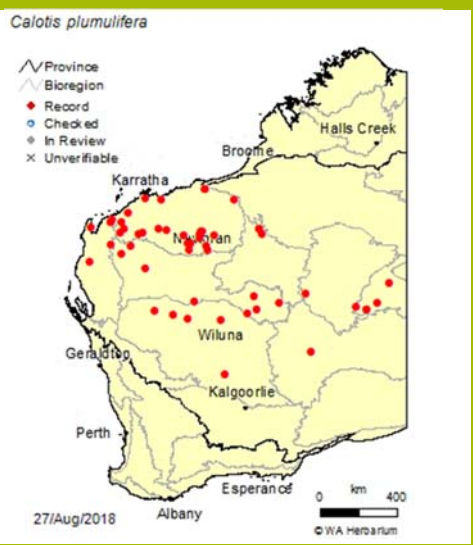
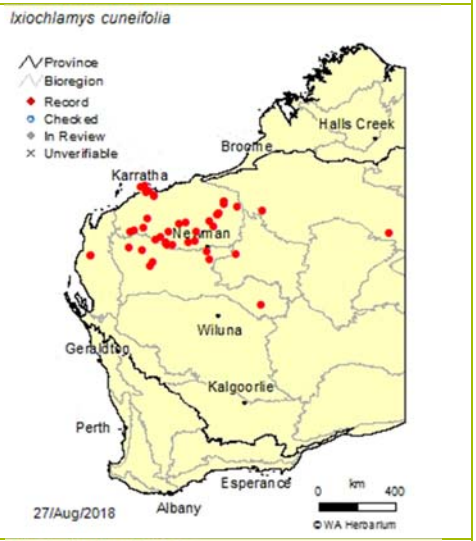
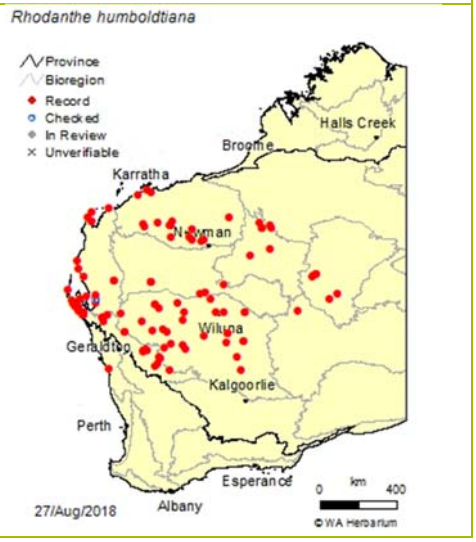
Family	Genus	Species	Status	Estimated number of individuals / population size	Easting	Northing
Fabaceae	*Acacia*	*startii*	P3	5	215867.0796	7491957.517
Fabaceae	*Acacia*	*startii*	P3	5	215718.3436	7491571.817
Fabaceae	*Acacia*	*startii*	P3	5	219491.0538	7491419.825
Fabaceae	*Acacia*	*startii*	P3	5	215385.6968	7491372.309
Fabaceae	*Acacia*	*startii*	P3	5	215498.0629	7491325.074
Fabaceae	*Acacia*	*startii*	P3	5	219368.8647	7491334.187
Fabaceae	*Acacia*	*startii*	P3	5	213829.6266	7491290.761
Fabaceae	*Acacia*	*startii*	P3	5	213828.3522	7491330.225
Fabaceae	*Acacia*	*startii*	P3	5	213558.5081	7491432.579
Fabaceae	*Acacia*	*startii*	P3	5	199324.9537	7489549.066
Fabaceae	*Acacia*	*startii*	P3	5	199311.5841	7489590.19
Fabaceae	*Acacia*	*startii*	P3	5	199209.0884	7489499.664
Fabaceae	*Acacia*	*startii*	P3	5	213400.9102	7491174.332
Fabaceae	*Acacia*	*startii*	P3	5	211957.2593	7491427.363
Fabaceae	*Acacia*	*startii*	P3	5	205580.8743	7490656.846
Fabaceae	*Acacia*	*startii*	P3	5	205557.2265	7490651.513
Fabaceae	*Acacia*	*startii*	P3	6	215799.3468	7491783.359
Fabaceae	*Acacia*	*startii*	P3	6	205240.0184	7490636.248
Fabaceae	*Acacia*	*startii*	P3	9	215862.3062	7491743.027
Fabaceae	*Acacia*	*startii*	P3	10	219547.1572	7491407.657
Fabaceae	*Acacia*	*startii*	P3	10	215518.2796	7491333.065
Fabaceae	*Acacia*	*startii*	P3	10	215377.051	7491471.957
Fabaceae	*Acacia*	*startii*	P3	10	215354.5238	7491350.638
Fabaceae	*Acacia*	*startii*	P3	10	213841.7819	7491254.671
Fabaceae	*Acacia*	*startii*	P3	10	213645.4425	7491366.849
Fabaceae	*Acacia*	*startii*	P3	10	213773.691	7491266.162
Fabaceae	*Acacia*	*startii*	P3	10	213803.2595	7491249.306
Fabaceae	*Acacia*	*startii*	P3	10	213830.3703	7491237.357
Fabaceae	*Acacia*	*startii*	P3	10	211034.3326	7491903.548
Fabaceae	*Acacia*	*startii*	P3	10	210867.8971	7491750.901
Fabaceae	*Acacia*	*startii*	P3	10	208503.6247	7491595.705
Fabaceae	*Acacia*	*startii*	P3	10	199324.2984	7489345.86
Fabaceae	*Acacia*	*startii*	P3	11	205313.3295	7490651.617
Fabaceae	*Acacia*	*startii*	P3	11	205178.4821	7490617.836
Fabaceae	*Acacia*	*startii*	P3	12	215718.9119	7491551.236
Fabaceae	*Acacia*	*startii*	P3	15	219563.379	7491151.625
Fabaceae	*Acacia*	*startii*	P3	16	215666.5815	7491461.003
Fabaceae	*Acacia*	*startii*	P3	20	215718.0217	7491743.833
Fabaceae	*Acacia*	*startii*	P3	20	208363.3396	7491550.395
Fabaceae	*Acacia*	*startii*	P3	20	215570.332	7491350.348
Fabaceae	*Acacia*	*startii*	P3	20	219554.6889	7491180.7
Fabaceae	*Acacia*	*startii*	P3	20	219545.0481	7491245.852
Fabaceae	*Acacia*	*startii*	P3	20	215360.611	7491507.458
Fabaceae	*Acacia*	*startii*	P3	20	215350.9512	7491546.166
Fabaceae	*Acacia*	*startii*	P3	20	215325.8991	7491554.222
Fabaceae	*Acacia*	*startii*	P3	20	213622.797	7491551.483
Fabaceae	*Acacia*	*startii*	P3	20	213689.5177	7491318.546
Fabaceae	*Acacia*	*startii*	P3	20	211611.9172	7491544.94
Fabaceae	*Acacia*	*startii*	P3	20	210986.5956	7491858.845
Fabaceae	*Acacia*	*startii*	P3	20	210958.2594	7491834.237
Fabaceae	*Acacia*	*startii*	P3	20	199320.7575	7489497.365

