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Department of Industry, Science, Energy and Resources
ABN: 74 599 608 295

AECOM

Square Kilometre Array Ecological Assessment

30-Jun-2021
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Square Kilometre Array Ecological Assessment

Client: Department of Industry, Science, Energy and Resources

ABN: 74 599 608 295

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Executive Summary

AECOM Australia Pty Ltd (AECOM) were engaged by Wajarri Enterprises Group (Wajarri) to conduct a flora and vegetation assessment and a fauna assessment for the Square Kilometre Array Low Project (SKA1-Low). The SKA1-Low array has an updated footprint and survey area on Boolardy and Kalli Station in the Murchison region. Surveys originally undertaken in 2014 were updated and additional field surveys conducted to describe the existing environment of the new survey area.

The survey area includes a numerous linear corridors and 512 array stations spanning a total of 4,918 ha. A flora and vegetation assessment and basic fauna assessment was undertaken in November 2020 by Botanist Floora de Wit and Ecologist Jared Leigh. The survey focussed on corridors that deviated significantly from the 2014 survey area. The remaining areas relied on extrapolation and interpretation of aerial imagery and historical results.

A summary of the results is presented below:

- No Threatened or Priority Ecological Communities were considered likely to occur and none were recorded in the survey area
- Ten native vegetation communities were mapped including six Acacia Open Woodlands on flats, two Mixed Shrublands on granite outcrops, and two Woodlands associated with ephemeral drainage lines were recorded
- Nine Priority flora species were considered likely to occur, of which three were confirmed to occur in the survey area:
    - *Petrophile pauciflora* (Priority 3) – two populations comprising 163 individuals
    - *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94) (Priority 3) – one population, no counts obtained
    - *Eremophila simulans* subsp. *megacalyx* (Priority 3) – may have been recorded, no identification material was available both in 2014 and in 2020. If the identification is correct, it was recorded at two locations and represented a dominant understorey shrub species with more than 1,000 individuals.
- Eight broad fauna habitats were defined and mapped within the survey area. Much of the habitat is in non-pristine condition and so habitat corridors remain a valuable asset to local fauna. Within the survey area these linkages consist of the more significant drainage channels and creek lines.
- Direct and indirect evidence of the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and Biodiversity Conservation BC Act listed Western Spiny-tailed Skink *Egernia stokesii badia* was recorded a total of five times across the 2014 and 2020 AECOM surveys. However, none of these observations are within the current survey area, due to a refinement of the survey area after the 2014 survey, and the granite boulders and heaps habitat that occurs within the survey area provides minimal quality habitat for the skink.
- The Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum* was recorded twice in rocky areas with scattered *Acacia* and *Eremophila*. However, again none of these records are within the current survey area. This species is likely to utilise habitats that are common within the region.

1.0 Introduction

1.1 Background

The Square Kilometre Array (SKA) Project is a large international radio telescope project which aims to answer key cosmological questions using radio waves from across the universe to look back into the cosmic dark ages. As with all big science projects, the SKA project will draw on the skills, experiences and support of 14 countries working collaboratively to construct and operate elements of the SKA project, with the first phase of the project being hosted by South Africa and Australia. Australia will host the SKA1-Low Frequency Aperture Array (SKA1-Low).

SKA1-Low is an entirely new array and will consist of up to 512 array stations. Each array station will consist of up to 256 individual antennas, representing more than 130,000 antennas in total. The majority of array stations will be in a densely populated core with three spiral arms, spread over a distance of 65 km.

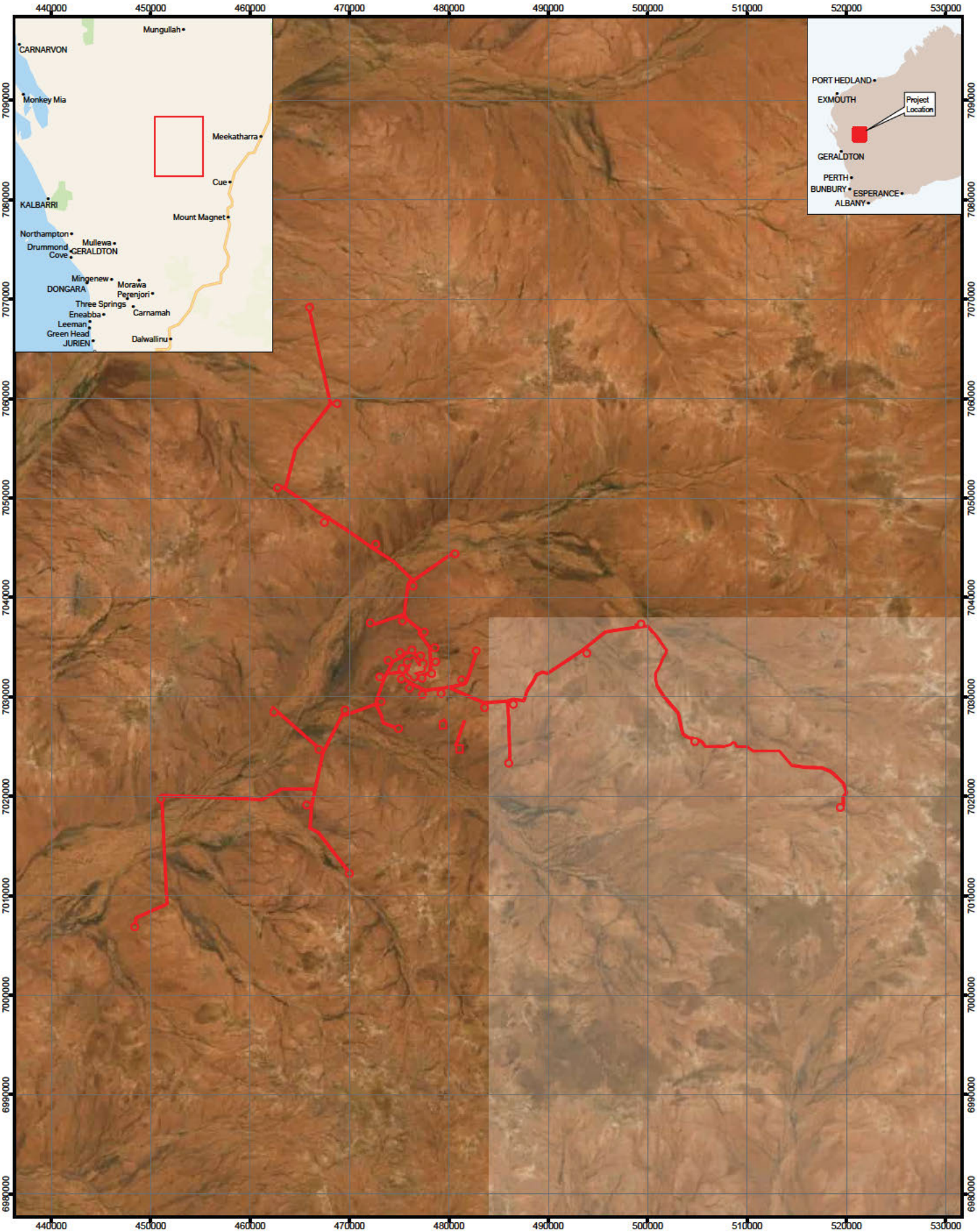
1.2 Location

The Project incorporates the SKA-Low array, (the survey area), which extends from Boolardy Station to Kalli Station in the Shire of Murchison. The survey area is approximately 250 km northeast of Geraldton, and 570 km north of Perth (Figure 1).

The survey area incorporates several linear “arms” with a central core. It includes 4,918 ha of native vegetation.

1.3 Objectives

The aim of the flora, vegetation and fauna assessment was to define the ecological values of the reconfigured footprint of the SKA1-Low survey area. Significant environmental factors and constraints were targeted to quantify conservation significant elements. Data collected, with consideration for the original surveys and report completed in 2014, was compiled into this technical report, the results of which are presented in a manner suitable for inclusion in environmental assessment documentation. The results will be used to inform the ultimate SKA design, environmental impact assessments and identify environmental factors or areas that require management.



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LEGEND
Survey Area

Survey Area

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure 1

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2.0 Existing Environment

2.1 Climate

The Shire of Murchison receives an arid climate with a mean annual rainfall of 190-240 mm (Curry et al., 1994). Rainfall varies significantly depending on the occurrence of sporadic significant rainfall events that are driven by cyclonic weather from the north and cold fronts from the southwest. The summer months are hot and consist of long periods where the temperature exceeds 37.5 degrees Celsius. Winters are cool and sunny with cold evenings and mild days.

The closest weather station to the project area is Meekatharra Airport (station 7045) located approximately 185 km east of Boolardy Station and the adjacent Kalli Station. An annual average rainfall of 235.8 mm has been recorded since 1944. The regional average annual evaporation is between 2,800 and 3,600 mm (BoM, 2020). Total annual rainfall to date for 2020 is 150.6 mm which is below average (BoM, 2020). Rainfall in the past six years has been below average (considering every second year). Mean annual rainfall since 1990 is 276 mm, with 170.2 mm recorded in 2020 (BoM, 2020).

Average maximum temperatures peak between December and February, with the highest recorded daily temperature of 38.3°C in January 2020 and the lowest recorded daily temperature of 7.4°C in July 2020. Temperatures do not always coincide with rainfall averages due to the high variability in rainfall (BoM, 2020).

The consecutive months of below average rainfall between March and July prior to the field survey may have implications on the survey results, further discussed in Section 4.0.

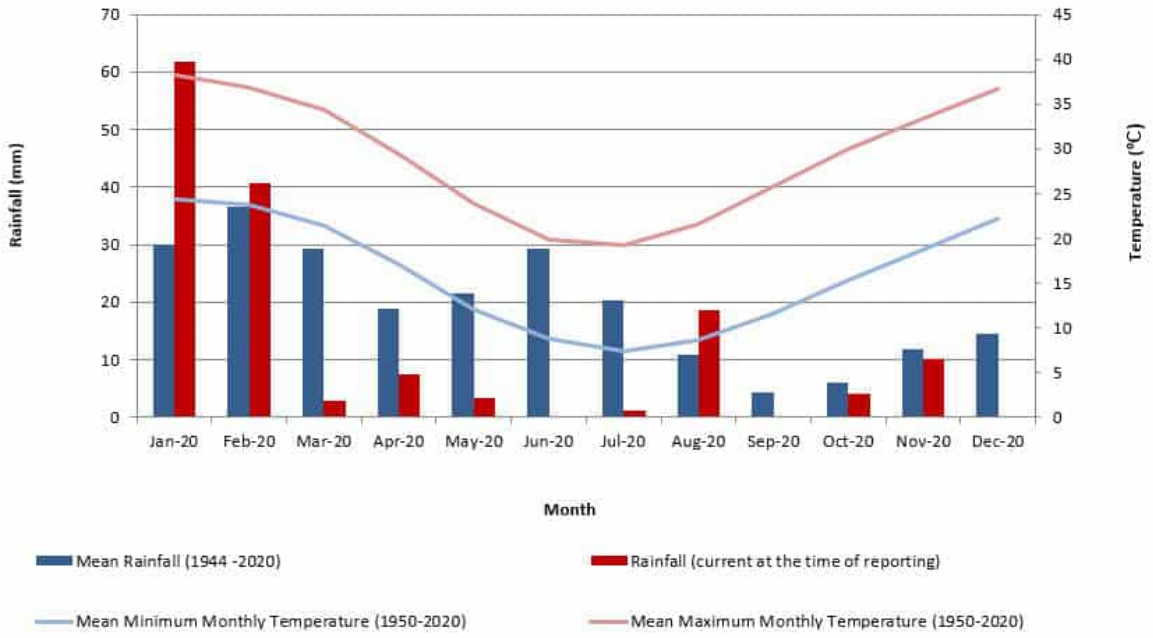


Figure 2 Rainfall and temperature data for Meekatharra Airport (Station 7045 BoM, 2020)

2.2 IBRA Region

There are 89 recognised Interim Biogeographical Regions of Australia (IBRA) that have been defined based on climate, geology, landforms and characteristic vegetation and fauna (CALM, 2002). The SKA project is located in the Murchison IBRA bioregion, in the centre of the Western Murchison Subregion. The Murchison bioregion is on the northern part of the Yilgarn Craton which is divided into the Eastern and Western Murchison. There are six wetlands (lakes) of national importance in the bioregion including Ballard, Barlee, Marmion, Wooleen, Breberle and Anneen Lakes.

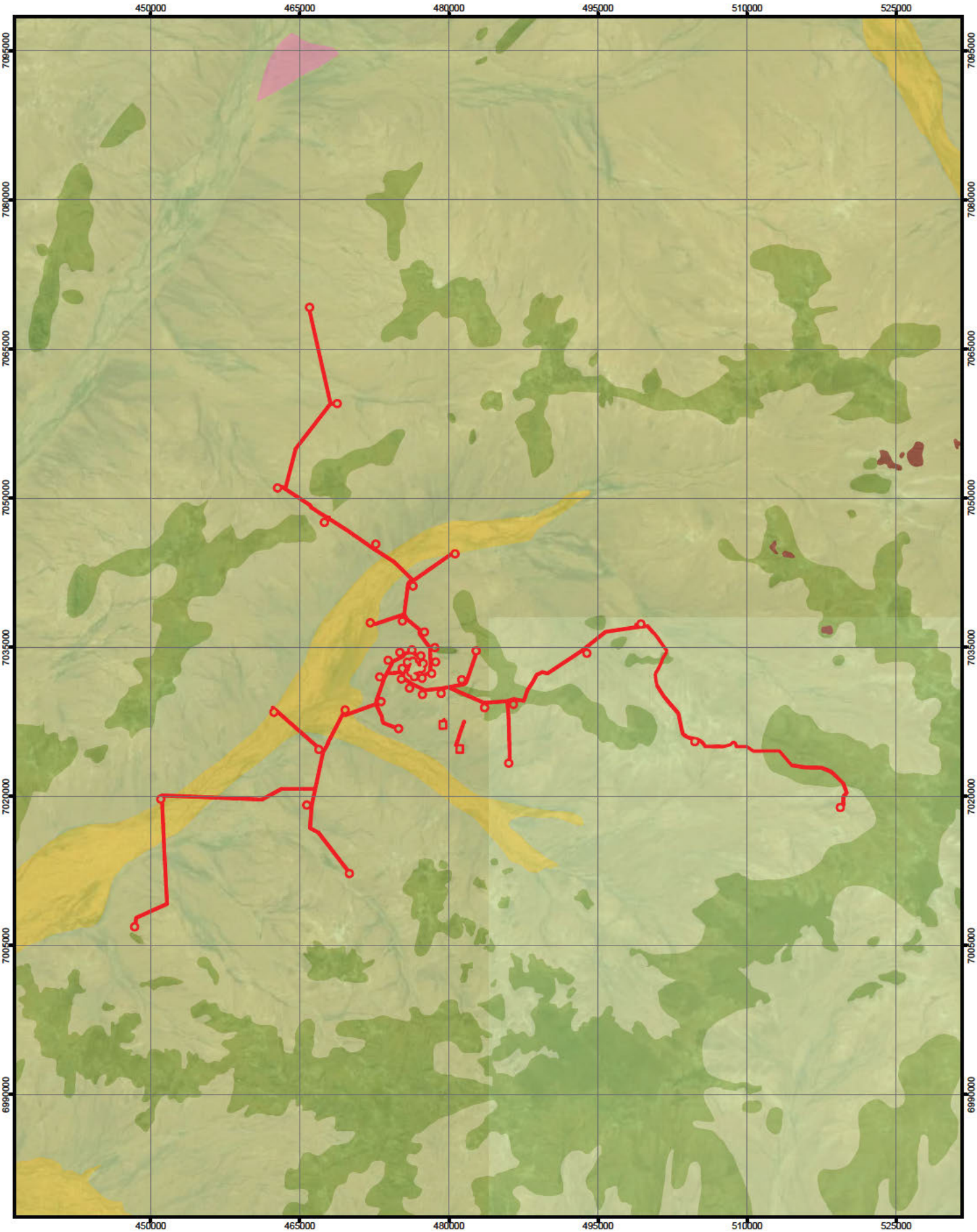
The Western Murchison subregion, described by Desmond *et al.* (2001), supports low Mulga woodlands with bunch grasses and ephemerals (annuals). Landscape features include outcrop and extensive fine-textured hardpan washplains. Quaternary sandplains support hummock grasslands, calcareous soils support Saltbush and saline alluvia support *Halosarcia* low shrublands. The subregion contains the headwaters of the Murchison and Wooramel Rivers which drain westwards to the coast. Rare features of the area include calcrete aquifers with short-range endemics, rare fauna, and flora. The land use is predominantly grazing native pastures (96%) and Crown Reserves (2.8%).

2.3 Vegetation

The survey area intersects with six vegetation associations mapped by Beard (1976) representing pre-European vegetation (Table 1; Figure 3). All associations have more than 90% remaining within the Murchison IBRA region and the Shire of Murchison (Govt. of WA, 2019).

Table 1 Pre-European vegetation associations that intersect with the survey area

Veg. Assoc.	Description	Area (ha)	% Remaining	
			Murchison IBRA Region	Shire of Murchison
18	Low woodland; Mulga (*Acacia aneura*)	998.34	99.68	100.00
29	Sparse low woodland; Mulga, discontinuous in scattered groups	4,190.53	99.98	100.00
39	Shrublands; Mulga scrub	360.09	99.10	99.99
204	Succulent steppe with open scrub; scattered Mulga & *Acacia sclerosperma* over Saltbush & Bluebush	526.76	99.60	100.00
341	Low woodland over scrub; Mulga over *Acacia sclerosperma,* Bowgada, *A. victoriae* & Minnieritchie (*A. grasbyi*)	100.05	100.00	100.00
2081	Shrublands; Bowgada and associated spp. scrub	30.43	99.87	100.00
Total Area (ha)		**4,918.33**	**-**	**-**



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LEGEND

Survey Area

Pre-European Vegetation

Low woodland, open low woodland or sparse woodland,Mulga Acacia aneura and associated species.

Rock,

Saltbush and bluebush with scrub or open scrub,Mulga, other wattle Atriplex spp, Maireana spp. with Acacia aneura & other Acacia spp.

Saltbush and/or bluebush with scattered low trees,Mulga, other wattle, casuarina Atriplex spp. Maireana spp. with Acacia aneura, A. papyrocarpa, Allocasuarina cristata

Scrub, open scrub or sparse scrub,Wattle, teatree & other species Acacia spp. Melaleuca spp.

Pre-European Vegetation Mapping

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SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
3

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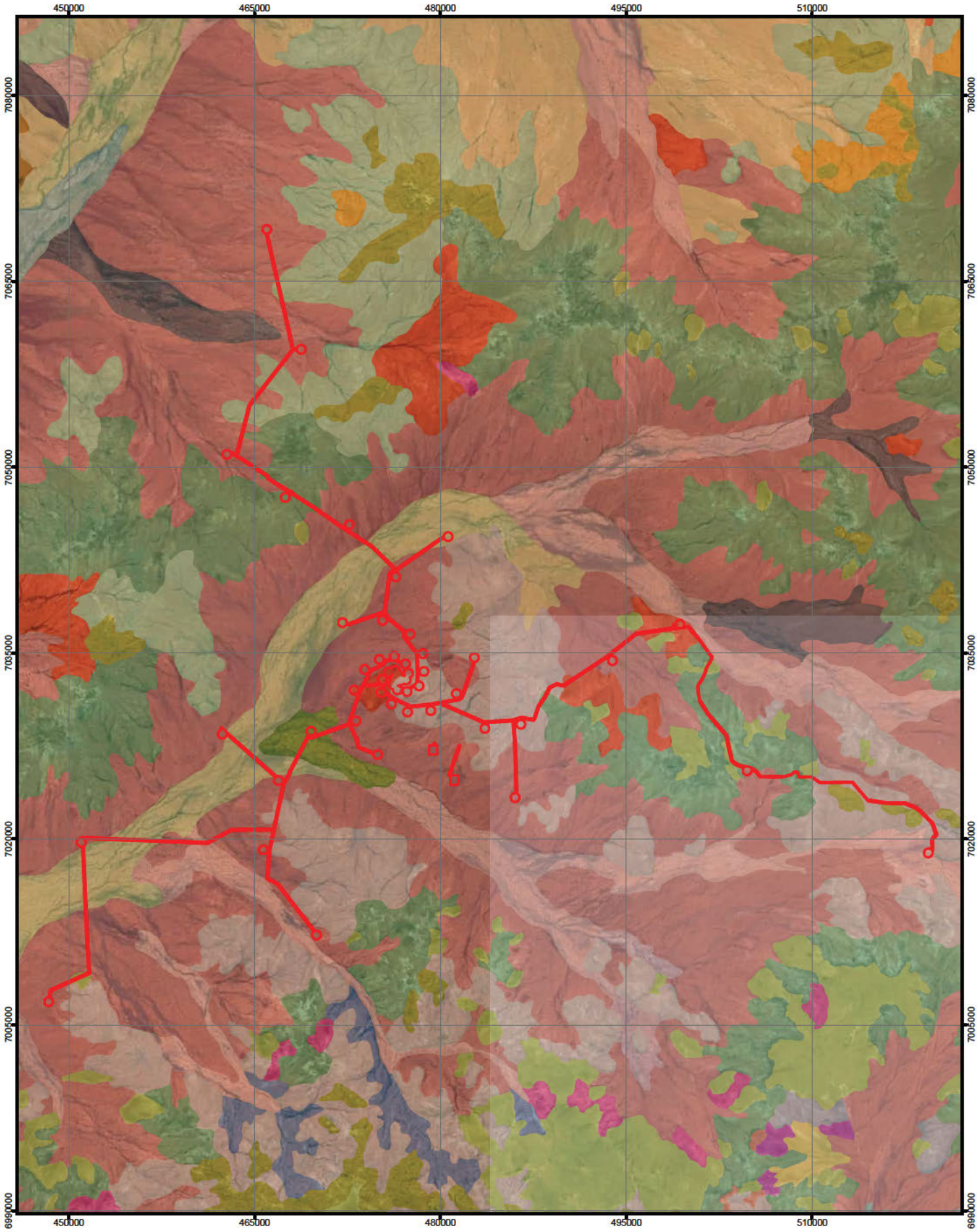
2.4 Land Systems

The mapping of soils, landscapes and vegetation in the Rangelands of Western Australia was conducted in the Wiluna-Meekatharra region in 1963 (Tille, 2006). This became the responsibility of the Department of Agriculture using a procedure developed by the CSIRO. The survey adopted the land system approach, where a land system is defined as an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation (Tille, 2006).

There are ten land systems that intersect with the survey area, described in Table 2 and mapped in Figure 4.

Table 2 Land systems of the survey area

Land System	Description	Area (ha)
Beringarra	Major riverine plains with active lower floodplains flanking channelled watercourses; supports mostly halophytic shrublands and mixed *Acacia* shrublands and low woodlands with minor perennial grasses; severely degraded and eroded in many areas.	395.34
Challenge	Gently undulating gritty-surfaced plains, occasional granite hills, tors and low breakaways, with *Acacia* shrublands.	1037.46
Ero	Tributary floodplains with shallow, erodible duplex soils on red-brown hardpan, more or less saline and supporting *Acacia* shrublands with halophytic and non-halophytic undershrubs; grazed preferentially and widely degraded and eroded.	60.99
Kalli	Elevated, gently undulating red sandplains edged by stripped surfaces on laterite and granite; tall *Acacia* shrublands and understorey of wanderrie grasses (and spinifex locally); replaced by more extensive areas of Bullimore land system.	74.85
Koonmarra	Quartz-strewn stony plains and low rises with outcropping granite, gneiss and schists; supports scattered Mulga and other mainly non-saline shrubs.	86.30
Millrose	Level or very gently undulating stony plains on hardpan and granite with irregularly distributed sandy Wanderrie banks, supporting mostly scattered Mulga shrublands with minor Wanderrie grasses.	425.06
Norie	Granite hills with exfoliating domes and extensive tor fields, supporting acacia shrublands.	3.73
Roderick	Broad, saline riverine plains, with numerous grassy drainage foci and claypans adjacent to central alluvial plains and major channels; also non-saline marginal hardpan wash plains; mainly supports halophytic shrublands with minor perennials.	93.94
Sherwood	Breakaways, kaolinised footslopes and extensive gently sloping plains on granite supporting Mulga shrublands and minor halophytic shrublands.	264.56
Yanganoo	Almost flat hardpan wash plains, with or without small Wanderrie banks and weak grooving; supporting Mulga shrublands and Wanderrie grasses on banks.	2476.17
	Total Area (ha)	**4918.41**



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LEGEND

Survey Area

Land System Mapping

- Agamemnon Land System
- Belele Land System
- Beringarra Land System
- Challenge Land System
- Cunyu Land System
- Ero Land System
- Farmer Land System
- Jundee Land System
- Kalli Land System
- Koonmarra Land System
- Mileura Land System
- Millex Land System
- Millrose Land System
- Mindura Land System
- Narryer Land System
- Norie Land System
- Roderick Land System
- Sherwood Land System
- Tindalarra Land System
- Violet Land System
- Waguin Land System
- Yandil Land System
- Yanganoo Land System

Land System Mapping

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SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure 4

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3.0 Legislative Framework

3.1 Overview

Table 3 summarises the key legislation governing the protection and management of Western Australia's conservation significant species and communities, which are further discussed below.

Table 3 Relevant legislation, regulations and guidance

Legislation	Purpose
Commonwealth of Australia	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Provides for the protection of the environment and the conservation of biodiversity.
Western Australia	
Biodiversity Conservation Act 2016 (BC Act)	Provides for the conservation and protection of Western Australia's biodiversity and biodiversity components.
Environmental Protection Act 1986 (EP Act)	Preventing, controlling and abating environmental harm and conserving, preserving, protecting, enhancing and managing the environment.
Biosecurity and Agriculture Management Act 2007 (BAM Act)	Provides for the management, control and prevention of certain plants and animals, and for the protection of agriculture and related resources generally.
EPA Technical Guidance – Terrestrial Fauna Surveys for Environmental Impact Assessment, 2020	Provides guidance on the standard of survey required to assist in collecting the appropriate data for decision-making associated with the protection of Western Australia's terrestrial fauna.
EPA Technical Guidance – Flora and vegetation Surveys for Environmental Impact Assessment, 2016	Provides guidance to ensure adequate flora and vegetation data of an appropriate standard are obtained and used in EIA.

3.2 *Environment Protection and Biodiversity Conservation Act 1999*

3.2.1 Matters of National Environmental Significance

Matters of national environmental significance include:

- listed threatened species and ecological communities
- migratory species protected under international agreements
- Ramsar wetlands of international importance
- the Commonwealth marine environment
- world Heritage properties
- national Heritage places
- Great Barrier Reef Marine Park
- a water resource, in relation to coal seam gas development and large coal mining development
- nuclear actions.

If an action is likely to have a significant impact on MNES this action must be referred to the Minister for the Environment for a decision on whether assessment and approval is required under the EPBC Act.

3.2.2 Flora and Fauna

The EPBC Act is the main piece of Federal legislation protecting biodiversity in Australia. Species at risk of extinction are recognised at a Commonwealth level and are categorised in one of six categories as outlined in Table 4, with an additional category for other specially protected fauna.

Table 4 Categories of species listed under Schedule 179 of the EPBC Act

Code	Conservation Category
Ex	Extinct Taxa
ExW	Extinct in the Wild
CE	Critically Endangered
E	Endangered
V	Vulnerable
CD	Conservation Dependent

3.2.3 Vegetation Communities

Communities can be classified as Threatened Ecological Communities (TECs) under the EPBC Act. The EPBC Act protects Australia's ecological communities by providing for:

- identification and listing of ecological communities as threatened
- development of conservation advice and recovery plans for listed ecological communities
- recognition of key threatening processes
- reduction of the impact of these processes through threat abatement plans.

Categories of federally listed TECs are described in Table 5.

Table 5 Categories of TECs that are listed under the EPBC Act

Code	Conservation Category
CE	Critically Endangered If, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future.
E	Endangered If, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future.
V	Vulnerable If, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium-term future.

3.3 Western Australian Legislation

3.3.1 Flora and Fauna

Under the BC Act, flora and fauna can be listed as Threatened (T) or extinct (X). Threatened flora are plants which have been assessed as being at risk of extinction (DBCA, 2019). The Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection (WAH, 1998-).

Plants and animals that are considered Threatened and need to be specially protected because they are under identifiable threat of extinction are listed under the BC Act. These categories are defined in Table 6.

Table 6 Conservation codes for flora and fauna listed under the *Biodiversity Conservation Act 2016*

Code	Conservation Category
CR	**Critically Endangered Species** Threatened species considered to be facing an extremely high risk of extinction in the wild in the immediate future.
EN	**Endangered Species** Threatened species considered to be facing a very high risk of extinction in the wild in the near future.
VU	**Vulnerable Species** Threatened species considered to be facing a high risk of extinction in the wild in the medium-term future.
EX	**Extinct Species** Species where there is no reasonable doubt that the last member of species has died.
MI	**Migratory Species** Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth. Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the *Convention on the Conservation of Migratory Species of Wild Animals* (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals, that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species.
CD	**Species of special conservation interest (conservation dependent fauna)** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened.
OS	**Other specially protected species** Fauna otherwise in need of special protection to ensure their conservation.

Species that have not yet been adequately surveyed to warrant being listed under the BC Act, or are otherwise data deficient, are added to Priority Lists under Priorities 1, 2 or 3 by the State Minister for Environment. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. Categories and definitions of Priority Flora and Fauna species are provided in Table 7.

3.3.2 Vegetation Communities

TECs are naturally occurring biological assemblages that occur in a particular type of habitat and that may be subject to processes that threaten to destroy or significantly modify the assemblage across its range. TECs are listed by both State and Commonwealth legislation.

Vegetation communities in Western Australia are described as TECs if they have been endorsed by the Western Australian Minister for Environment following recommendations made by the Threatened Species Scientific Committee. Categories of TECs are defined in Table 8.

Department of Biodiversity, Conservation and Attractions (DBCA) maintains a database of state listed TECs which is available for online searches via their website. Possible TECs that do not meet survey criteria or are not adequately defined are listed as Priority Ecological Communities (PECs) under Priorities 1, 2 and 3. 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. Conservation dependent communities are classified as Priority 5. PECs are endorsed by the Minister for Environment and are described in Table 9.

DBCA requires that all Priority and Threatened ecological communities are considered during environmental impact assessments and clearing permit applications.

There is currently no formal protection afforded to TECs or PECs listed at the state level.

Table 7 Conservation codes for WA flora and fauna listed by DBCA and endorsed by the Minister for Environment

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

Table 8 Conservation codes for State listed ecological communities

Conservation Code	Category
PD	Presumed Totally Destroyed
CR	Critically Endangered
EN	Endangered
VU	Vulnerable

Table 9 Conservation categories for Priority Ecological Communities

Code	Conservation Category
P1	Priority One: poorly-known ecological communities
P2	Priority Two: poorly-known ecological communities
P3	Priority Three: poorly known ecological communities
P4	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.
P5	Priority Five: conservation dependent ecological communities

3.3.3 Biosecurity and Agriculture Management Act 2007

Biosecurity is the management of the risk of animal and plant pests and diseases entering, emerging, establishing or spreading in WA to protect the economy, environment and community. Biosecurity is managed under the BAM Act which came into effect 1 May 2013. Exotic animals and plants can become an invasive species if they can establish in new areas where local conditions are favourable for their growth. Each organism listed under the BAM Act comes with certain legal / import requirements:

- Declared Pest, Prohibited - s12. Prohibited organisms are declared pests by virtue of section 22(1) and may only be imported and kept subject to permits.
- Permitted - s11. Permitted organisms may be subject to an import permit if they are potential carriers of high-risk organisms.
- Declared Pest - s22(2). Declared pests may be subject to an import permit if they are potential carriers of high-risk organisms and may also be subject to control and keeping requirements once within Western Australia.
- Permitted, Requires Permit - r73. Regulation 73 permitted organisms may only be imported subject to an import permit.

Declared pests can be assigned to a C1, C2 or C3 control category under the Biosecurity and Agriculture Management Regulations 2013:

- C1 Exclusion - Organisms which should be excluded from part or all of Western Australia.
- C2 Eradication - Organisms which should be eradicated from part or all of Western Australia.
- C3 Management - Organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism.
- Unassigned - Declared pests that are recognised as having a harmful impact under certain circumstances, where their subsequent control requirements are determined by a Plan or other legislative arrangements under the BAM Act.

3.3.4 *Environmental Protection Act 1986* (and Clearing Regulations)

Section 38 (Part IV) of the EP Act provides that any person may refer a significant proposal (one that is likely to have a significant effect on the environment) to the EPA. The EP Act also states that where the environmental impact of a proposal can be adequately assessed and managed through other legislative mechanisms the proposal is unlikely to require formal environmental impact assessment.

If a proposal is not formally assessed by the EPA under Part IV of the EP Act, a Part V native Vegetation Clearing Permit may be required. Under Section 51C of the EP Act, clearing of native vegetation without a Native Vegetation Clearing Permit is an offence unless an exemption applies. Exemptions offered for clearing under Regulation 5 of the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* do not apply within Environmentally Sensitive Areas (ESA).

4.0 Methodology

4.1 Desktop Assessment

A comprehensive desktop assessment was undertaken to gather background information of the local area, restricted up to an 80 km radius from the survey area centre point (latitude: -26.77592 longitude: 117.19408). Sources used to inform the desktop assessment included:

- DBCA threatened species and communities database
- Western Australian Herbarium (WAH) records
- NatureMap
- Atlas of Living Australia (AoLA)
- EPBC Act Protected Matters Search Tool (PMST) database
- Alexander Holm & Associates (2008) Radio Astronomy Project Environmental Assessment
- AECOM (2014) Square Kilometre Array Ecological Assessment.

All flora and fauna of conservation significance identified in the desktop assessment was assessed for their likelihood of occurrence in the survey area (Table 10).

Available literature was consulted including Beard (1976) vegetation mapping, Land Systems Mapping (Department of Agriculture, 1991), a review of the Western Murchison subregion (Desmond *et al.*, 2001) and environmental studies conducted by Alexander Holm & Associates (2008) for the MRO area. These documents were used to define the existing environment and provide local and regional context for the survey results.

Table 10 Categories of likelihood of occurrence for species of conservation significance identified in the desktop assessment

Category	Flora	Fauna	Communities
Likely	Habitat is present in the survey area and it has been recorded in close proximity	Survey areas are within the known distribution of the species, habitat is present in the survey area and it has been recorded in close proximity previously	Known occurrences of the community in close proximity to the Survey area. Vegetation looks the same within the known occurrence and survey area based on aerial imagery. Geographic location is similar to the survey area
May	Habitat may be present in the survey area and/or it has been previously recorded in close proximity	Survey area are within the known distribution of the species, marginal habitat may be present and/or it has been previously recorded in close proximity	Known occurrence of the community in the local area, and/or vegetation looks the same within known occurrence and survey area based on aerial imagery. Geographic location is similar to the survey area
Unlikely	No suitable habitat is present and there have been no recorded locations in close proximity to the survey area	Survey area are outside known distribution for that species, or no suitable habitat is present and there have been no recent recorded locations in close proximity to the survey areas	Known occurrence of the community in close proximity to the Survey area however geographic location does not occur in survey area

4.2 Flora and Vegetation

A detailed flora and vegetation assessment was undertaken between 19 and 23 November 2020 utilising methods outlined in the EPA (2016) Flora Survey Technical Guide. The assessment was completed by Floora de Wit (collection permit FB62000137). Floora de Wit has 13 years' experience undertaking flora and vegetation assessments and was the lead botanist for the 2014 ecological assessment project (AECOM, 2014).

Floristic data was sampled from 32 relevès, defined as unbounded quadrats. Relevés were determined to be a better representation of vegetation due to the sparse foliage cover and isolated occurrence of many species. In 2020 the survey team had a good understanding of the expected vegetation communities therefore more focus was placed on targeting significant flora species, using relevés to support the delineation of vegetation communities as necessary.

Data collected at sample point locations included the presence of plant species, their cover abundance, structural composition of vegetation, physical environment, and presence/absence of disturbance. Each sample point location was given a unique site number, and the following parameters recorded:

- date
- location using hand-held GPS (accuracy of 5 m)
- photograph
- soil details (type, colour, moisture)
- topography
- vegetation condition using the Keighery (1994) scale
- disturbance notes
- fire history
- species present
    - estimated height
    - estimated percentage cover.

Any species unable to be identified in the field were collected for identification in AECOM's in-house herbarium and the specimens and taxonomic references and keys at the Western Australian Herbarium (WAH). Naming of species followed the convention of the WAH.

4.2.1 Vegetation Mapping

Vegetation communities were described and mapped based on changes in dominant species composition and landform. The 2020 dataset was combined with the 2014 dataset to analyse floristic similarity of sample point locations (see survey effort in Figure 5). Relevé data had a high similarity to the 2014 quadrat data, further supporting the decision to use relevés as a method for recording floristics. The complete dataset included the 32 relevés from 2020, and 64 quadrats and 28 observation points from 2014.

Only data collected from within the survey area, or directly adjacent, is included in this report.

Vegetation community descriptions were based on the National Vegetation Information System (NVIS) framework at level V Association (DotEE, 2017a). This is consistent with the AECOM (2014) vegtation mapping.

Vegetation condition was determined using the Keighery (1994) condition scale (Table 11). The scale is based on disturbance (e.g. grazing, erosion), degree of alteration to community and habitat structure and site ecology.

Table 11 Bushland condition ratings (Keighery, 1994)

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

4.2.2 Targeted Searches

Targeted surveys were conducted for conservation significant flora and fauna identified in the desktop assessment considered likely to occur. Target sites included granite outcrops, breakaways, and saline riverine areas. This was informed by the desktop assessment and the 2014 results which showed that these locations were most likely to support Priority flora species.

Where targeted Threatened or Priority Flora species were observed, the following data were collected:

- location using a hand-held GPS
- the number of individuals in the immediate population, or an estimate of the size (number) of the population with an estimated radius of its spatial extent
- vegetation condition
- associated dominant species
- soil type and colour
- topography.

4.3 Fauna

AECOM has conducted two Level 1 / basic fauna surveys over sections of the survey and surrounding areas in 2014 and 2020. The 2014 survey was reported in AECOM (2014) and details have largely been incorporated into this report where relevant.

The 2020 basic fauna survey was conducted between 20th and 23rd November 2020 by Ecologist Jared Leigh. Jared has over 16 years' experience in the environmental industry and completed a Bachelor of Science (Environmental) majoring in Zoology and Marine Biology. The survey was conducted in accordance with Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2020). The survey was conducted concurrently with the flora and vegetation survey, which enables consistent mapping of the fauna habitats and vegetation communities.

The field survey was undertaken following completion of the desktop assessment, with the survey primarily focused on verifying the findings of the desktop assessment and identifying and mapping (significant) fauna habitat. Signs of threatened fauna species with potential to utilise the habitats of the survey area were searched for during the basic fauna survey. These species are discussed in Table 14.

Fauna habitats were assessed for specific habitat components, including consideration of structural diversity and refuge opportunities for fauna, in order to determine the potential for these habitats to support conservation significant species. The fauna habitat assessments included:

- location
- general habitat description
- habitat condition and disturbance types
- dominant / characteristic flora species and vegetation layers
- presence and abundance of key habitat features such as large mature trees, small and large hollows, fallen logs, course and fine litter, decorticating bark, bare ground, grass, stones and boulders, rock crevices, soil cracks, vines, dense shrubs, water bodies etc.
- presence of fauna and secondary signs (e.g. scats, digging, tracks, burrows, eggshell, bones, feathers etc.)
- connectivity of habitat.