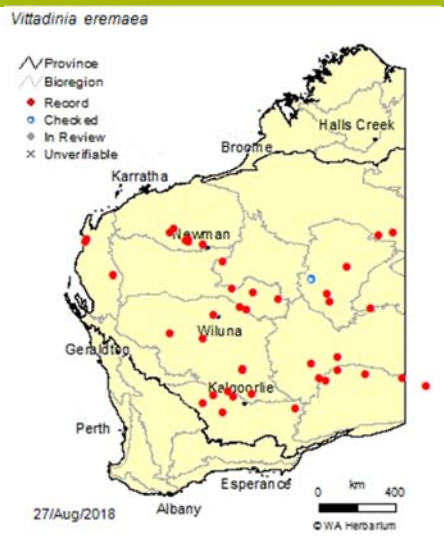
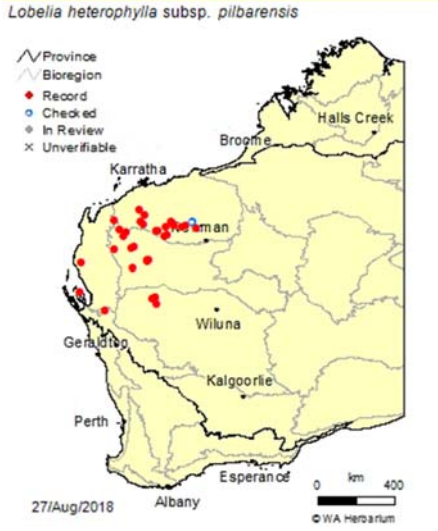
Family	Genus	Species	Status	Estimated number of individuals / population size	Easting	Northing
Fabaceae	*Acacia*	*startii*	P3	20	199201.5666	7489534.242
Fabaceae	*Acacia*	*startii*	P3	20	199255.3925	7489450.266
Fabaceae	*Acacia*	*startii*	P3	20	205357.639	7490587.834
Fabaceae	*Acacia*	*startii*	P3	20	199266.5794	7489399.334
Fabaceae	*Acacia*	*startii*	P3	30	215805.6285	7492007.962
Fabaceae	*Acacia*	*startii*	P3	30	219533.3506	7491313.228
Fabaceae	*Acacia*	*startii*	P3	30	215410.8712	7491367.048
Fabaceae	*Acacia*	*startii*	P3	30	215449.8516	7491390.35
Fabaceae	*Acacia*	*startii*	P3	30	213655.2967	7491158.945
Fabaceae	*Acacia*	*startii*	P3	50	215892.8822	7491775.302
Fabaceae	*Acacia*	*startii*	P3	50	215893.296	7491788.997
Fabaceae	*Acacia*	*startii*	P3	50	215927.2572	7491848.321
Fabaceae	*Acacia*	*startii*	P3	50	215907.6341	7491897.406
Fabaceae	*Acacia*	*startii*	P3	50	215901.5029	7491982.062
Fabaceae	*Acacia*	*startii*	P3	50	215899.1396	7492007.918
Fabaceae	*Acacia*	*startii*	P3	50	215897.7368	7492066.196
Fabaceae	*Acacia*	*startii*	P3	50	215836.7268	7491988.969
Fabaceae	*Acacia*	*startii*	P3	50	215861.5342	7491902.844
Fabaceae	*Acacia*	*startii*	P3	50	215860.0928	7491858.132
Fabaceae	*Acacia*	*startii*	P3	50	213855.9702	7491165.522
Fabaceae	*Acacia*	*startii*	P3	50	210621.1152	7491881.386
Fabaceae	*Acacia*	*startii*	P3	50	210637.7805	7491919.216
Fabaceae	*Acacia*	*startii*	P3	50	219496.3176	7491445.145
Fabaceae	*Acacia*	*startii*	P3	50	219524.9795	7491216.859
Fabaceae	*Acacia*	*startii*	P3	50	219545.5474	7491265.71
Fabaceae	*Acacia*	*startii*	P3	50	219525.9189	7491285.541
Fabaceae	*Acacia*	*startii*	P3	50	213604.7814	7491575.881
Fabaceae	*Acacia*	*startii*	P3	50	213567.5345	7491600.085
Fabaceae	*Acacia*	*startii*	P3	50	213554.2708	7491581.162
Fabaceae	*Acacia*	*startii*	P3	50	213544.3198	7491530.949
Fabaceae	*Acacia*	*startii*	P3	50	213552.6208	7491480.49
Fabaceae	*Acacia*	*startii*	P3	50	213719.1438	7491298.632
Fabaceae	*Acacia*	*startii*	P3	50	210902.055	7491858.121
Fabaceae	*Acacia*	*startii*	P3	50	211055.7147	7491930.917
Fabaceae	*Acacia*	*startii*	P3	50	199321.7233	7489453.569
Fabaceae	*Acacia*	*startii*	P3	50	199284.3518	7489613.939
Fabaceae	*Acacia*	*startii*	P3	50	199236.0618	7489620.557
Fabaceae	*Acacia*	*startii*	P3	50	199217.0241	7489583.416
Fabaceae	*Acacia*	*startii*	P3	50	199283.821	7489449.319
Fabaceae	*Acacia*	*startii*	P3	50	210969.2903	7491771.517
Fabaceae	*Acacia*	*startii*	P3	50	210645.3207	7491888.281
Fabaceae	*Acacia*	*startii*	P3	50	199736.443	7489466.612
Fabaceae	*Acacia*	*startii*	P3	50	199422.2191	7489439.898
Fabaceae	*Acacia*	*startii*	P3	50	199333.9979	7489404.852
Fabaceae	*Acacia*	*startii*	P3	50	199334.1353	7489277.3
Fabaceae	*Acacia*	*startii*	P3	50	199301.6087	7489267.005
Fabaceae	*Acacia*	*startii*	P3	50	199278.7441	7489269.048
Fabaceae	*Acacia*	*startii*	P3	100	213849.3376	7491197.54
Fabaceae	*Acacia*	*startii*	P3	100	199371.5688	7489428.525
Fabaceae	*Acacia*	*startii*	P3	100	215436.8228	7491347.683
Fabaceae	*Acacia*	*startii*	P3	100	210932.8998	7491920.303