In addition to recording all observed fauna and birds identified from distinctive calls, details of indirect evidence such as scats, tracks and diggings was documented. In particular, attention was given to conservation significant species identified in the desktop assessment as having the potential to occur in the area.

The taxonomy and nomenclature of vertebrate species for mammals, reptiles and amphibians is consistent with the Western Australian Museum's Checklist of Vertebrates of Western Australia (2020) and the Australian Faunal Directory (https://biodiversity.org.au/afd/home) for avian species.

4.4 Survey Limitations

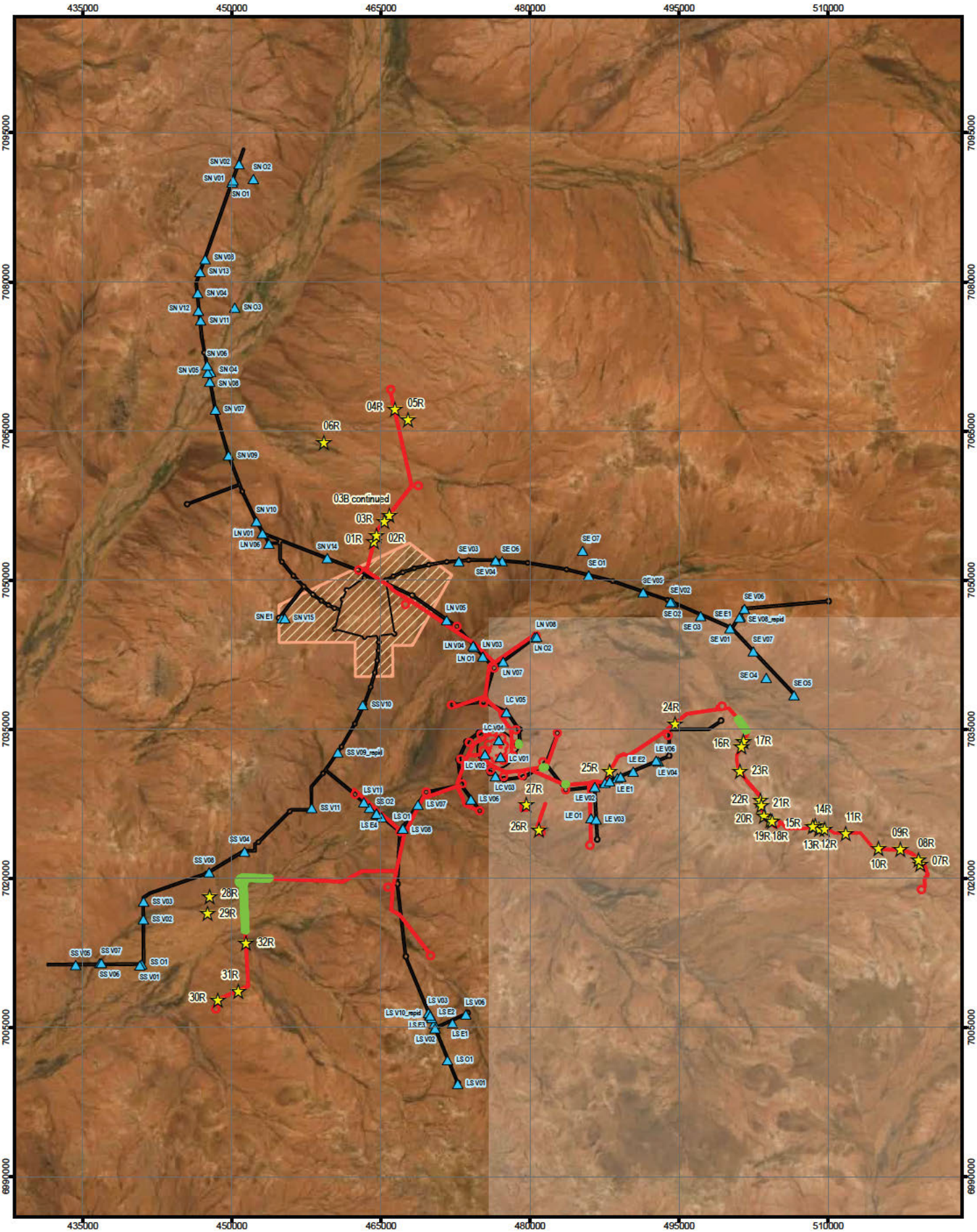
No significant limitations were identified that may influence the outcome of the field surveys. Seven limitations were considered as defined in the EPA Technical Guide (2016). These are discussed in Table 12.

Table 12 Limitations of the ecological survey

Limitation	Flora and Vegetation Assessment	Basic Fauna Survey
Availability of contextual information on the region	**Not a limitation** Sufficient resources were available to provide contextual information. These included NatureMap, DBCA databases, FloraBase, Alexander & Holmes (2008) and AECOM (2014) ecological survey reports.	**Not a limitation** Sufficient resources were available to provide contextual information. These included NatureMap and DBCA database, AoLA EPBC Act PMST, Alexander Holm & Associates (2008), AECOM (2014), Phoenix Environmental Sciences (Phoenix [2015]) and various field guides.
Competency/experience of consultant conducting survey	**Not a limitation** The flora and vegetation assessment was led by Floora de Wit who has more than 13 years' experience conducting surveys of similar scope. Floora was also involved in the 2014 surveys for the SKA project.	**Not a limitation** The fauna survey was undertaken by Ecologist Jared Leigh who has more than 16 years' experience in the environmental industry in WA.

Limitation	Flora and Vegetation Assessment	Basic Fauna Survey
Proportion of flora/fauna identified, recorded and/or collected (based on sampling, timing and intensity)	**Not a limitation** Survey effort includes - 24 people days in late August to September 2014 completing 65 quadrats - Four people days in mid November 2020 completing 32 relevés. Vegetation communities were determined by comparing floristic data from 32 relevés and 65 quadrats completed in 2014 and 2020. Survey effort is shown in Figure 5. Species richness was low in 2020, a reflection of a reduced survey effort due to being combined with the 2014 dataset, and the dry climate.	**Minor limitation** The 2014 and 2020 surveys were conducted in Spring over a sufficient time period to assess the habitats of the survey area. Species diversity was low in 2020, a reflection of a reduced survey effort due to being combined with the 2014 dataset, and the dry conditions proceeding the survey. The 2020 field survey focussed on surveying areas that were far from areas previously surveyed in 2014 and 2008. Areas not accessed were mapped using extrapolation from 2014 mapping and aerial imagery. A couple of small areas of potential granite were identified on the aerial imagery after the 2020 field survey that were surveyed but not mapped in 2014. These areas have subsequently been mapped as Granite boulders and heaps, but have not been confirmed in the field.
Completion (is further work needed)	**Not a limitation** No further surveys are recommended due to the lack of threatened flora and communities considered likely to occur, and the overall degradation of the vegetation as a result of extensive historical grazing.	**Minor limitation** The objectives of the basic fauna survey were met, however further assessment of granite boulders and heaps as Western Spiny-tailed Skink habitat may be required if granite is to be impacted by the project.
Remoteness and/or access problems	**Moderate limitation** Sampling was restricted to areas that were accessible within the timeframe provided. The field survey focussed on accessing areas that were far from areas previously surveyed in 2014 and 2008. Areas not accessed were mapped using extrapolation from 2014 mapping, and assessing aerial imagery. The vegetation was noted to be homogenous in the region. As such, this is not considered a significant limitation for vegetation mapping. More effort was spent accessing areas likely to support Priority flora species (major waterways and granite outcrops).	**Moderate limitation** Sampling was restricted to areas that were accessible within the timeframe provided. The field survey focussed on accessing areas that were far from areas previously surveyed in 2014 and 2008. Areas not accessed were mapped using extrapolation from 2014 mapping and aerial imagery. Habitats were homogenous in the region. As such, this is not considered a significant limitation for habitat mapping and the basic fauna survey objectives.

Limitation	Flora and Vegetation Assessment	Basic Fauna Survey
Timing, weather, season, cycle	**Moderate limitation** Annual species were absent and several species lacked suitable material for confident identification. The species *Eremophila simulans* was collected from two locations. Lack of suitable material means that the subspecies was unable to be determined. The subspecies *megacalyx* is a Priority 3 species considered likely to occur in the area.	**Minor to moderate limitation** The survey was conducted after a period of dry weather and species observed was probably low as a result. However, this did not significantly impact the basic fauna survey.
Disturbances (e.g. fire flood, accidental human intervention) which affected results of the survey	**Not a limitation** No disturbances were observed that may have influenced the outcome of the survey.	**Not a limitation** The fauna survey was not disrupted or impacted.



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APPROVED BY	J.LEIGH	
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Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2021).Geoscience Australia, Streetpro

LEGEND

- 2020 Survey Area
- 2014 Survey Area
- 2020 Flora Sites
- 2014 Flora Sites
- Not Accessed
- Alexander & Holmes 2008 Mapping

Survey Effort

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure 5

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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5.0 Desktop Study Results

5.1 Conservation Significant Communities

There are no EPBC Act listed TECs identified in the desktop assessment.

One Priority 1 PEC was identified during the desktop assessment, namely, "Meka calcrete groundwater assemblage type on Murchison palaeodrainage on Meka Station.". This PEC occurs 7 km south of the nearest infrastructure corridor.

The extent of this PEC is mapped on Figure 6

5.2 Conservation Significant Flora

No flora species listed as Threatened under the EPBC Act or BC Act were identified in the desktop assessment as potentially occurring in the survey area. Sixty-six Priority flora species were determined to potentially occur. Of these, nine species are considered likely to occur, seven species may occur, and the remaining 48 species are unlikely to occur. Species considered likely to, or may occur, are detailed in Table 13.

Numerous species considered unlikely to occur are associated with Mt Weld and Weld Ranges, therefore suitable habitat is not present within the survey area. The comprehensive desktop results are presented in Appendix A and mapped on Figure 6.

Table 13 Flora desktop results

Species	WA Cons. Code	Habitat	Justification
Calandrinia butcherensis	P1	Red sands on flats	Located directly adjacent to survey area, habitat present
Calandrinia sp. Boolardy Station (P. Jayasekara 719-JHR-01)	P1	Flat. Low plain. Red/orange sand/clay.	Recorded close to survey area between the two southern arms.
Eremophila muelleriana	P3	Red sand, sandy clay, lateritic sand. Flats, sand dunes, hills.	Recorded within the Project area directly adjacent to the survey area, habitat present
Eremophila simulans subsp. *megacalyx*	P3	Found on rangeland plains road verge with red, sandy gravel laterite.	Recorded within survey area
Gunniopsis divisa	P3	Loam, quartz. Roadsides. IN the Murchison, Yalgoo IBRA regions	Recorded during 2014 surveys.
Hemigenia tysonii	P3	Red Sands, plains and gently undulating dunes.	Recorded during 2014 surveys, suitable habitat may be present.
Ptilotus beardii	P3	Clayey soils. Saline flats, low breakaways.	Recorded during 2014 surveys, suitable habitat present.
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	P3	Red sand. Plains.	Recorded during 2014 surveys, suitable habitat present.
Verticordia jamiesonii	P3	Sandy clay soils. Lateritic breakaways.	Recorded during 2014 surveys, suitable habitat present.

Priority Species Department of Environment and Conservation's Priority Species List: Priority 1, P2, P3, P4

5.3 Conservation Significant Fauna

The desktop fauna assessment identified 21 conservation significant fauna species that could potentially occur within the survey area. This included four species (Golden Gudgeon *Hypseleotris aurea,* Night Parrot *Pezoporus occidentalis*, Woma *Aspidites ramsayi* [southwest subpop] and Arid bronze azure butterfly *Ogyris subterrestris petrina*) DBCA specifically requested AECOM to assess.

The likelihood of occurrence of fauna species was determined by assessing the likely presence of suitable habitat in the survey area and reviewing the recent records and distribution of the species. This assessment determined that:

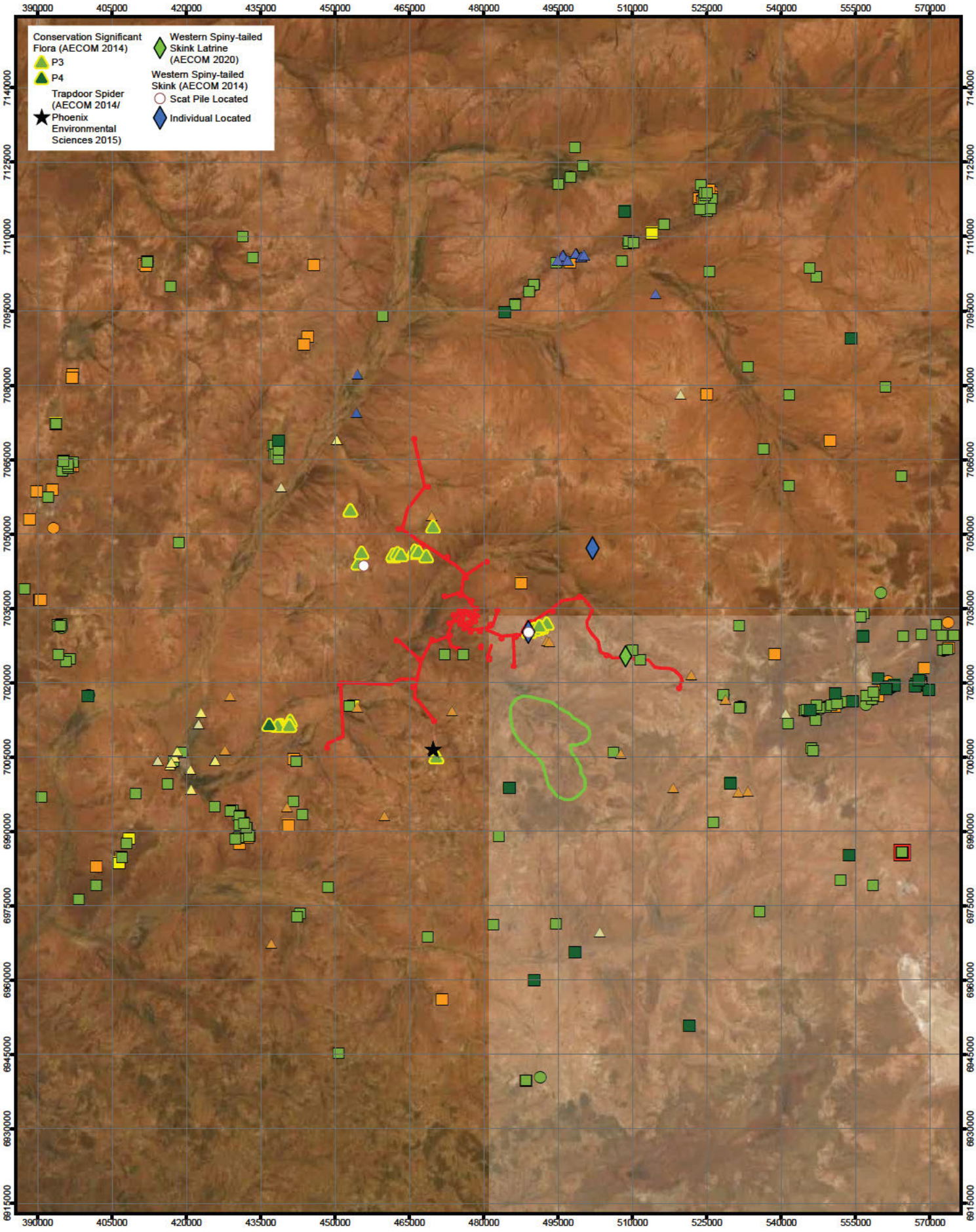
- three species are ‘likely to occur’
- eight species ‘may occur’
- ten species are ‘unlikely to occur’.

The eleven species considered as ‘likely to occur’ and “may occur” in the survey area include eight bird, one mammal, one reptile and one invertebrate species. These species vary to that in AECOM (2014) due to several changes in conservation status and reorganisation of taxa. Table 14 identifies the 11 species and provides relevant ecological information. The conservation significant categories as defined by DBCA, the BC Act and the EPBC Act are defined in Section 3.0. The full desktop assessment for all fauna species and their likelihood of occurrence in the survey area are presented in Appendix A3.

Table 14 Conservation significant fauna species that are likely to and may occur in the survey area

Scientific Name	Common Name	Conservation Status		Ecology
		State	EBPC Act	
Birds				
Calidris ferruginea	Curlew Sandpiper	CR	CE	The Curlew Sandpiper is a small, slim bird weighing 57 g. In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. In Western Australia, they are widespread around coastal and sub coastal plains from Cape Arid to the south-west Kimberley. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas and less often recorded inland around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.
Calidris subminuta	Long-toed Stint	MI	Marine / Migratory	The Long-toed Stint is a very small sandpiper and member of the Calidridinae family. The species is characterised by its distinctive shape; a small head, long slim neck, rounded belly, short rear-end, long legs (often held flexed), short straight bill tapering to finely pointed tip, folded primaries that fall level with the tail and show little or no primary projection beyond the tertials (Higgins & Davies, 1996). In Western Australia this species is found mainly along the coast, with a few scattered inland records. It is distributed along most of the Australian coastline with large densities on the Victorian and Tasmanian coasts. The Red-necked Stint has been recorded in all coastal regions, and found inland in all states when conditions are suitable.
Falco peregrinus	Peregrine Falcon	OS	-	The Peregrine Falcon is a medium-sized raptor (length 35-55cm; wingspan 80-105cm) with slate-grey back, a striking charcoal black head and face which contrast with a pale cream bib on the neck and breast (Birdlife Australia, 2020). A well-known falcon, the Peregrine inhabits a vast array of environs in Australia. Usually uncommon and migratory (Pizzey & Knight, 2007). This species lays its eggs in recesses of cliff faces, tree hollows or large abandoned nests (Bamford, 2009)
Gelochelidon nilotica	Gull-billed Tern	MI	Migratory	The Gull-billed Tern is entirely white, except for a black crown from bill to nape, a grey back and upper wings and darker flight feathers. The iris is dark brown, bill and legs black. The sexes are similar. In non-breeding plumage, the head is mainly white, the crown streaked brownish-grey and the ear coverts are dull black. Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean.
Oxyura australis	Blue-billed Duck	P4	-	The Blue-billed Duck is a compact diving duck with males having a large scooped bright, light blue bill. The tail is dark with stiff pointed feather tips and is usually held flat on the surface of the water except when in display (Birdlife Australia, 2020). The Blue-billed Duck is endemic to south eastern and south western Australia. It prefers deep water in large permanent wetlands and swamps with aquatic vegetation. This species of duck is fully aquatic and rarely comes onto land (OoEH, 2018)
Rostratula australis	Australian Painted Snipe	EN	EN	The Australian Painted Snipe is a stocky wading bird around 220–250 mm in length with a long pinkish bill. It has been recorded less frequently at a smaller number of more scattered locations farther west in South Australia, the Northern Territory and Western Australia. The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains.