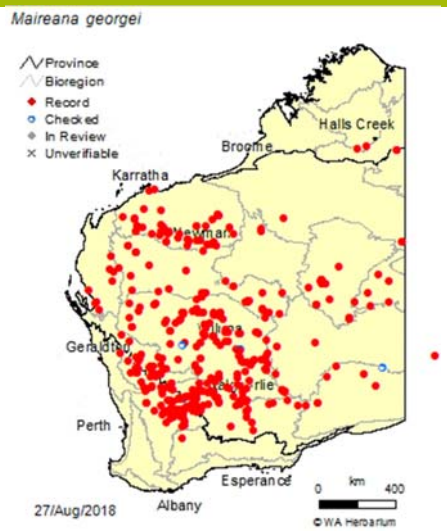
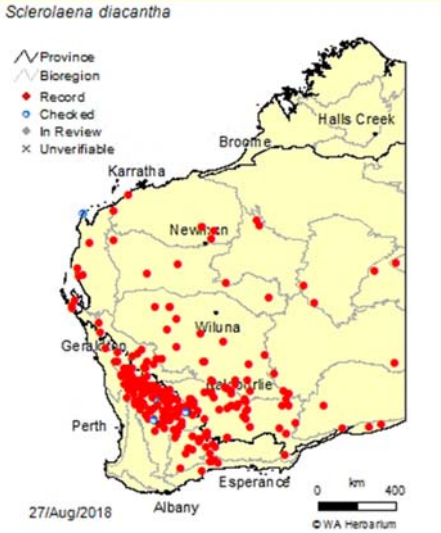
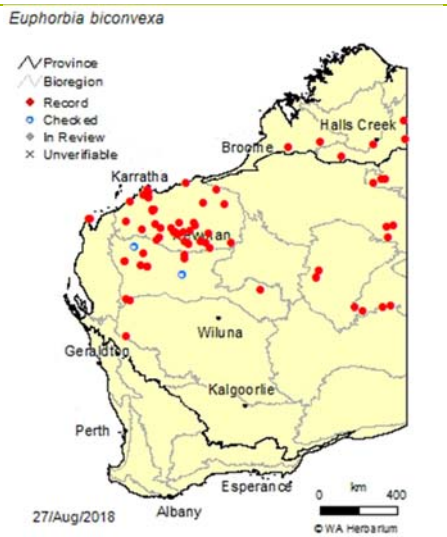
Family	Genus	Species	Status	Estimated number of individuals / population size	Easting	Northing
Fabaceae	*Acacia*	*startii*	P3	100	210951.3925	7491982.939
Fabaceae	*Acacia*	*startii*	P3	100	210982.3142	7492015.532
Fabaceae	*Acacia*	*startii*	P3	100	211022.622	7492050.596
Fabaceae	*Acacia*	*startii*	P3	100	211041.7649	7492017.443
Fabaceae	*Acacia*	*startii*	P3	100	211051.1314	7491970.374
Fabaceae	*Acacia*	*startii*	P3	1000	213853.9205	7491110.791
Fabaceae	*Acacia*	*startii*	P3	1000	213696.5429	7491079.37
Fabaceae	*Acacia*	*startii*	P3	1000	210766.8556	7491612.867

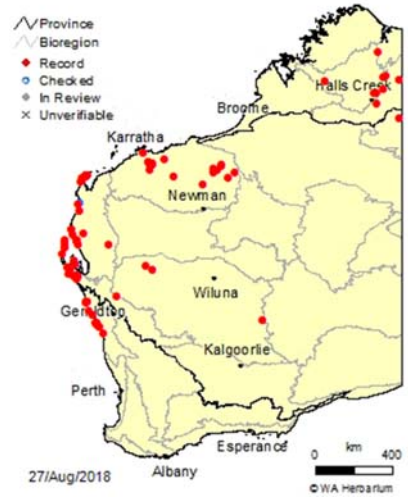
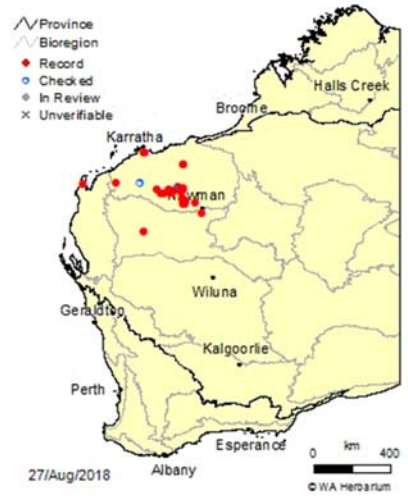
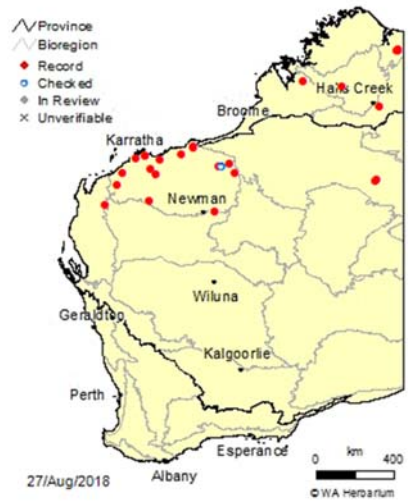
APPENDIX N

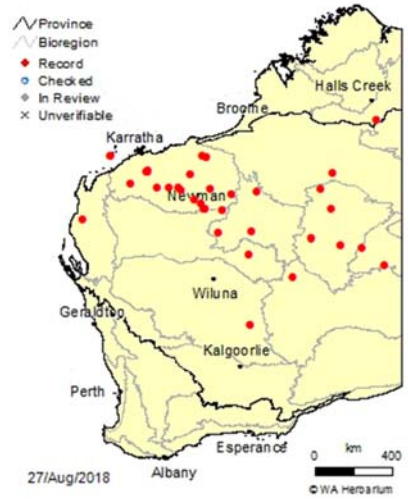
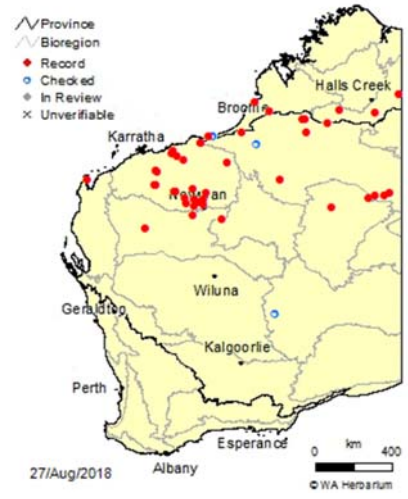
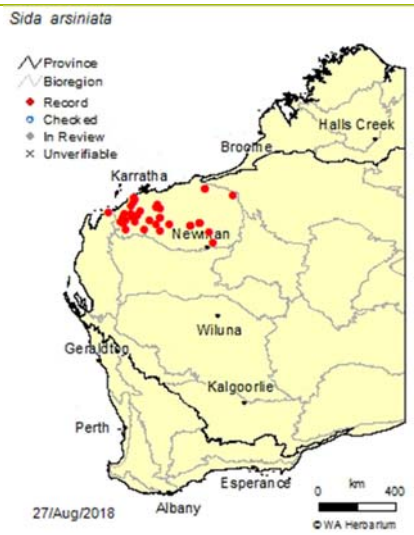
Flora Range Extensions