Scientific Name	Common Name	Conservation Status		Ecology
		State	EBPC Act	
Tringa glareola	Wood Sandpiper	MI	Marine / Migratory	The Wood Sandpiper is a small thin wader and member of the Tringinae family. The species has a length of 19–23 cm, a wingspan of 56–57 cm and a weight of 55 g. The species has a short straight bill and long legs. The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. They are typically associated with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially Melaleuca and River Red Gums *Eucalyptus camaldulensis* and often with fallen timber. They also frequent inundated grasslands, short herbage or wooded floodplains, where floodwaters are temporary or receding, and irrigated crops. They are also found at some small wetlands only when they are drying (Higgins & Davies, 1996).
Tringa nebularia	Common Greenshank	MI	Marine / Migratory	The Common Greenshank is a largely built wader, weighing up to 190 g for both sexes. The species is found in inland wetlands and sheltered coastal habitats (DotE, 2015). The Common Greenshank is generally absent from the Western Deserts although there are a few records from the Great Sandy Desert and the Nullarbor Plain. It occurs around most of the coast from Cape Arid in the south to Carnarvon in the north-west. In the Kimberleys it is recorded in the south-west and the north-east, with isolated records from the Bonaparte Archipelago (Higgins & Davies, 1996).
Invertebrates				
Idiosoma clypeatum	Northern Shield-backed Trapdoor Spider	P3	-	*Idiosoma clypeatum* is one of seven highly autapomorphic species in the polyphyletic 'sigillate complex'. *Idiosoma clypeatum* has a widespread distribution in Western Australia's inland arid zone, principally throughout the Yalgoo and Murchison bioregions where it is the only known species in the nigrum-group (excluding a population of *I. formosum* from the southern Yalgoo. It extends from near Paynes Find, the Blue Hill Range, Kadji Kadji Nature Reserve, and Karara in the south, north and north-east to at least Coolcalalaya Homestead, Jack Hills, Albion Downs, Yakabindie, and Yeelirrie. This distribution seems to be strongly correlated with annual rainfall of less than 250 mm (Rix *et al.*, 2018)
Reptiles				
Egernia stokesii badia	Western Spiny-tailed Skink	VU	E	The Western Spiny-tailed Skink belongs to a group of moderately large, rock-dwelling reptiles (Chapple, 2003). Two colour forms exist; the brown form and black form, the latter is delineated from the former by its black colouration, lack of patterning in adults and differing head and scale morphology (DotE, 2015). The black form occupies rock crevices in large, isolated rocky outcrops, typically granite (Duffield & and Bull, 2002). Crevices are usually identifiable by a "latrine" or scat pile, resulting from regular defecation of all family members, in close proximity to the entrance (Chapple, 2003).
Mammals				
Sminthopsis longicaudata	Long-tailed Dunnart	P4	-	The Long-tailed Dunnart is unique among dunnarts in that its tail is twice the length of the head and body. They are grey with a very pale underbelly, white legs and feet. Adults weigh 15-20 g. *Sminthopsis longicaudata* inhabits exposed rock and stony soils with hummock grasses and shrubs. Flat-topped hills, lateritic plateaus, sandstone ranges and breakaways. Sparse mulga over spinifex. The species has been recorded in disjunct populations across arid Australia with populations recorded in the southern Carnarvon Basin.



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Data sources:

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Survey Area
TEC / PEC (DBCA)
Priority 1
Threatened and Priority Flora Database (DBCA)
Priority 1
Priority 3
Priority 4

WA Herb (DBCA)
Threatened
Priority 1
Priority 2
Priority 3
Priority 4

Desktop Threatened Fauna (DBCA)
Critically Endangered
Endangered
Vulnerable
Migratory Species
Specially Protected
Priority 3
Priority 4

Desktop Results

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SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure 6

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6.0 Field Survey Results and Discussion

6.1 Vegetation

6.1.1 Vegetation Communities

No TECs or PECs were anticipated to occur and none were recorded in the survey area. Ten native vegetation communities were defined and mapped by comparing floristic data from 32 relevés and 65 quadrats. The vegetation was largely homogenous, characterised by Mulga Open Woodlands on hard clay on flat terrain, sometimes with quartz on the surface. Distinct areas included deep sand plains dominated by shrubs, and granite outcrops with sparse vegetation. Granite boulders and outcrops were noted to be statistically similar to adjacent Mulga on plains, however they were described separately as the landform was considered significantly different. Further, the granite outcrops provide suitable habitat for several Priority flora and fauna species, therefore the distinction was considered important.

Vegetation communities are mapped in Figure 7.

Table 15 Vegetation communities recorded in the survey area

Description	Site details	Photo
Plains		
AfSa Acacia Woodland *Acacia fuscaneura, Acacia incurvaneura* and occasional *Acacia pruinocarpa* low open woodland over *Senna artemisioides* subsp. *helmsii, Acacia tetragonophylla* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid to tall sparse shrubland.	Plains, rarely with quarts on the surface. Red clay soils. Species richness: • 2020 – 7 native species • Total – 41 native species Quadrats: • 2020 – 1 site • 2014 – 4 quadrats	
AfEfPo Acacia Woodland *Acacia fuscaneura, Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii, Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus, Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.	Common community found across variety of landscapes including hardpan clays, clay loams and clay sandy soils on flat terrain. May have quarts or granite rocks (small to large) on surface. Species richness: • 2020 – 58 native species • Total – 110 native and 1 weed species Quadrats: • 2020 – 11 sites • 2014 – 10 quadrats	

Description	Site details	Photo
AiAtEf Acacia Woodland *Acacia incurvaneura, Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla, Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva, Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.	Flat terrain with red clay with a variable soil profile reflecting erosion. Alluvial sands found close to drainage channels transition to clay loams on flats. Species richness: • 2020 – 29 native species • Total – 76 native and 2 weed species Quadrats: • 2020 – 4 sites • 2014 – 13 quadrats	
AvEp Acacia Woodland *Acacia victoriae* subsp. *victoriae, Acacia sclerosperma* subsp. *sclerosperma* and *Acacia tetragonophylla* tall shrubland over *Eremophila pterocarpa* subsp. *pterocarpa, Senna* sp. Meekatharra (E. Bailey 1-26) and *Atriplex amnicola* mixed chenopod shrubland	Hardwash plains with red-brown sandy loam clay soils. Species richness: • 2020 – 19 native species • Total – 50 native and 3 weed species Quadrats: • 2020 – 1 site • 2014 – 5 quadrats In 2014 a populations of Priority 3 *Gunniopsis divisa* was recorded (outside the 2020 survey area).	

Description	Site details	Photo
AaEcPo Acacia Woodland *Acacia aptaneura, Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta, Eremophila simulans* and *Eremophila gilesii* mid open shrubland over *Ptilotus obovatus, Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.	Low rises or plains with deep sandy red soils. Species richness: • 2020 – 42 native species Quadrats: • 2020 – 8 sites	
ApAgEf Acacia Woodland *Acacia pteraneura low woodland to open woodland over Acacia grasbyi and Acacia tetragonophylla tall sparse shrubland over Eremophila forrestii subsp. forrestii, Senna artemisioides subsp. helmsii and Eremophila fraseri subsp. parva mid shrubland.*	Undulating flat terrain with red-brown sandy loam soils. Species richness: • 2020 – NA • Total – 48 native species Quadrats: • 2020 – 0 sites • 2014 – 8 quadrat	

Description	Site details	Photo
Granite		
AiTdPb Mixed Shrubland *Acacia incurvaneura, Acacia fuscaneura* and *Acacia caesaneura* low isolated clumps of trees over *Thryptomene decussata, Eremophila forrestii* subsp. *forrestii* and *Acacia oswaldii* mid open shrubland over *Ptilotus drummondii, Eragrostis eriopoda* and *Solanum lasiophyllum* low sparse mixed shrub and grassland.	Granite outcrops on undulating terrain. Species richness: • 2020 – 29 native species • Total – 29 native species Quadrats: • 2020 – 4 sites • 2014 – 1 quadrat In 2014 populations of Priority 3 *Ptilotus beardii* and *Verticordia jamiesonii* were recorded (outside the 2020 survey area).	
ArCc Mixed Shrubland *Acacia rhodophloia* low open woodland over *Corchorus crozophorifolius, Cymbopogon ambiguus* and *Eremophila platycalyx* subsp. *platycalyx* mixed low to mid shrub and grassland.	Granite domes and boulders with light brown sand loam soils. Also includes *Dodonaea viscosa* subsp. *spathulata* and *Eremophila latrobei* subsp. *latrobei*. Species richness: • 2020 – 20 native species • Total – 31 native species Quadrats: • 2020 – 2 sites • 2014 – 2 quadrats In 2014 populations of Priority 3 *Ptilotus beardii* were recorded (outside the 2020 survey area). In 2020 populations of Priority 3 *Petrophile pauciflora* were recorded.	

Description	Site details	Photo
Drainage		
AiAbSa Acacia Woodland *Acacia incurvaneura, Hakea lorea* subsp. *lorea* and *Acacia aneura* low open woodland over *Acacia burkittii, Acacia tetragonophylla* and *Acacia victoriae* subsp. *victoriae* tall shrubland over *Senna artemisioides* subsp. *helmsii, Ptilotus obovatus* and *Senna artemisioides* subsp. x *sturtii* low to mid sparse shrubland.	Undefined broad drainage and flat terrain. Red-brown sandy loam soils. Species richness: • 2020 – 12 native species • Total – 33 native and 1 weed species Quadrats: • 2020 – 1 site • 2014 – 3 quadrats	
AcAsTd Casuarina Woodland *Allocasuarina campestris* low to mid woodland over *Acacia sclerosperma* subsp. *sclerosperma, Exocarpos aphyllus and Scaevola spinescens* mid to tall open shrubland over *Tecticornia doliiformis, Atriplex amnicola and Tecticornia ?indica mid chenopod shrubland.*	Associated with major drainage channels. Exposed granite at some locations. Soils are light red sand to sandy clay. Trees are confined to banks of channels. Species richness: • 2020 – NA • Total – 46 native and 2 weed species Quadrats: • 2020 – no sites • 2014 – 3 quadrats In 2014 a population of Priority 3 *Frankenia confusa* was recorded in this community (outside the 2020 survey area).	

6.1.2 Condition

Boolardy station has been used for sheep and cattle grazing since 1876. The impact of this, combined with a drying climate, is prevalent across the survey area (Plate 1). It has resulted in a loss of total biomass, erosion of the surface, and soil compaction. The 'native vegetation' currently present is unlikely to be a good reflection of pre-European vegetation. Lacking a suitable reference of condition, the entire survey area has been considered in 'Very Good' condition. Vegetation condition is mapped in Figure 7.

Plate 1 Dry conditions prevail at Boolardy Station

6.2 Flora

6.2.1 Diversity

A total of 91 native flora species from 41 genera and 23 families were recorded. No weed species were recorded during the survey.

Six species that were collected for confirmation lacked suitable material for a confident identification at the WA Herbarium. This included *Eremophila simulans* which lacked material sutiable to infer the subspecies. One of the *E. simulans* subspecies (*megacalyx*) is listed as a Priority 3 species and was considered likely to occur.

The complete species list is provided in **Appendix B**. All site data is presented in Appendix C.

6.2.2 Conservation Significant Flora

No species listed under the EPBC Act or the BC Act were recorded during the field survey.

Three Priority 3 flora species were recorded:

- *Petrophile pauciflora*
- *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94)
- *Eremophila simulans* subsp. *megacalyx* may have been recorded.

Species are discussed in detail below.

***Petrophile pauciflora* (P3)**

P. pauciflora is a short robust shrub (Plate 2). The species was recorded on and near granite outcrops near the eastern boundary of Boolardy Station and on Kalli Station (Figure 7). Where the species occurs it was considered locally common, with 163 individuals recorded (Table 16). Where granite outcrops extended beyond the survey area, so did the *P. pauciflora* populations.

This species was not recorded in 2014.

Table 16 *Petrophile pauciflora* (P3) records in the survey area recorded by AECOM

Survey	No. of locations	No. of individuals	Plant life cycle
AECOM 2020	2	163	Old flower material available

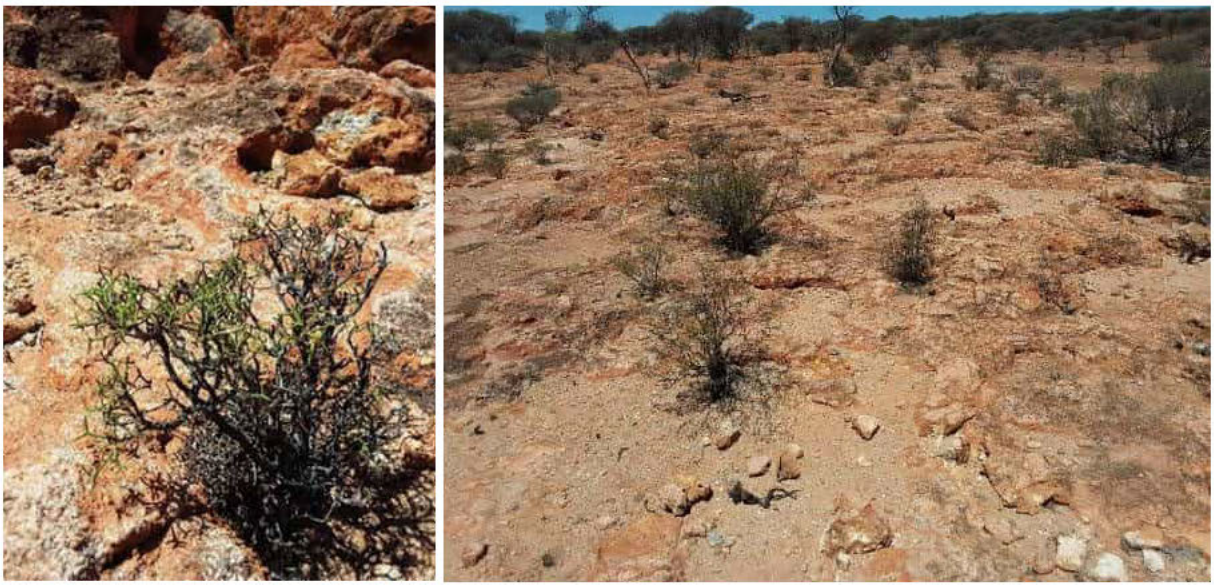

Plate 2 *Petrophile pauciflora* habit (left) and habitat (right)

Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94) (P3)

S. sp. Woolgorong is a shrub that grows up to 1 m tall with yellow flowers (Plate 3). It is known from sporadic records in the Western Murchison IBRA subregion. In 2014 it was recorded at two locations comprising approximately 201 individuals (Table 17). It was recorded at one site in 2020, at the time it was not recognised as the Priority species. It was vegetative and generally in poor condition. It formed a co-dominant understorey shrub species. The 2020 record is approximately 20 km from the 2014 record and 62 km from the nearest DBCA record.

The spatial distribution of *Sauropus* sp. Woolgorong is shown in Figure 7.

Table 17 *Sauropus* sp. Woolgorong records in the survey area recorded by AECOM

Survey	No. of locations	No. of individuals	Plant life cycle
AECOM 2014	2	~210	Vegetative
AECOM 2020	1	Not counted	Vegetative

Plate 3 *Sauropus* sp. Woolgorong

Eremophila simulans (potential P3)

E. simulans was collected in the survey area. All individuals were vegetative (no fruiting or flowering material) at the time of the field survey. The specimen was submitted to the WA Herbarium for format identification by Mike Hislop. Mike advised that there was not enough suitable identification material to determine what subspecies the sample represented.

Eremophila simulans subsp. *megacalyx* was recorded by Alexander Holms & Associates (2008) in the MRO. At that time it was not listed as a Priority species. This species was potentially recorded in 2014. At this time the sample collected was also vegetative and unable to be confirmed as the Priority 3 species. It was assumed to represent subspecies *megacalyx* as a precaution. *E. simulans* subsp. *megacalyx* is known to occur in the local area, was recorded in 2014, and there are several DBCA database records nearby.

E. simulans was recorded mostly on community AaEcPo, a mixed shrubland on plains with sandy surface (Plate 4; Figure 7). This corresponds to descriptions of habitat in the DBCA database search results. Two populations were recorded, comprising more than 1,0000 individuals (Table 18). At one location this species represented the dominant mid-storey shrub species.

Table 18 *Eremophila simulans* records in the survey area recorded by AECOM

Survey	No. of locations	No. of individuals	Plant life cycle
AECOM 2014	3	8	Vegetative
AECOM 2020	2	+1000, locally common	Vegetative

Plate 4 ***Eremophila simulans*** **habit**

6.2.3 Other Species

In 2014 five Priority flora species were recorded in addition to those mentioned above in Section 6.2.2. This included:

- *Frankenia confusa* (P4) delisted from P2
- *Gunniopsis divisa* (P3)
- *Hemigenia tysonii* (P3)
- *Ptilotus beardii* (P3)
- *Verticordia jamiesonii* (P3).

Their distribution is shown on Figure 6 and discussed below.

Frankenia confusa **(P4)**

Frankenia confusa is a low diffuse shrub that grows up to 0.75 m tall. It occurs on wet pale brown sand, brown clay and grey soils on banks of rivers, waterholes and river floodplains.

F. confusa was recorded at one location including 20 individuals in 2014. At the time this species was listed as a Priority 2 species. It was recorded on the bank of a major well-defined channel, the same channel that intersects with the current survey area.

No *Frankenia* species were observed in any of the ephemeral drainage channels. Its occurrence nearby was associated with a wider channel that had undulating banks of clay loam soils that supported several samphire shrub species. This community was not recorded in the current survey area.

Gunniopsis divisa **(P3)**

Gunniopsis divisa is a prostrate annual succulent herb that grows up to 10 cm high. The stems radiate from the base and are fleshy and hairless. The flowers are a pale yellow, fading to white and flowers occur in August. This species is commonly found on colluvial outwash associated with banded ironstone formations.

G. divisa was recorded at nine locations comprising 149 individuals within the wide ephemeral drainage line that also intersects with the current survey area (Figure 6).

The absence of this species could be attributed to survey timing. No annuals were present at the time of the 2020 field survey. Its absence in the survey area cannot be confidently determined.

***Hemigenia tysonii* (P3)**

Hemigenia tysonii is a perennial woody upright shrub that grows up to 0.5 m high with purple-blue-pink/white flowers. This species is commonly found on red sand, sandy clay, lateritic sands on flats, sand dunes and hills.

H. tysonii was recorded at one location northeast of the MRO in 2014 comprising 2 individuals. The population was found in Mulga open woodland on a sandy rise.

The species is locally uncommon and considered unlikely to occur in the survey area following significant survey effort between 2014 and 2020.

***Ptilotus beardii* (P3)**

Ptilotus beardii is a compact perennial rigid shrub that grows 0.15-0.5 m tall. This species has dark bark on the lower stems and cobweb-like indumentums on young shoots that become glabrescent with age. *Ptilotus beardii* grows on clayey soils, saline flats and low breakaways.

P beardii was recorded at six locations comprising +1,300 individuals. Of these locations it was considered locally common at four of them. *P. beardii* is associated with granite outcrops and plains adjacent to granite domes and boulders. This species is a perennial shrub that was noted to have reduced biomass when recorded in 2014.

Searches for this species were undertaken at all granite outcrops, no individuals were recorded. It is possible that this species has since senesced due to prevailing dry conditions or was overlooked if it lacked suitable flowering material (flowering period in 2014 was late August early September).

***Verticordia jamiesonii* (P3)**

Verticordia jamiesonii is a short shrub that grows up to 60 cm tall. It has one basal stem and is openly and irregularly branched. The species has tiny leaves, shining red buds, and cream to white flowers with distinct hairs on the stamens, staminodes and style.

V. jamiesonii grows on sand and clay, sometimes with lateritic gravel in pockets of soil and crevices on weathered, heavy laterite on low breakaways and on rocky hills in open shrublands. One population was recorded comprising more than 270 individuals. It was considered locally common at this location.

This species was anticipated to occur amongst granite rocky outcrops. It was easy to identify in 2014 when it was in flower. Targeted searches in 2020 did not record this species. It is possible that it was overlooked lacking suitable flowering material, however no species that closely resembled *Verticordia* was observed. It may occur in areas identified as potential granite outcrops that were not accessed.

6.3 Fauna

Results presented below largely incorporate those from AECOM (2014) where relevant.