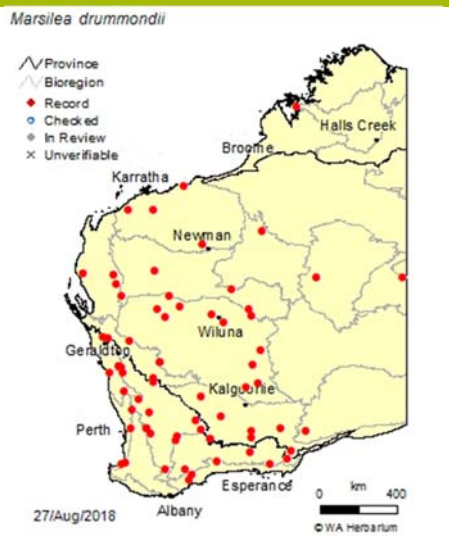
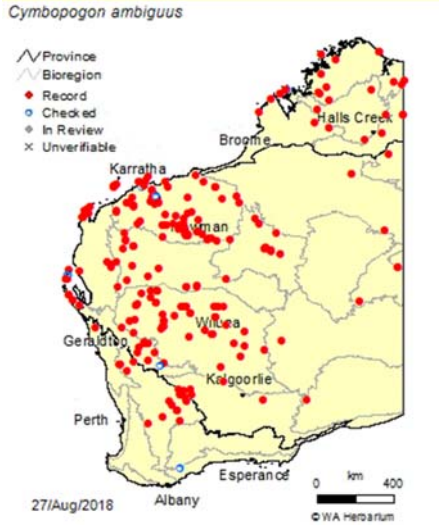
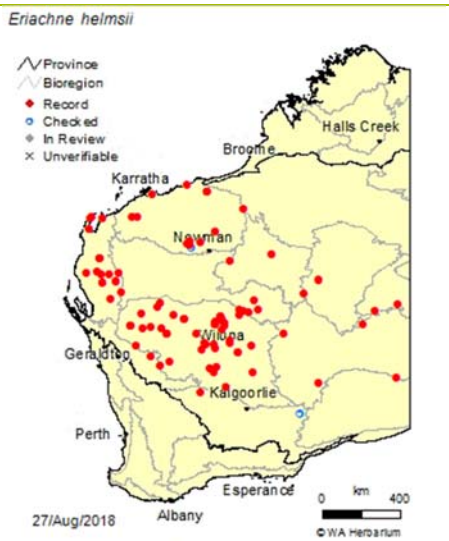
Family	Species	Current Known Distribution
Asteraceae	*Calotis plumulifera*	
	Ixiochlamys cuneifolia	
	Rhodanthe humboldtiana	

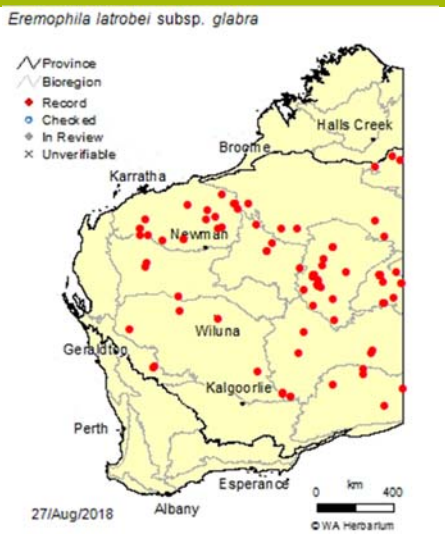
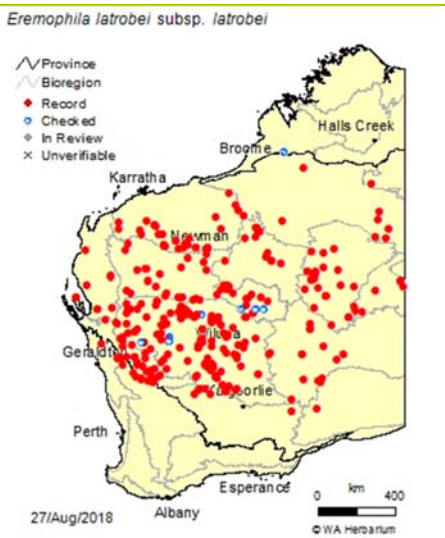
Family	Species	Current Known Distribution
	Vittadinia eremaea	
Campanulaceae	*Lobelia heterophylla* subsp. *pilbarensis*	
Celastraceae	*Stackhousia* sp. Mid west coastal (D. & B. Bellairs 6561)	

Family	Species	Current Known Distribution
Chenopodiaceae	*Maireana georgei*	
	Sclerolaena diacantha	
Euphorbiaceae	*Euphorbia biconvexa*	

Family	Species	Current Known Distribution
Fabaceae	*Lotus australis*	*Lotus australis* 
	Senna ferraria	*Senna ferraria* 
	Vigna lanceolata var. *lanceolata*	*Vigna lanceolata* var. *lanceolata* 

FAMILY	SPECIES	CURRENT KNOWN DISTRIBUTION
Haloragaceae	*Haloragis gossei* var. *gossei*	*Haloragis gossei* var. *gossei* 
Malvaceae	*Sida arenicola*	*Sida arenicola* 
	Sida arsiniata	*Sida arsiniata* 