6.3.1 Fauna Inventory

A total of 92 fauna species were recorded across the two field surveys conducted by AECOM in 2014 and 2020 (refer to Appendix D). This comprised 61 bird, 15 reptile, 14 mammal, one amphibian and one invertebrate species. Fifty vertebrate fauna species were identified during the 2020 survey, with an additional 11 species added 81 species identified by AECOM (2014). Conditions encountered during the 2020 survey were very dry, with a lack of water and flowering plants probably leading to less species being observed, with minimal water and nectivorous birds observed compared to the 2014 survey. The AECOM 2014 survey also had significantly longer in the field.

6.3.1.1 Conservation Significant Fauna

Eight conservation significant fauna species were recorded during the 2014 and 2020 surveys. These include:

- Western Spiny-tailed Skink *Egernia stokesii badia*
- Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*
- Black-faced Cuckoo-shrike *Coracina novae-hollandiae*
- Magpie Lark *Grallina cyanoleuca*
- Whistling Kite *Haliastur sphenurus*
- Australian Kestrel *Falco cenchroides*
- Welcome Swallow *Hirundo neoxena*
- Australian Pipit *Anthus australis*.

However, these seven avian species are listed as Marine under the EPBC Act and are therefore only considered significant when on Commonwealth land. These species are not discussed further as the survey area does not contain any Commonwealth land.

6.3.1.1.1 Western Spiny-tailed Skink

The Western Spiny-tailed Skink *Egernia stokesii badia* is listed under the EPBC Act as Endangered and under the WC Act as Vulnerable. It belongs to the cunninghamii group; a group of moderately large, rock-dwelling reptiles (Chapple, 2003). Two colour forms exist; the brown form and black form, the latter is delineated from the former by its black colouration, lack of patterning in adults and differing head and scale morphology (DotEE, 2020). Western Spiny-tailed Skinks are saxicolous (rock dwelling), occupying rock crevices in large, isolated rocky outcrops, typically granite (Duffield & and Bull, 2002). Occasionally, hollow logs or semi-arboreal habitats are utilised for shelter, with the brown form predominantly occupying York Gum woodland (Chapple, 2003). Crevices occupied by the black form of Western Spiny-tailed Skink are usually identifiable by a “latrine” or scat pile, resulting from regular defecation of all family members, in close proximity to the entrance (Chapple, 2003).

Granite outcrops within the survey and surrounding area were subject to intense searches during the 2014 and 2020 field surveys, during which direct and indirect evidence of the skink was recorded a total of five times, with two direct observations and three scat piles and latrines recorded. However, none of these records are now within the current survey area, due to a refinement of the survey area after the 2014 survey. Refer to Figure 7 for the three observations within one kilometre of the survey area. The latrine recorded during this survey is also just outside of the survey area (40 m south).

Granite boulders and heaps have been mapped across the survey area, and these have generally been assessed for quality as skink habitat. This assessment was largely based on whether lateral crevices are present, and relative size and fragmentation of the granite outcrops. Generally, the survey area avoids the more significant outcrops in the area, and minimal quality habitat for the Western Spiny-tailed Skink exists in the survey area.

Table 19 Western Spiny-tailed Skink observations

Evidence	Year	Location		Photo
		Latitude	Longitude	
Individual	2014	[redacted]	[redacted]	
Scat pile	2014	[redacted]	[redacted]	
Individual	2014	[redacted]	[redacted]	
Scat pile	2014	[redacted]	[redacted]	
Latrine	2020	[redacted]	[redacted]	

6.3.1.1.2 Northern Shield-back Trapdoor Spider

AECOM (2014) and a subsequent targeted survey by Phoenix (2015) recorded a threatened trapdoor spider species (*Idiosoma nigrum)* twice within the survey and surrounding area. However in 2018, a conservation systematics review was published (Rix *et al*., 2018) that detailed the revision of the genus *Idiosoma*. One of the results of this review was that *I. nigrum* was shown to contain multiple species and the distribution of *I. nigrum* included only those populations within the central and central-western Wheatbelt bioregion (Rix *et al*., 2018). The *Idiosoma* populations recorded through the Murchison bioregion are now regarded as the Northern Shield-backed Trapdoor Spider *I. clypeatum* (Rix *et al,* 2018). The review concluded that *I. clypeatum* is the only known species from this genus in the Murchison bioregion (Rix *et al*., 2018) and its distribution seems to be strongly correlated with annual rainfall of less than 250 mm. The species is Priority 3 listed by the DBCA.

The Northern Shield-backed Trapdoor Spider was recorded twice in rocky areas with scattered *Acacia* and *Eremophila*. However, none of these records are within the current survey area, due to a refinement of the survey area after the 2014 survey.

Plate 5 Northern Shield-backed Trapdoor Spider burrow recorded in 2014

6.3.1.1.3 Additional Species

Based on the desktop assessment and the field survey, the following additional conservation significant fauna species have the potential to utilise the habitats within the survey area:

- six threatened, Marine and Migratory listed waders and waterbird species (Curlew Sandpiper *Calidris ferruginea*, Long-toed Stint *Calidris subminuta*, Gull-billed Tern *Gelochelidon nilotica*, Australian Painted Snipe *Rostratula australis*, Wood Sandpiper *Tringa glareola*, Common Greenshank *Tringa nebularia)* that may seasonally utilise the marginal channel and creek line habitats:
- Peregrine Falcon *Falco peregrinus* (listed as OS under the BC Act) may utilise the major channel creek lines with large eucalypts. Generally the breakaways within the survey area do not provide suitable habitat for this falcon.

Refer to Table 20 and Appendix A for further detail on all of these conservation significant species.

6.3.2 Introduced Fauna

Ten introduced fauna species were recorded in the survey area. Species comprised:

- Common Myna *Acridotheres tristis*
- Goat *Capra hircus*
- European Cattle *Bos taurus*
- Camel *Camelus dromedaries*
- Dog *Canis familiaris* (either Dingo *Canis familiaris dingo* or Feral Dog *Canis familiaris familiaris*)
- Red Fox *Vulpes vulpes*
- Cat *Felis catus*
- Rabbit *Oryctolagus cuniculus*
- Horse *Equus caballus.*

All of these species except for European Cattle and the Dingo are Declared Pests under the BAM Act. Generally all of these species were identified directly or indirectly (scats and tracks) sporadically throughout the survey area.

6.3.3 Fauna Habitats

The survey area is generally fairly homogenous in regards to fauna habitat, predominantly comprising sparse vegetation on hardpan and sandplains, with or without surface rocks. Less common but more significant fauna habitats include granite (domes, heaps and boulders); drainage channels and rocky breakaways. These less common habitats tend to have more structural complexity and microhabitats, support species of conservation significance, and have an associated higher fauna habitat quality. Although the more common fauna habitats may also potentially provide habitat for conservation significant species, these are well represented in the region.

Eight broad fauna habitats were defined and mapped within the survey area, predominantly based on vegetation, landform and soils. Habitat mapping generally closely aligns with the vegetation mapping in Figure 7. The most common fauna habitat was the hardpan plain with intermittent sandplain making up, 3,281 ha and 66.7% of the survey area. Within this habitat, hardpans can persist for several kilometres, vegetation is generally sparse with no large trees or dense understorey, minimal leaf litter apart from at the base of trees and shrubs, and occasional smaller logs and fallen branches. This habitat supports a diverse range of common bird species in the area and some reptiles and macropods. The habitat is not considered to be significant and is extensive throughout the landscape.

Table 20 describes these fauna habitats, includes the area and percentage these cover within the survey area, and the conservation significant fauna species with potential to utilise these habitats. Refer to Figure 7 for habitat mapping.

6.3.3.1 Fauna Habitat Linkages

Habitat linkages are typically areas or corridors of vegetation that link (larger) areas of fauna habitat. Linkages are important as they enable fauna to move freely between remnant bushland patches, therefore increasing gene-flow between populations. A study conducted by Gilbert *et al.* (1998) found that corridors and/or linkages do maintain species richness in the fragmented landscapes.

The Project is located in the Midwest region, where land use is predominantly grazing native pastures (96%) and Crown Reserves (2.8%). As such, much of the existing habitat is in non-pristine condition and so habitat corridors remain a valuable asset to local fauna. Habitat linkages are also considered to be of importance in this dry landscape where large bare areas are common. Within the survey area these linkages consist of the more significant drainage channels and creek lines and impacts to these should be minimised. The most valuable linkage corridors occur within the channels and creek line habitat as mapped in Figure 7.

Table 20 Fauna habitats of the survey area

Fauna Habitat	Habitat for conservation significant fauna	Survey Area		Representative Photo
		Ha	%	
Channels and creek line Major and minor drainage lines subject to occasional flooding. Minor drainage areas tend to exhibit little variation in habitat characteristics to hardpan plains (when dry), apart from slightly higher vegetation cover and sandier soils. Major drainage channels tend to contain larger trees (e.g. eucalypts, *Allocasuarina* sp.) with steep channels. This habitat provides value to fauna through the use as linkages throughout the landscape, and although impacted from grazing and other introduced fauna is of moderate to high quality for this area.	This habitat may seasonally provide habitat for waterbird species including: • Curlew Sandpiper *Calidris ferruginea* • Long-toed Stint *Calidris subminuta* • Gull-billed Tern *Gelochelidon nilotica* • Australian Painted Snipe *Rostratula australis* • Wood Sandpiper *Tringa glareola* • Common Greenshank *Tringa nebularia*. May provide habitat for Peregrine Falcon *Falco peregrinus*. Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum**.	184.73	3.76	 

Fauna Habitat	Habitat for conservation significant fauna	Survey Area		Representative Photo
		Ha	%	
Granite boulders and heaps Low hills of emergent granite and rock piles of various sizes with scattered *Acacia* sp. and *Eremophila* sp. This habitat contains some leaf litter beneath vegetation, but does not contain a dense understorey, large trees, significant hollows or logs > 300 mm diameter. This habitat provides water catchment and a relatively high diversity of flora and fauna. However in general, the larger more significant areas of this habitat lie outside the survey area, with the survey area aligned to avoid these areas. A couple of small areas of potential granite have been identified on the aerial imagery. These areas were not mapped. These areas were surveyed in 2014 but not mapped as granite. These areas have subsequently been mapped as Granite boulders and heaps, but have not been confirmed in the field.	The survey area generally only provides marginal habitat for the Western Spiny-tailed Skink. The survey area has been aligned to avoid better quality granite habitat, which can be found directly adjacent the survey area. Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*. Exact habitat requirements for this species are unknown. However, it generally occurs near the bases of *Acacia* or *Eremophila* (Tim Moulds [Invertebrate Solutions, pers comm., 2020).	3.19	0.06	 

Fauna Habitat	Habitat for conservation significant fauna	Survey Area		Representative Photo
		Ha	%	
Granite domes Domes of emergent granite with occasional small cracks and fissures. No value floristically however provides value for small reptile species which seek shelter underneath rocks exfoliated from the surface. Water may pool on surface. Vegetation, leaf litter and fallen logs / branches are rare. Moderate quality habitat with some niche microhabitats.	None according to the desktop assessment and field survey results.	1.76	0.04	 
Hardpan plain with intermittent sandplain This habitat contains sparse *Acacia* over mixed native shrubs on hardpan plain with intermittent sandplains. This habitat has abundant bare ground and does not contain a dense understorey, large trees, significant hollows, logs > 300 mm diameter, surface rocks or significant leaf litter. Microhabitats are scarce and this habitat is generally likely to be utilised by larger mammal, and some reptile and avian species.	Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*. Exact habitat requirements for this species are unknown. However, it generally occurs near the bases of *Acacia* or *Eremophila* (Tim Moulds [Invertebrate Solutions, pers comm., 2020).	3,281.33	66.72	 

Fauna Habitat	Habitat for conservation significant fauna	Survey Area		Representative Photo
		Ha	%	
This is moderate to low quality habitat due to minimal structural complexity and disturbance through grazing and introduced fauna. This habitat may contain some smaller areas of scattered granite, especially when adjacent granite outcrops. These areas are generally not suitable habitat for the Western Spiny-tailed Skink.				
Non-saline stony or gritty surfaced plains Similar to Hardpan plains, with occasional *Acacia* sp. over open mixed native shrubs, but with quarts and stones on orange clay soils. This habitat does not contain dense understorey, large trees, significant hollows, logs > 300 mm diameter, large rocks or significant leaf litter. Microhabitats are scarce and this habitat is generally likely to be utilised by larger mammal, and some reptile and avian species. This is moderate to low quality habitat due to minimal structural complexity and disturbance through grazing and introduced fauna.	Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*. Exact habitat requirements for this species are unknown. However, it generally occurs near the bases of *Acacia* or *Eremophila* (Tim Moulds [Invertebrate Solutions, pers comm., 2020).	1,120.69	22.79	 

Fauna Habitat	Habitat for conservation significant fauna	Survey Area		Representative Photo
		Ha	%	
Rocky breakaways, slopes and plateau edges This habitat consists of ferruginised duricrust and weathered granite on white to orange to light brown sandy clayey soils. It includes steep breakaway faces and short rocky upper slopes (Alexander Holm & Associates, 2008) with scattered *Acacia* sp. and *Eremophila* sp. It contains areas of moderate leaf litter at the base of vegetation, stones and rocks up to 2m, and occasional rock crevices. This habitat does not contain dense understorey, large trees, large hollows, logs > 300 mm diameter or large boulders. This is considered moderate to high quality fauna habitat with abundant microhabitats, overhangs, fissures etc. Generally the survey area has been aligned to avoid the significant breakaways of higher quality.	Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*. Exact habitat requirements for this species are unknown. However, it generally occurs near the bases of *Acacia* or *Eremophila* (Tim Moulds [Invertebrate Solutions, pers comm., 2020) Marginal habitat (within the survey area) for the Peregrine Falcon *Falco peregrinus*.	27.63	0.56	 

Fauna Habitat	Habitat for conservation significant fauna	Survey Area		Representative Photo
		Ha	%	
Saline lower footslopes below breakaways The saline lower footslopes found below breakaways. Vegetation cover is intermittent with large sparse areas common. Habitats is moderate to low quality habitat due to minimal structural complexity.	None according to the desktop assessment and field survey results.	6.86	0.14	
Sandplain Alluvial plains of orange to brown sands (often with thin crust). Supports *Acacia, Eremophila* and *Ptilotus* species. This habitat contains significant bare ground with some leaf litter around the base of vegetation. It does not contain a dense understorey, large trees, significant hollows, logs > 300 mm diameter or rocks. Microhabitats are scarce and this habitat is generally likely to be utilised by larger mammal, and some reptile and avian species. This is moderate to low quality habitat due to minimal structural complexity and disturbance	Possible habitat for the Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum*. Exact habitat requirements for this species are unknown. However, it generally occurs near the bases of *Acacia* or *Eremophila* (Tim Moulds [Invertebrate Solutions, pers comm., 2020).	77.66	1.58	 

Fauna Habitat	Habitat for conservation significant fauna	Survey Area		Representative Photo
		Ha	%	
through grazing and introduced fauna.				
TOTAL Area (ha)		**4,918.33**	**100**	

Notes: * Exact habitat requirements for this species are unknown. However, it generally occurs near the bases of *Acacia* or *Eremophila* (Tim Moulds [Invertebrate Solutions, pers comm., 2020).

7.0 Conclusions

The flora and vegetation and fauna assessment was successfully completed for the defined survey area on Boolardy and Kalli Station in November 2020 for the Square Kilometre Array Project.

A summary of the results is presented below:

- No Threatened or Priority Ecological Communities were anticipated to occur and none were recorded. Ten native vegetation communities were recorded and mapped. None are considered regionally significant as vegetation communities were widespread and common in the area, despite some supporting populations of Priority species. The area comprises largely of Acacia open woodland with pockets of granite outcrops and ephemeral drainage lines.
- The region was noted to be very dry and has been impacted from extensive historical grazing. This has led to a reduced biomass, significant erosion, and compacted soil profile.
- Three Priority 3 flora species were recorded including *Petrophile pauciflora* (163 individuals) *Sauropus* sp. Woolgorong (M. Officer s.n. 10/8/94). Both species are restricted to the southeast arm. The Priority 3 *Eremophila simulans* subsp. *megacalyx* was unable to be confidently identified. A sample representing *E. simulans* was collected and assumed to represent the Priority 3 species. More than 1,000 individuals of *E. simulans* were recorded in the survey area.
- Eight broad fauna habitats were defined and mapped within the survey area, comprising hardpan plain and intermittent sandplain, rocky breakaways, granite domes, granite boulders and heaps, channels and creek lines, sandplains, non-saline stony or gritty surfaced plains, and saline lower footslopes below breakaways. Much of the existing habitat is in non-pristine condition and so habitat corridors remain a valuable asset to local fauna. Within the survey area these linkages consist of the more significant drainage channels and creek lines and impacts to these should be minimised.
- The granite boulders and heaps fauna habitat may support populations of the saxicolous EPBC Act and BC Act listed Western Spiny-tailed Skink *Egernia stokesii badia*. Direct and indirect evidence of the skink was recorded a total of five times across 2014 and 2020. However, none of these records are within the current survey area, due to a refinement of the survey area after the 2014 survey. The latrine recorded in this survey is also just outside of the current survey area.
- The Northern Shield-backed Trapdoor Spider *Idiosoma clypeatum* was recorded twice (AECOM, 2014; Phoenix, 2015) in rocky areas with scattered *Acacia* and *Eremophila*. However, none of these records are within the current survey area. This species is likely to utilise habitats that are common within the region.

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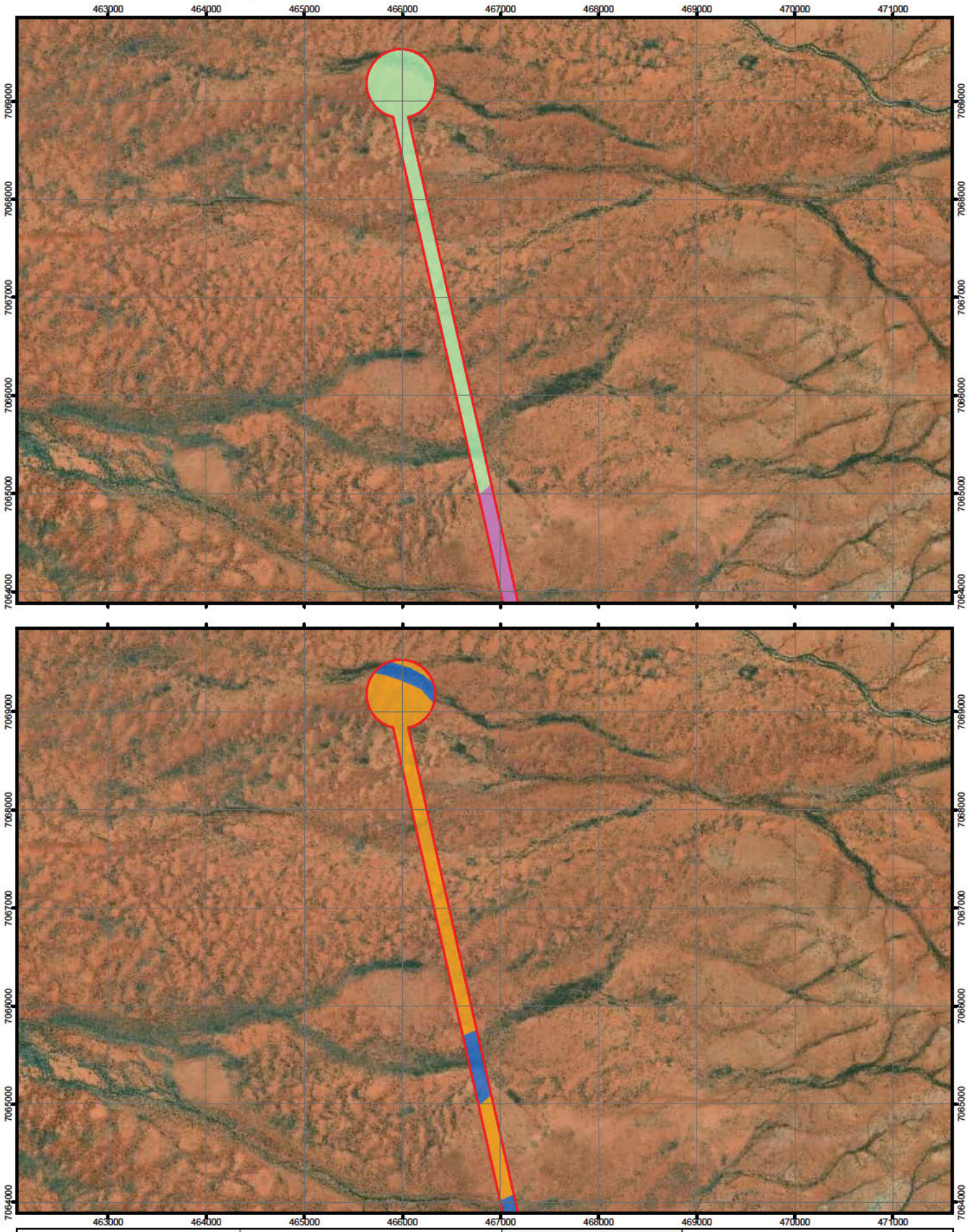

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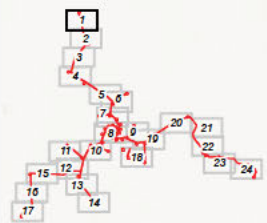
LEGEND

Vegetation Communities
- AfEfPo
- AiAtEf

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure 7.1

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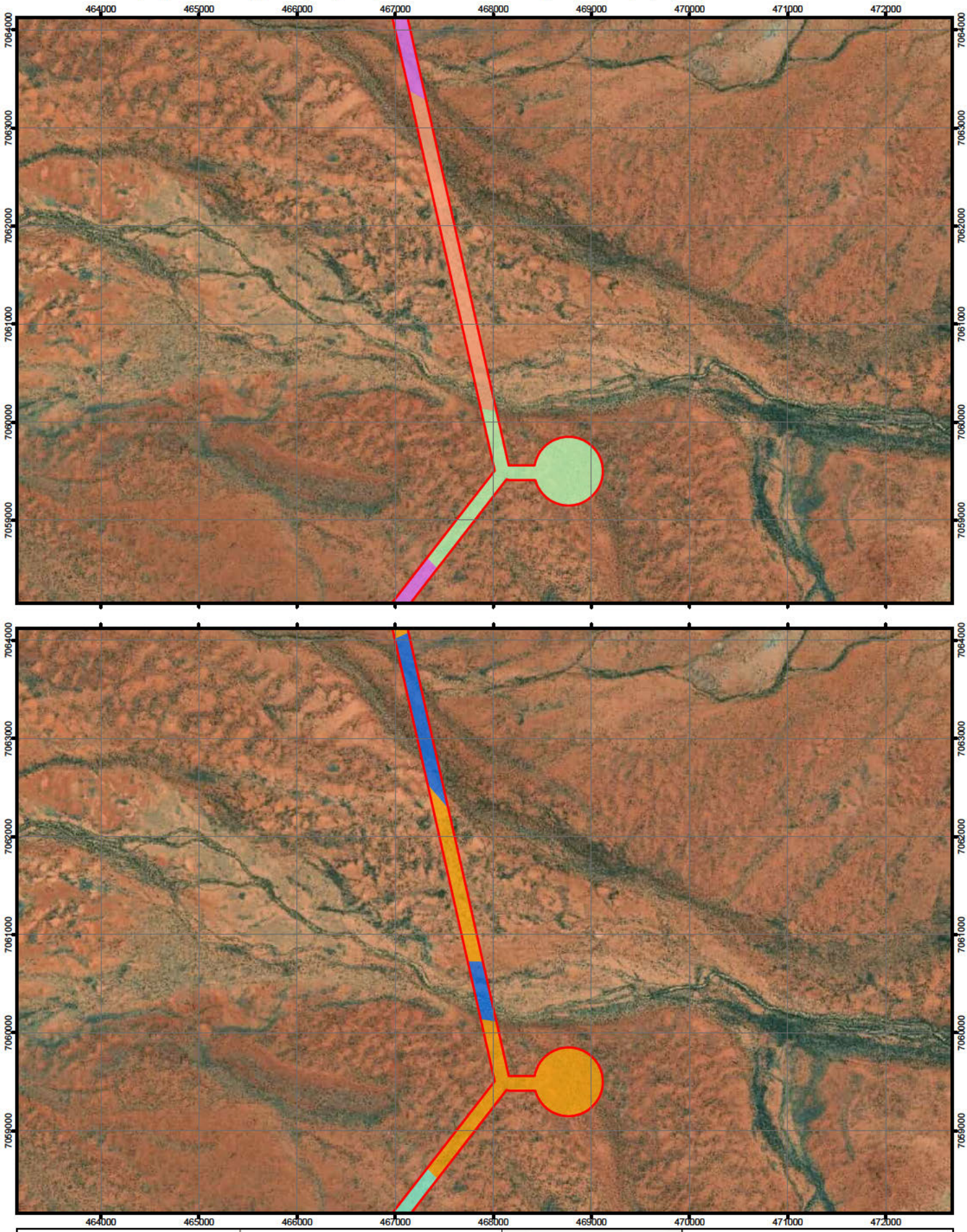

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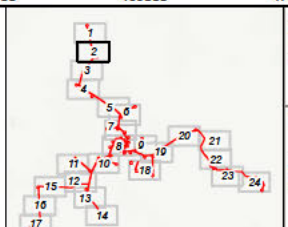
LEGEND

Vegetation Communities
- AfEfPo
- AiAbSa
- AiAtEf

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.2

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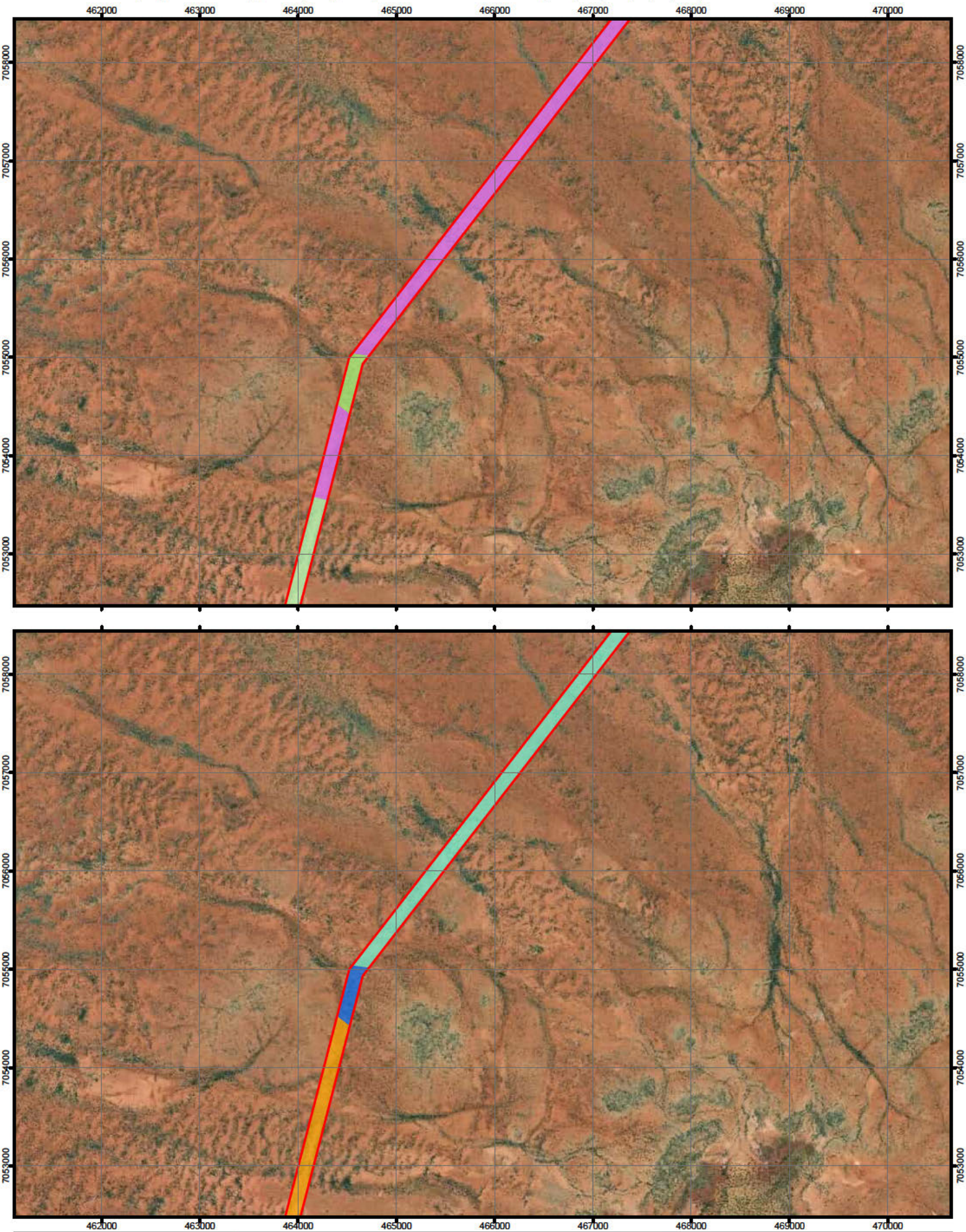

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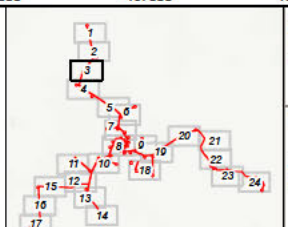
LEGEND

Vegetation Communities
- AfEfPo
- AiAtEf
- AvEp

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure 7.3

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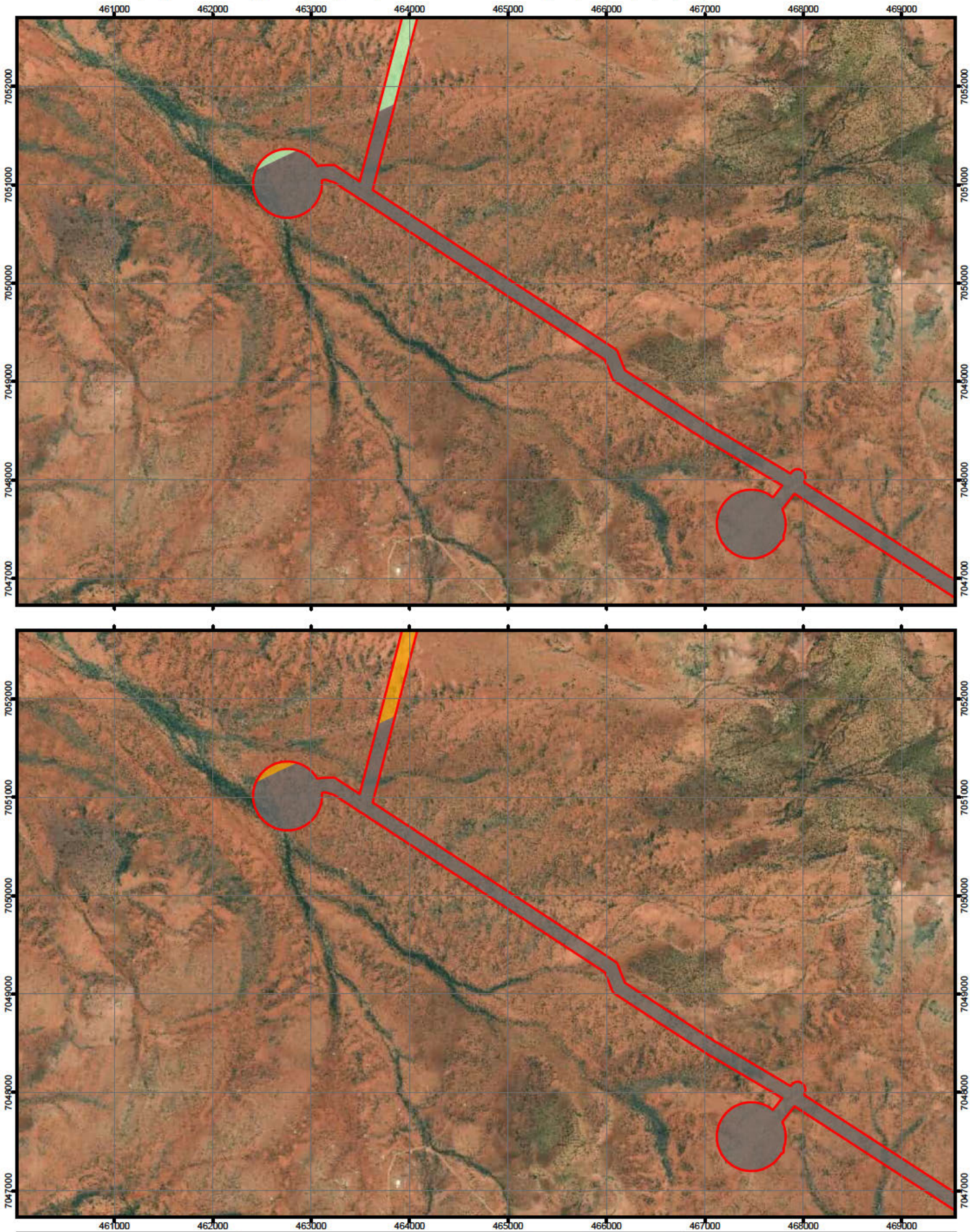

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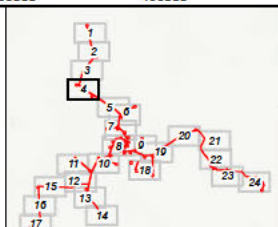
LEGEND

Vegetation Communities
- AiAtEf
- MRO

Fauna Habitat
- Hardpan plain with intermittent sandplain
- MRO



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure **7.4**

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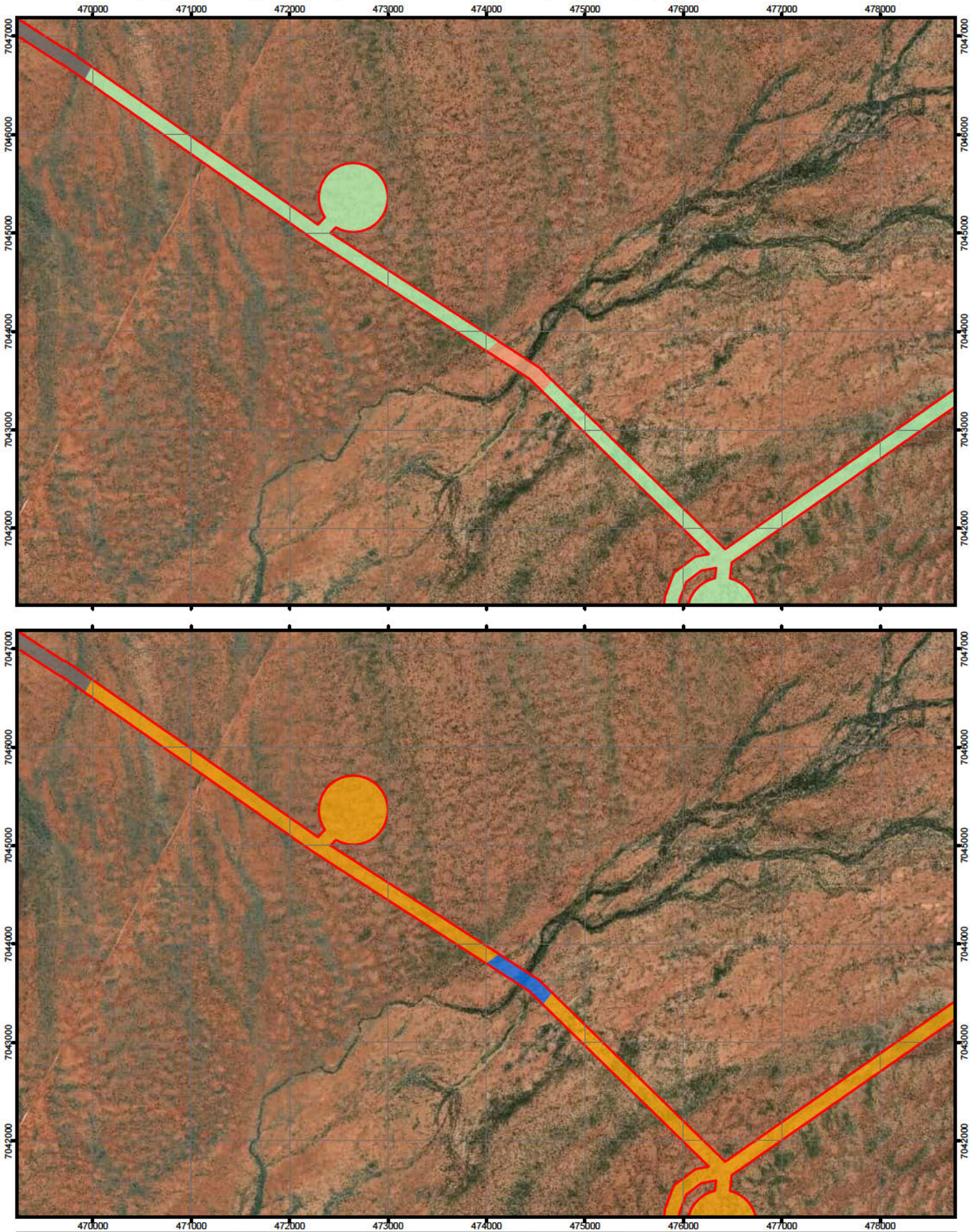

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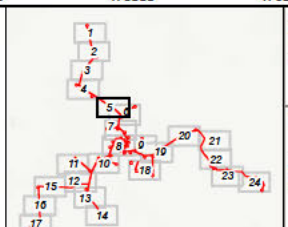
LEGEND

Vegetation Communities
- AfSa
- AiAbSa
- AiAtEf
- MRO

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain
- MRO
- Non saline stony or gritty surfaced plains



Vegetation Communities, Fauna Habitats and Observations

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SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure **7.5**