Family	Species	Current Known Distribution
Marsileaceae	*Marsilea drummondii*	
Poaceae	*Cymbopogon ambiguus*	
	Eriachne helmsii	

Family	Species	Current Known Distribution
Scrophulariaceae	*Eremophila latrobei* subsp. *glabra*	
	Eremophila latrobei subsp. *latrobei*	

APPENDIX O

Systematic Fauna Species List

Common name	Scientific name	Family	Con Sig	Total Number	Number of individuals recorded in each fauna habitat	Number of individuals recorded in each vegetation type
Reptile						
Barred Wedge-snouted Ctenotus	*Ctenotus schomburgkii*	Scincidae		4	Acacia Shrubland (4)	AcMpSs (4)
Black-headed Python	*Aspidites melanocephalus*	Pythonidae		1	Road/Shoulder (1)	Road/Shoulder (1)
Bungarra	*Varanus gouldii*	Varanidae		2	Acacia Shrubland (1); Grassland (1)	AaSaTg (1); McTdTe (1)
Central Military Dragon	*Ctenophorus isolepis gularis*	Agamidae		12	Acacia Shrubland (10); Grassland (2)	AbAtTg (5); AiHlTg (3); McTdTe (2); Previous D&G (2)
Dune Dragon	*Ctenophorus femoralis*	Agamidae		12	Acacia Shrubland (2); Dune (10)	CcVfTe (10); Previous D&G (2)
Fire-tailed Skink	*Morethia ruficauda exquisita*	Scincidae		1	Grassland (1)	McTdTe (1)
Leopard Ctenotus	*Ctenotus pantherinus*	Scincidae		2	Acacia Shrubland (2)	AiHlTg (1); Previous D&G (1)
Lerista sp	*Lerista sp*	Scincidae		2	Dune (2)	CcVfTe (2)
Long-nosed Dragon	*Gowidon longirostris*	Agamidae		1	Minor Drainage (1)	AcVfCc (1)
Lozenge-marked Dragon	*Ctenophorus scutulatus*	Agamidae		3	Acacia Shrubland (3)	AaSaTg (1); AiHlTg (2)
Nimble Ctenotus	*Ctenotus hanloni*	Scincidae		1	Acacia Shrubland (1)	AbAtTg (1)
Red Dragon	*Ctenophorus rubens*	Agamidae		7	Acacia Shrubland (7)	AbAtTg (3); AiHlTg (2); Previous D&G (2)
Rufus Sand Dragon	*Ctenophorus rubens*	Agamidae		1	Acacia Shrubland (1)	Previous D&G (1)
Stimson's Python	*Antaresia stimsoni stimsoni*	Pythonidae		1	Grassland (1)	McTdTe (1)
Thorny Devil	*Moloch horridus*	Agamidae		1	Dune (2)	CcVfTe (2)
Varanus sp	*Varanus sp*	Varanidae		5	Acacia Shrubland (3); Grassland (2)	AaSaTg (1); AbAtTg (1); AcMpSs (1); AbAtTg/McTdTe mosaic (1); McTdTe (1)
Western Bearded Dragon	*Pogona minor minor*	Agamidae		1	Acacia Shrubland (2)	Previous D&G (1); Road/Shoulder (1)
Yellow-spotted Monitor	*Varanus panoptes rubidus*	Varanidae		9	Acacia Shrubland (7); Major Drainage (2)	AaSaTg (1); AiHlTg (4); EvAcAt (2); Road/Shoulder (2)
Avian						
Australian Bustard	*Ardeotis australis*	Otididae		12	Acacia Shrubland (11); Dune (1)	AaSaTg (3); AiHlTg (5); AxAcCc (2); CcVfTe (1); AbAtTg/AxAcCc mosaic (1)
Australian Kestrel (Nankeen Kestrel)	*Falco cenchroides*	Falconidae	*MA*	5	Acacia Shrubland (3); Major Drainage (1); Previous D&G (1)	AxAcCc (1); EvAcAt (1); Previous D&G (1); Road/Shoulder(2)
Australian Pipit	*Anthus australis*	Motacillidae		5	Acacia Shrubland (3); Minor Drainage (1); Road/Shoulder (1)	AcMpSs (3); AcVfCc (1); Road/Shoulder (1)
Australian Ringneck	*Platycercus zonarius*	Psittacidae		4	Acacia Shrubland (4)	AbAtTg (4)
Black-breasted Buzzard	*Hamirostra melanosternon*	Accipitridae		1	Acacia Shrubland (1)	AbAtTg (1)
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Campephagidae	*MA*	4	Acacia Shrubland (2); Major Drainage (2)	AbAtTg (2); EvAcAt (2)
Black-faced Woodswallow	*Artamus cinereus*	Artamidae		31	Acacia Shrubland (31)	AbAtTg (4); AcMpSs (10); AiHlTg (8); AxAcCc (6);Previous D&G (3)