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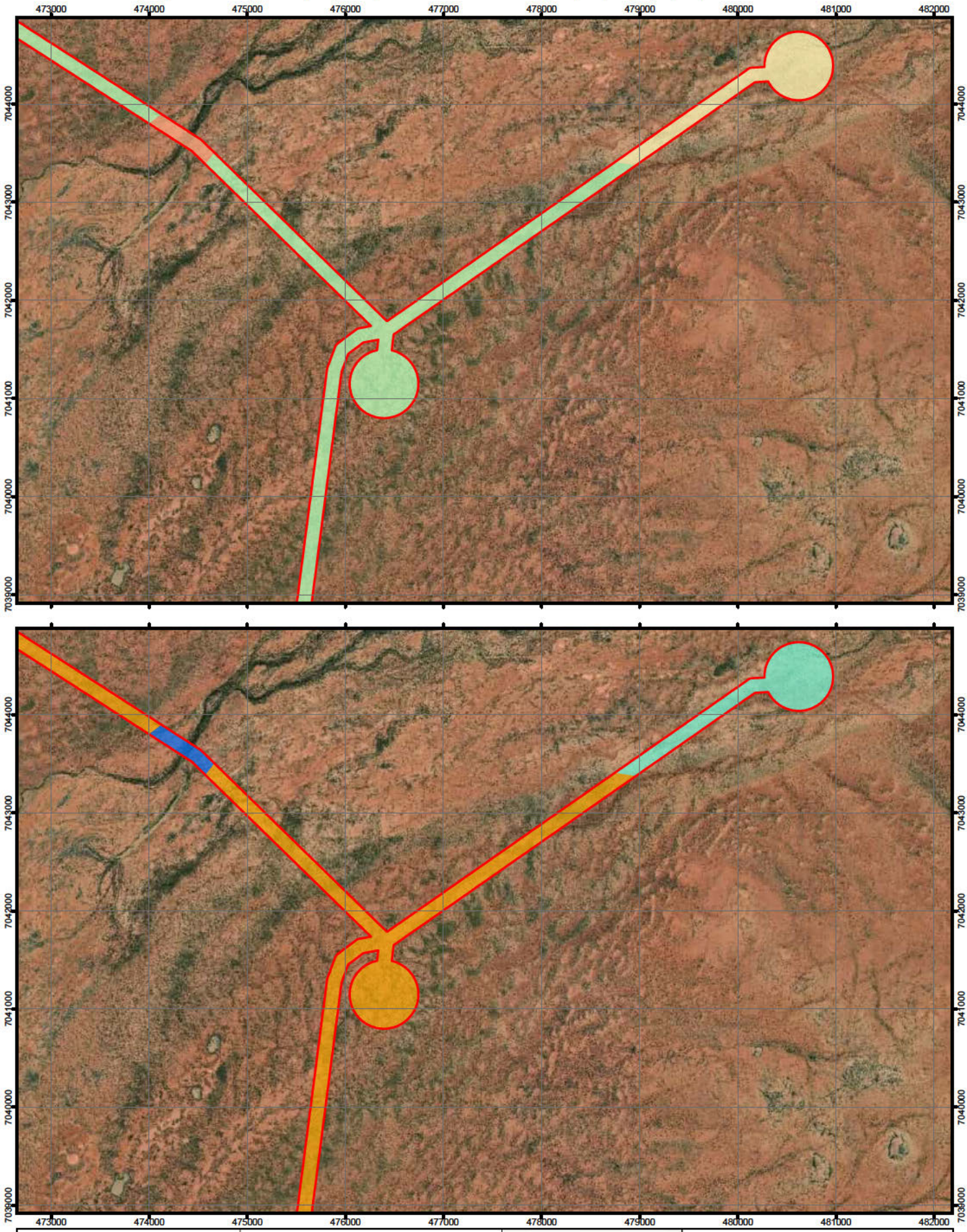

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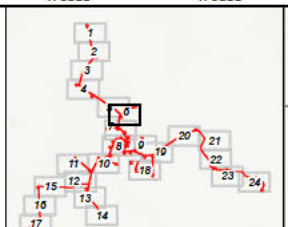
LEGEND

Vegetation Communities
- AfSa
- AiAbSa
- AiAtEf

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.6

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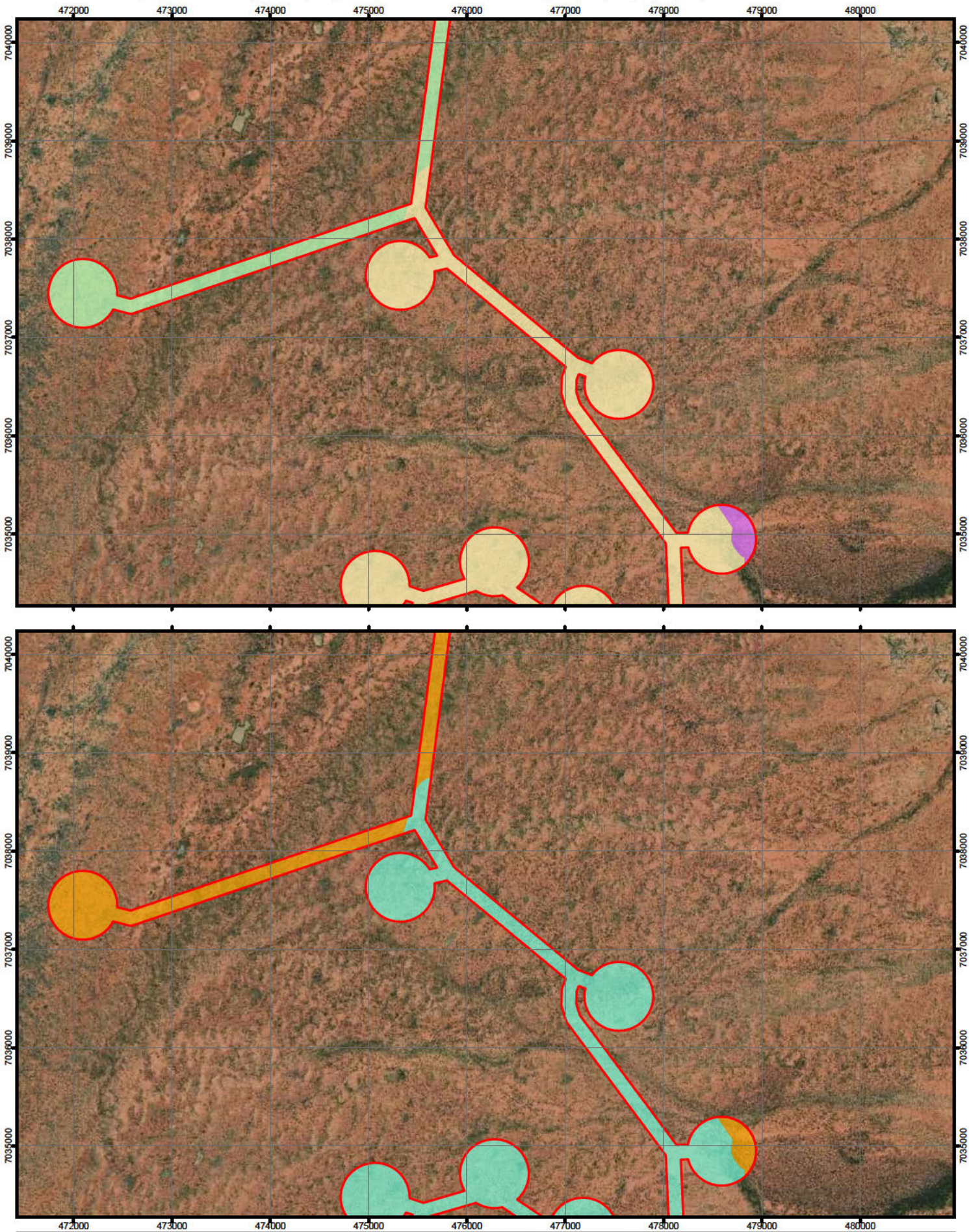

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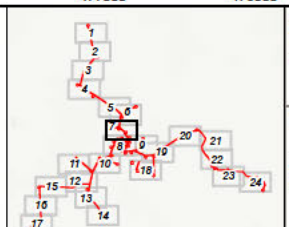
LEGEND

Vegetation Communities
- AfEfPo
- AfSa
- AiAtEf

Fauna Habitat
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.7

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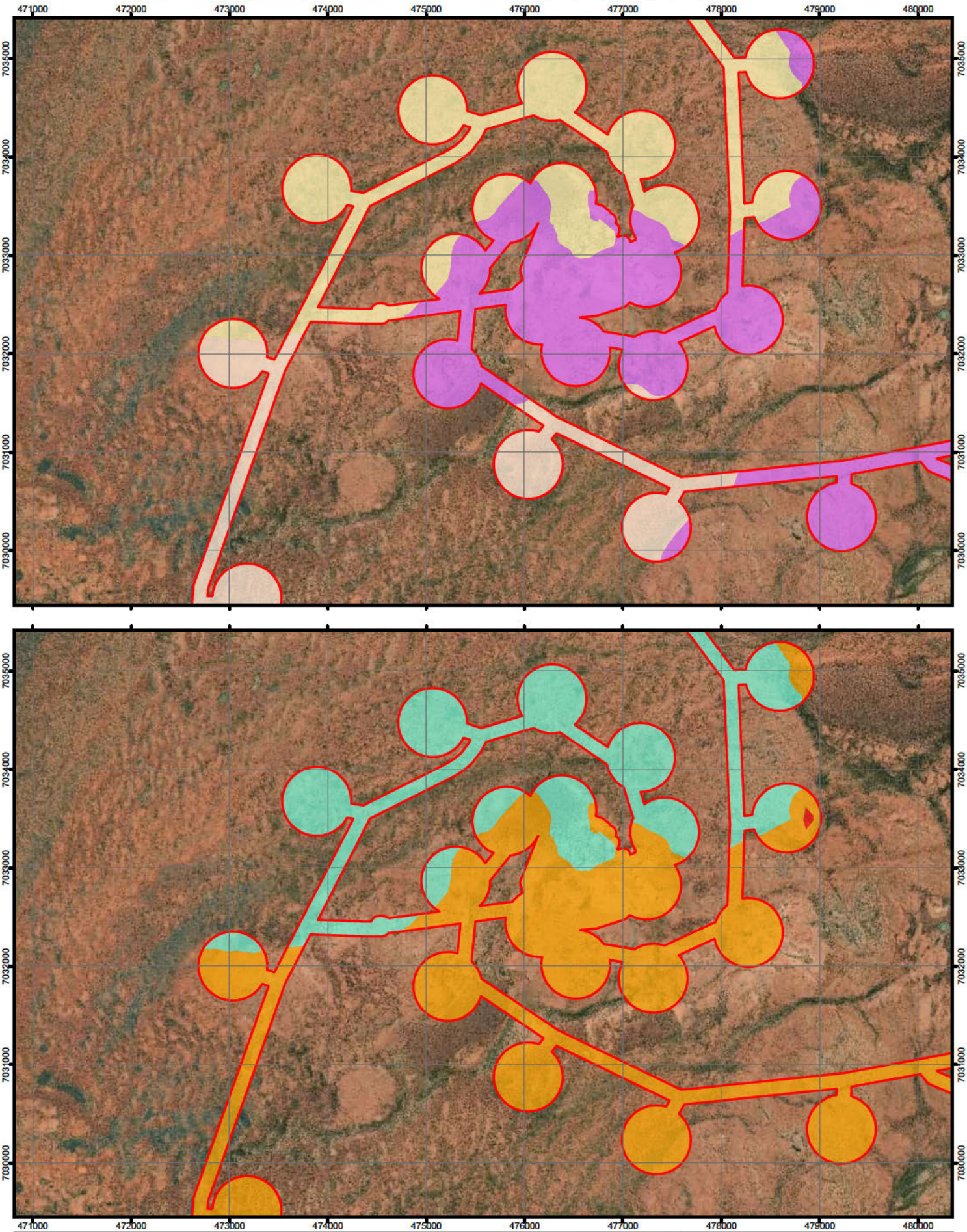

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Data sources:

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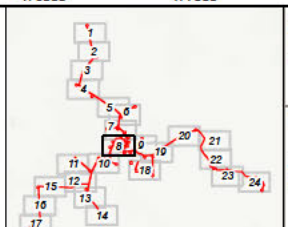
LEGEND

Vegetation Communities
- AfEfPo
- AfSa
- ApAgEf

Fauna Habitat
- Granite domes
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.8

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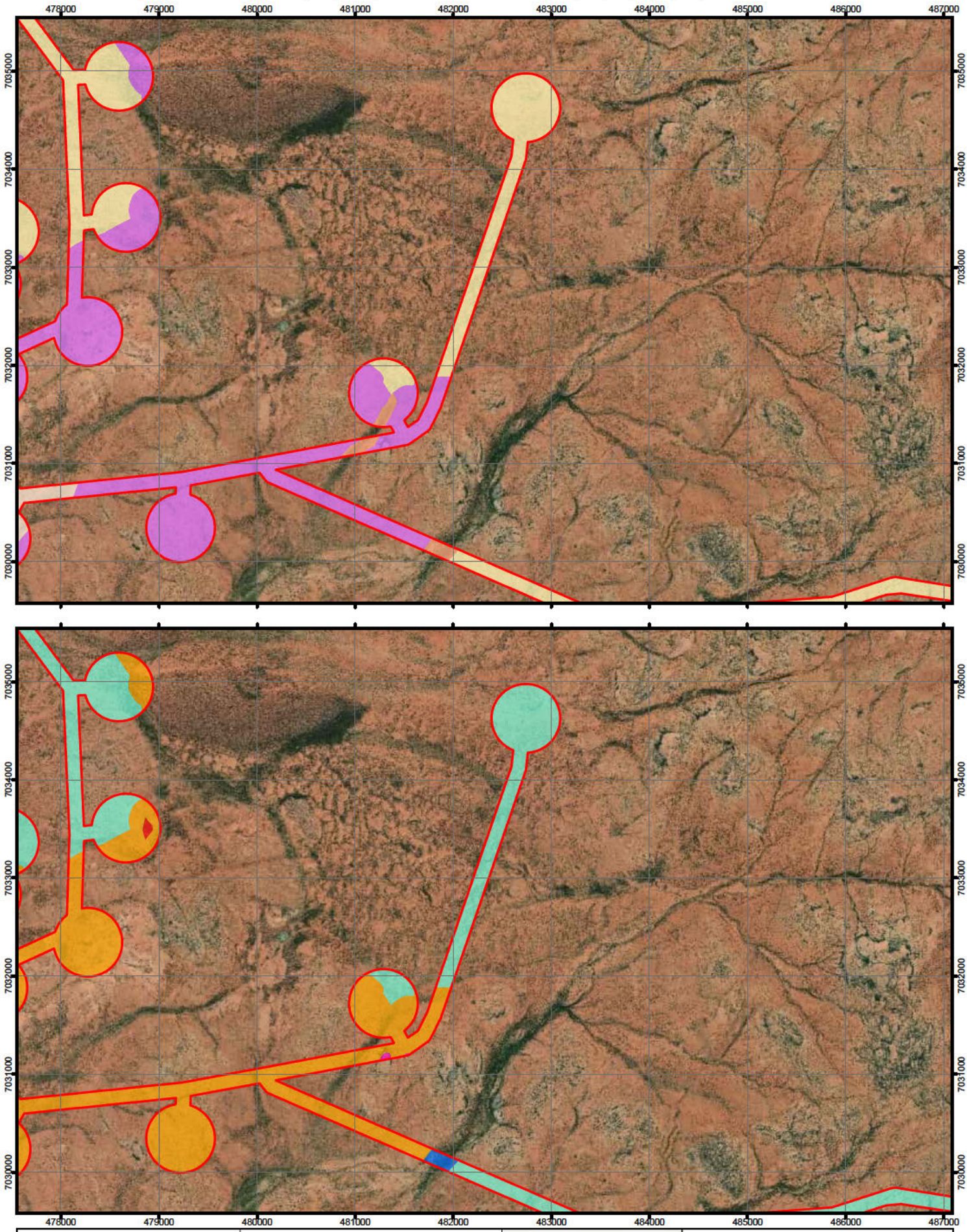

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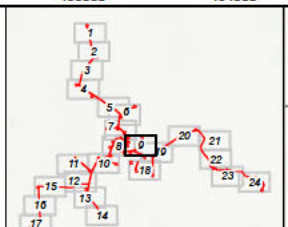
LEGEND

Vegetation Communities
- AfEfPo
- AfSa
- AiAbSa
- ApAgEf

Fauna Habitat
- Channels and creek line
- Granite boulders and heaps
- Granite domes
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure 7.9

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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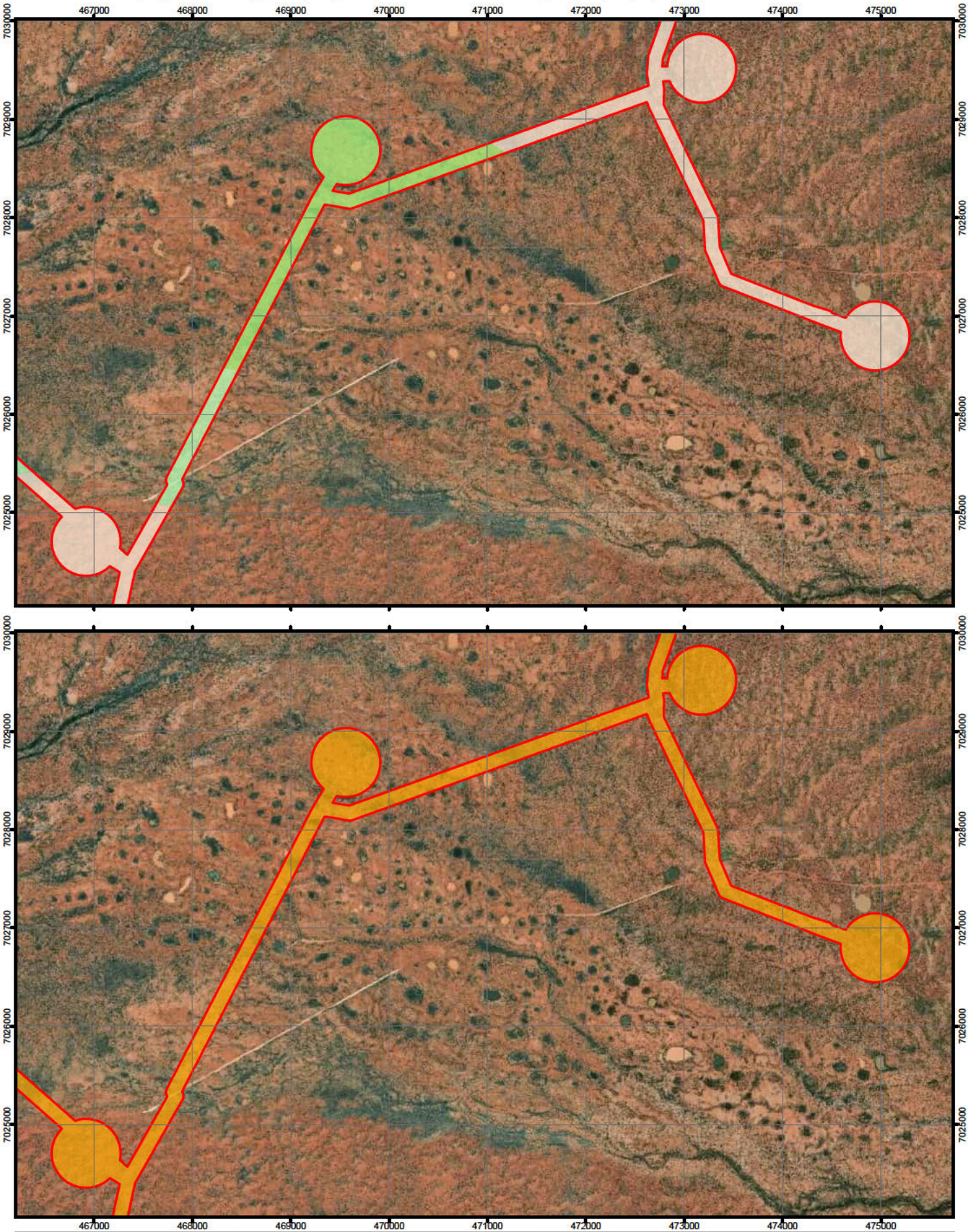

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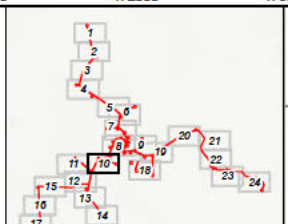
LEGEND