Brown Falcon	*Falco berigora*	Falconidae		1	Major Drainage (1)	EvAcAt (1)
Brown Goshawk	*Accipiter fasciatus*	Accipitridae	*MA*	1	Acacia Shrubland (1)	AxAcCc (1)
Brown Honeyeater	*Lichmera indistincta*	Meliphagidae		9	Acacia Shrubland (7); Major Drainage (1); Minor Drainage (1)	AbAtTg (3); AcVfCc (1); AxAcCc (2); AbAtTg/AxAcCc mosaic (2); EvAcAt (1)
Chestnut-rumped Thornbill	*Acanthiza uropygialis*	Acanthizidae		1	Acacia Shrubland (1)	AbAtTg (1)
Cockatiel	*Nymphicus hollandicus*	Cacatuidae		8	Acacia Shrubland (6); Major Drainage (2)	AiHlTg (6); EvAcAt (2)
Crested Bellbird	*Oreoica gutturalis*	Oreoicidae		10	Acacia Shrubland (10)	AbAtTg (5); AcMpSs (2); AxAcCc (2); AbAtTg/AxAcCc mosaic (1)
Crested Pigeon	*Ocyphaps lophotes*	Columbidae		22	Acacia Shrubland (20); Minor Drainage (1); Dune (1)	AbAtTg (7); AcVfCc (1); AiHlTg (1); AxAcCc (9); CcVfTe (1); AbAtTg/AxAcCc mosaic (1); Previous D&G (2)
Crimson Chat	*Epthianura tricolor*	Meliphagidae		24	Acacia Shrubland (22); Minor Drainage (2)	AaSaTg (1); AbAtTg (9); AcMpSs (1); AcVfCc (2); Previous D&G (11)
Diamond Dove	*Geopelia cuneata*	Columbidae		2	Acacia Shrubland (2)	AxAcCc (2)
Emu	*Dromaius novaehollandiae*	Dromaiidae		6	Acacia Shrubland (3); Grassland (1); Dune (2)	AaSaTg (2); CcVfTe (2); AbAtTg/McTdTe mosaic (1); Previous D&G (1);
Galah	*Cacatua roseicapilla*	Cacatuidae		10	Acacia Shrubland (7); Major Drainage (3)	AaSaTg (2); AxAcCc (5); EvAcAt (3);
Grey Shrike-thrush	*Colluricincla harmonica*	Pachycephalidae		1	Acacia Shrubland (1)	AxAcCc (1)
Grey-crowned Babbler	*Pomatostomus temporalis*	Pomatostomidae		6	Major Drainage (6)	EvAcAt (6)
Little Button-quail	*Turnix velox*	Turnicidae		17	Acacia Shrubland (14); Major Drainage (3)	AbAtTg (4); AcMpSs (1); AiHlTg (1); AbAtTg/AxAcCc mosaic (4); EvAcAt (3); Road/Shoulder (4)
Little Corella	*Cacatua sanguinea*	Cacatuidae		1	Acacia Shrubland (1)	Road/Shoulder (1)
Little Crow	*Corvus bennetti*	Corvidae		3	Acacia Shrubland (2); Major Drainage (1)	AiHlTg (1); AxAcCc (1); EvAcAt (1)
Little Eagle	*Hieraaetus morphnoides*	Accipitridae		1	Acacia Shrubland (1)	AcMpSs (1)
Magpie-lark	*Grallina cyanoleuca*	Monarchidae	*MA*	1	Major Drainage (1)	EvAcAt (1)
Pallid Cuckoo	*Cacomantis pallidus*	Cuculidae	*MA*	1	Acacia Shrubland (1)	AbAtTg/AxAcCc mosaic (1)
Pied Honeyeater	*Certhionyx variegatus*	Meliphagidae		6	Acacia Shrubland (4); Major Drainage (2)	AcMpSs (1); AcVfCc (2); AxAcCc (1); EvAcAt (2)
Red-browed Pardalote	*Pardalotus rubricatus*	Pardalotidae		3	Acacia Shrubland (2); Major Drainage (1)	EvAcAt (1); Previous D&G (2)
Red-capped Robin	*Petroica goodenovii*	Petroicidae		4	Acacia Shrubland (4)	AcMpSs (1); AcVfCc (3)
Redthroat	*Pyrrholaemus brunneus*	Acanthizidae		5	Acacia Shrubland (5)	AxAcCc (5)
Rufous Songlark	*Megalurus mathewsi*	Locustellidae		7	Acacia Shrubland (6); Major Drainage (1)	AcVfCc (4); AxAcCc (2); EvAcAt (1)
Rufous Whistler	*Pachycephala rufiventris*	Pachycephalidae		5	Major Drainage (5)	EvAcAt (5)
Rufous-crowned Emu-wren	*Stipiturus ruficeps*	Maluridae		4	Grassland (4)	McTdTe (4)
Singing Honeyeater	*Gavicalis virescens*	Meliphagidae		62	Acacia Shrubland (55); Dune (1); Grassland (1); Major Drainage (5)	AaSaTg (15); AcMpSs (4); AcVfCc (4); AiHlTg (3); AxAcCc (22); CcVfTe (1); AbAtTg/AxAcCc mosaic (5); EvAcAt (5); McTdTe (1); Previous D&G (3)
Spotted Harrier	*Circus assimilis*	Accipitridae		1	Acacia Shrubland (1)	AbAtTg (1)

Common name	Scientific name	Family	Con Sig	Total #	Number of individuals recorded in each fauna habitat	Number of individuals recorded in each vegetation type
Thick-billed Grasswren	*Amytornis textilis*	Maluridae		4	Dune (1); Grassland (3)	CcVfTe (1); AbAtTg/McTdTe mosaic (2); McTdTe (1)
Torresian Crow	*Corvus orru*	Corvidae		5	Acacia Shrubland (4); Grassland (2)	AaSaTg (1); AbAtTg (2); McTdTe (2); Previous D&G (1)
Tree Martin	*Petrochelidon nigricans*	Hirundinidae	*MA*	10	Acacia Shrubland (1)	AaSaTg (10)
Variegated Fairy-wren	*Malurus lamberti*	Maluridae		92	Acacia Shrubland (88); Dune (4)	AaSaTg (29); AcMpSs (19); AcVfCc (7); AiHlTg (3); AxAcCc (18); CcVfTe (4); AbAtTg/AxAcCc mosaic (3); Previous D&G (9)
Western Wedgebill (Chiming Wedgebill)	*Psophodes occidentalis*	Psophodidae		15	Acacia Shrubland (14); Major Drainage (1)	AbAtTg (3); AcMpSs (4); AiHlTg (1); AxAcCc (2); AbAtTg/AxAcCc mosaic (2); EvAcAt (1); Previous D&G (2);
Whistling kite	*Haliastur sphenurus*	Accipitridae	*MA*	8	Acacia Shrubland (4); Dune (1); Major Drainage (3)	AiHlTg (1); AxAcCc (1); CcVfTe (1); EvAcAt (3); Road/Shoulder (2)
White-plumed Honeyeater	*Ptilotula penicillata*	Meliphagidae		4	Acacia Shrubland (3); Major Drainage (1)	AbAtTg (3); EvAcAt (1)
White-winged Fairywren	*Malurus leucopterus*	Maluridae		53	Acacia Shrubland (50); Dune (3)	AbAtTg (12); AcMpSs (15); AiHlTg (3); AxAcCc (3); CcVfTe (3); AbAtTg/AxAcCc mosaic mosaic (4); Previous D&G (11)
White-winged Triller	*Lalage tricolor*	Campephagidae		15	Acacia Shrubland (11); Major Drainage (4)	AaSaTg (3); AbAtTg (2); AcMpSs (2); EvAcAt (4); Previous D&G (4)
Willie Wagtail	*Rhipidura leucophrys*	Rhipiduridae		2	Acacia Shrubland (2)	AbAtTg (1); Previous D&G (1)
Yellow-throated Miner	*Manorina flavigula*	Meliphagidae		10	Acacia Shrubland (9); Major Drainage (1)	AxAcCc (9); EvAcAt (1)
Zebra Finch	*Taeniopygia guttata*	Estrildidae		136	Acacia Shrubland (130); Major Drainage (6)	AaSaTg (9); AbAtTg (24); AcMpSs (39); AiHlTg (5); AxAcCc (20); AbAtTg/AxAcCc mosaic (7); EvAcAt (6); McTdTe (6); Previous D&G (14); Road/Shoulder (6)
Mammal						
Cat	*Felis catus*	Felidae		6	Acacia Shrubland (6)	AaSaTg (1); AbAtTg (2); AiHlTg (2);AxAcCc (1)
Dingo	*Canis familiaris dingo*	Canidae		5	Acacia Shrubland (5)	AbAtTg (2); AiHlTg (1); Previous D&G (1)
Euro	*Osphranter robustus erubescens*	Macropodidae		34	Acacia Shrubland (25); Minor Drainage (1); Major Drainage (3); Grassland (3); Dune (2)	AaSaTg (9); AcMpSs (1); AcVfCc (1); AiHlTg (1); AxAcCc (8); CcVfTe (2); AbAtTg/McTdTe mosaic (3); EvAcAt (3); Previous D&G (5); Road/Shoulder (1)
European Cattle	*Bos taurus*	Bovidae		70	Acacia Shrubland (51); Major Drainage (10); Minor Drainage (1); Grassland (2); Dune (6)	AbAtTg (9); AcMpSs (3); AcVfCc (1); AxAcCc (21); CcVfTe (6); AbAtTg/AxAcCc mosaic (6); AbAtTg/McTdTe mosaic (1); EvAcAt (10); McTdTe (1); Previous D&G (11); Road/Shoulder (1)
Goat	*Capra hircus*	Bovidae		1	Grassland / Shrubalnd (1)	AbAtTg/McTdTe mosaic (1)
Horse	*Equus caballus*	Equidae		3	Major Drainage (3)	EvAcAt (3)
Red Fox	*Vulpes vulpes*	Canidae		2	Acacia Shrubland (1); Grassland (1)	McTdTe (1); Previous D&G (1)
Short-beaked Echidna	*Tachyglossus aculeatus acanthion*	Tachyglossidae		2	Dune (1); Grassland (1)	CcVfTe (1); McTdTe (1)
Spinifex Hopping-mouse	*Notomys alexis alexis*	Muridae		6	Acacia Shrubland (4); Dune (1); Grassland (1)	AiHlTg (1); AxAcCc (1); CcVfTe (3); McTdTe (1)

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