Vegetation Communities
- AiAtEf
- ApAgEf
- AvEp

Fauna Habitat
- Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.10

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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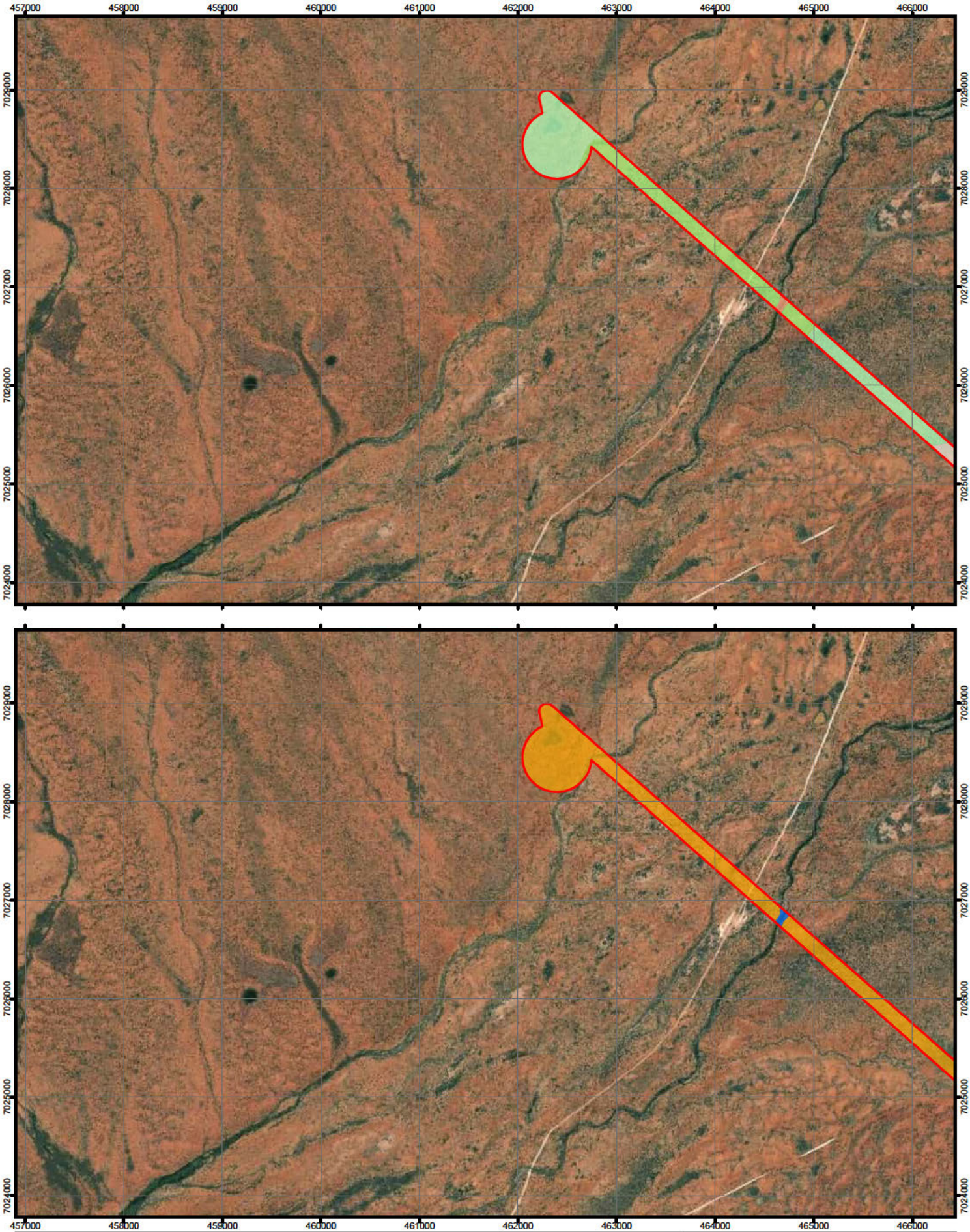

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Data sources:

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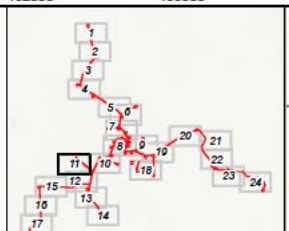
LEGEND

Vegetation Communities
- AiAbSa
- AiAtEf
- ApAgEf
- AvEp

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.11

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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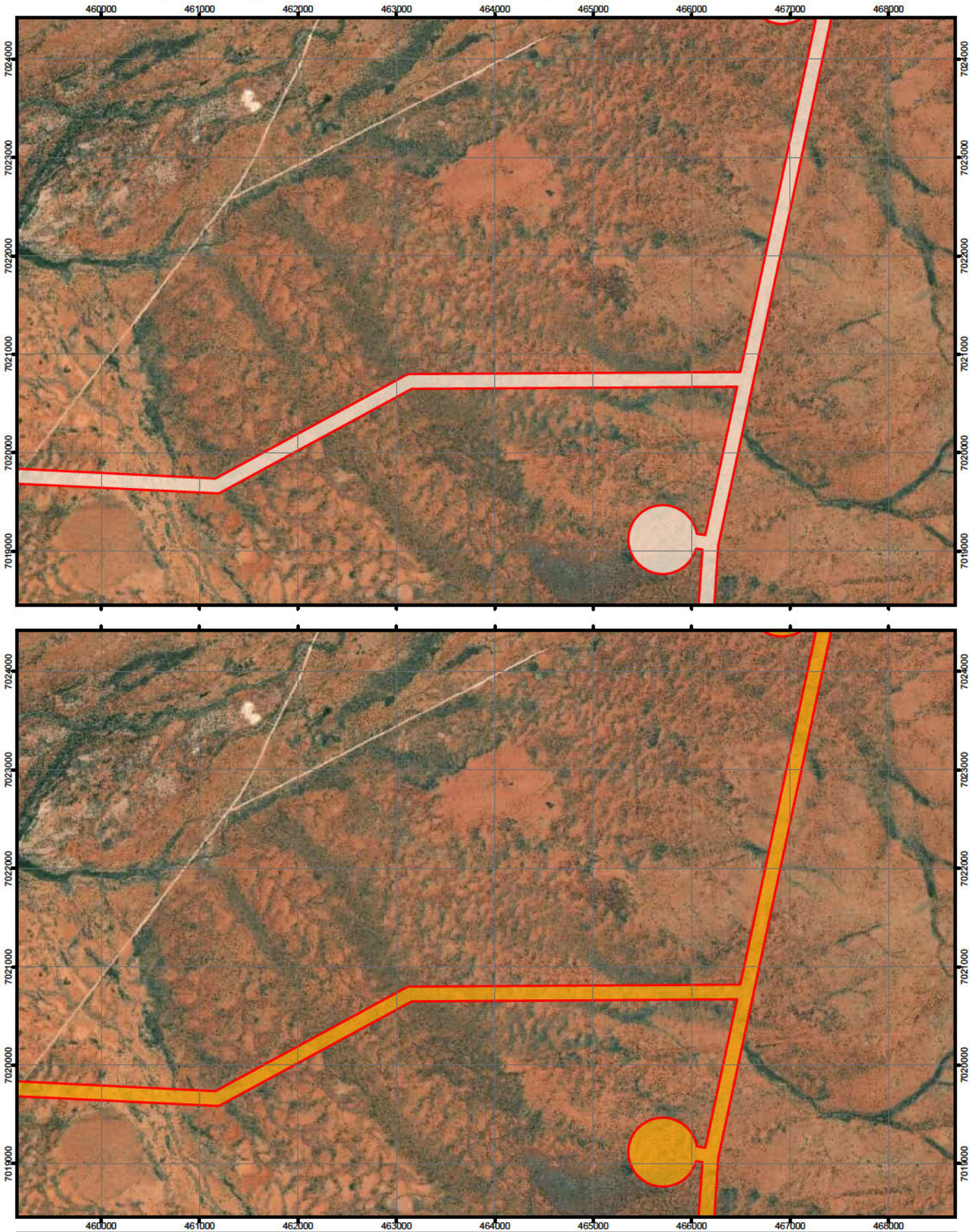

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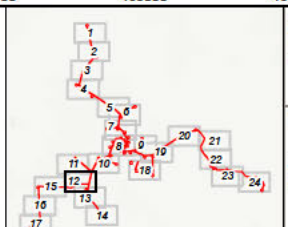
LEGEND

Vegetation Communities
ApAgEf

Fauna Habitat
Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.12

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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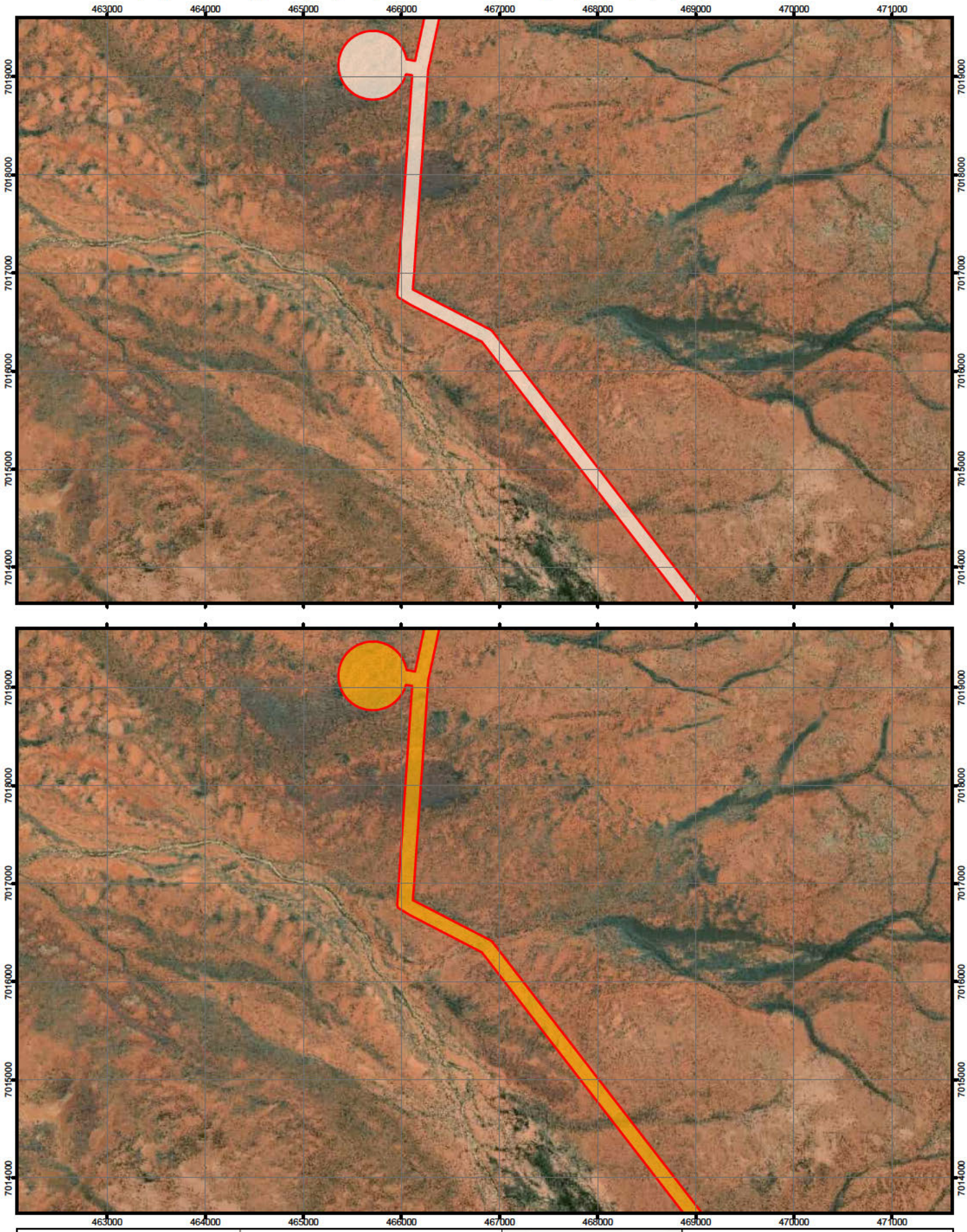

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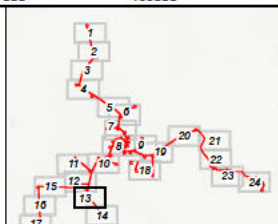
LEGEND

Vegetation Communities
- ApAgEf

Fauna Habitat
- Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.13

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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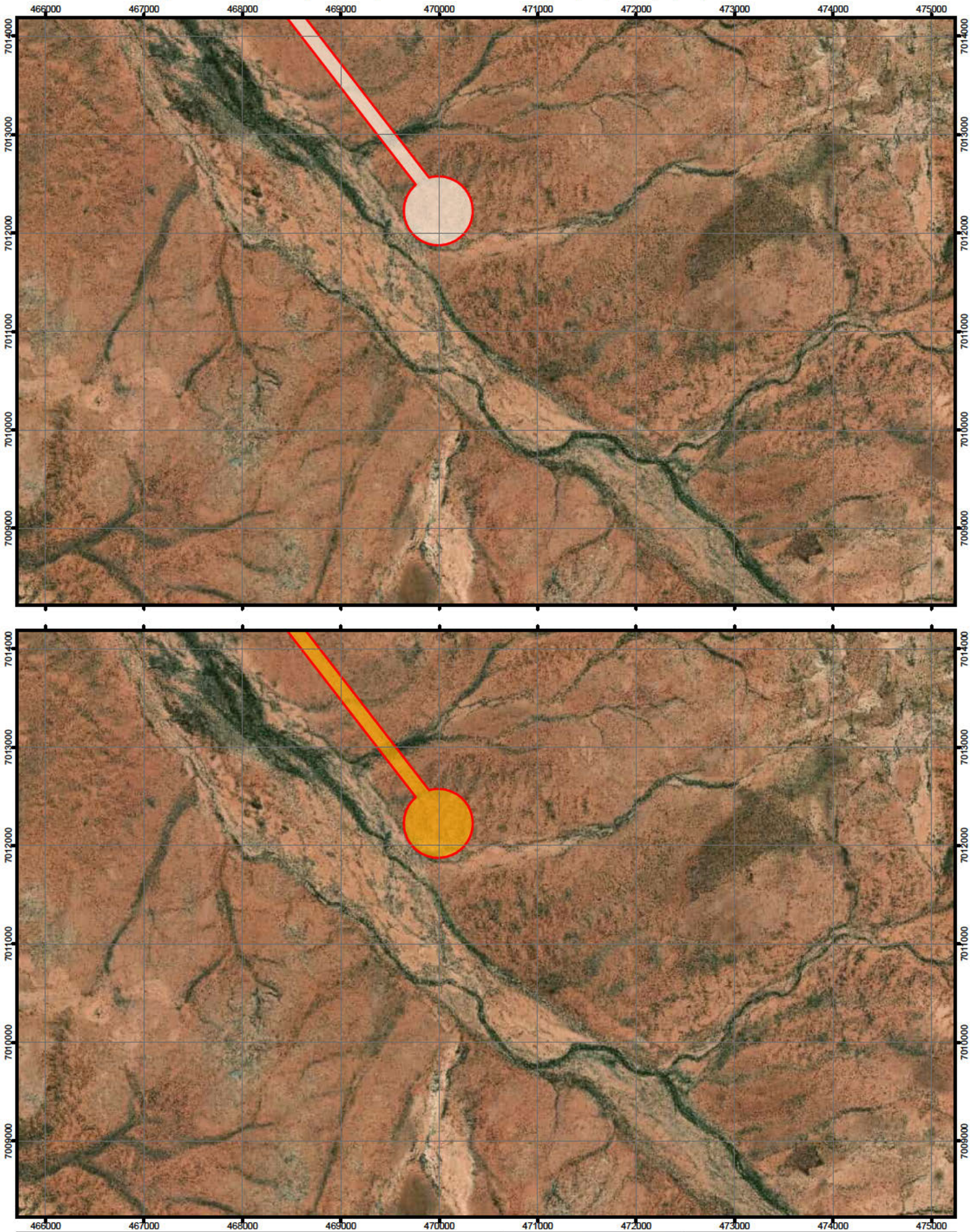

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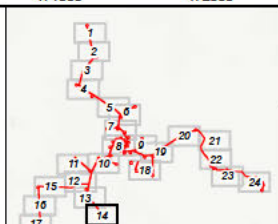
LEGEND

Vegetation Communities
ApAgEf

Fauna Habitat
Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.14

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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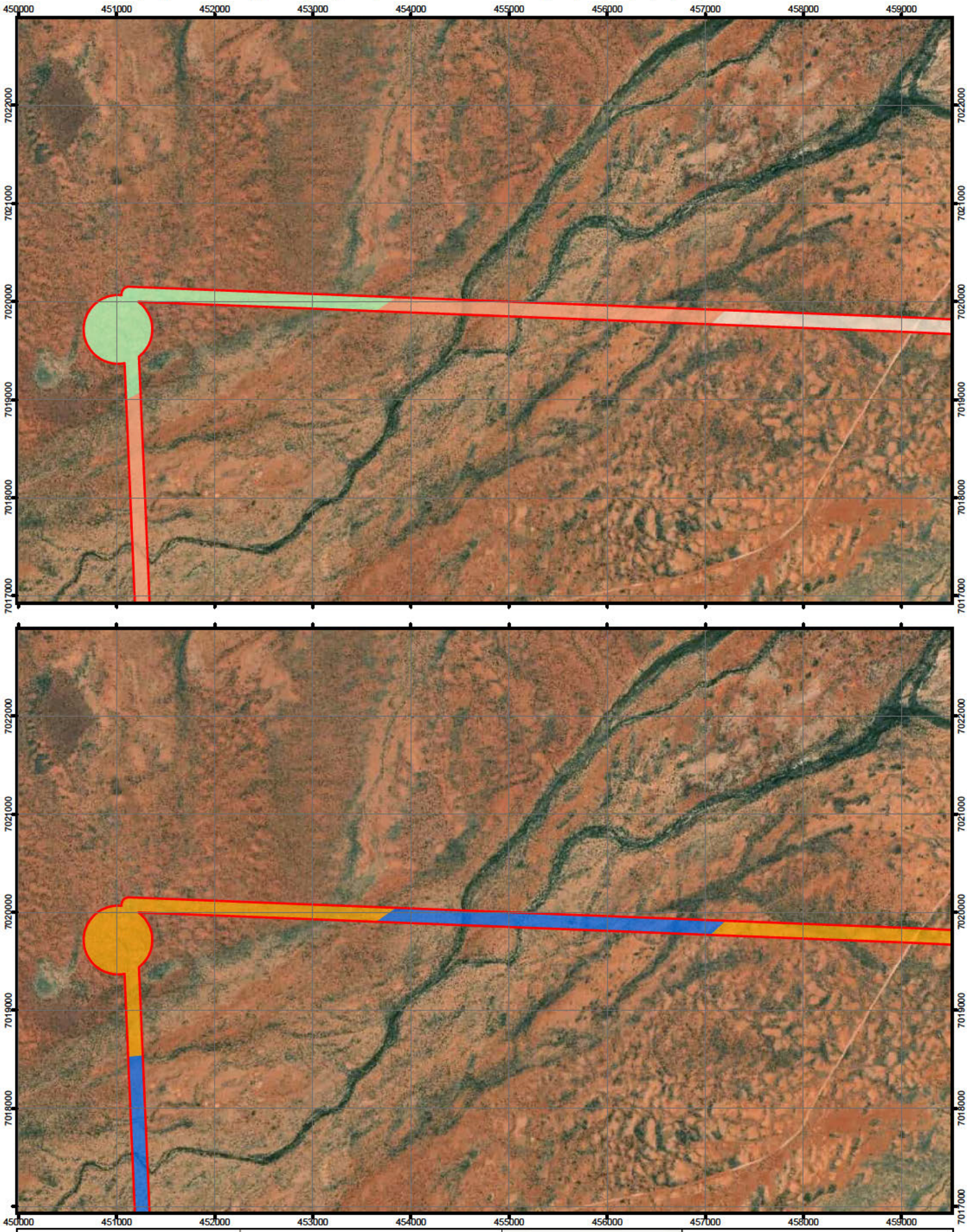

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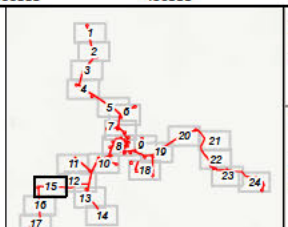
LEGEND

Vegetation Communities
- AiAbSa
- AiAtEf
- ApAgEf

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.15

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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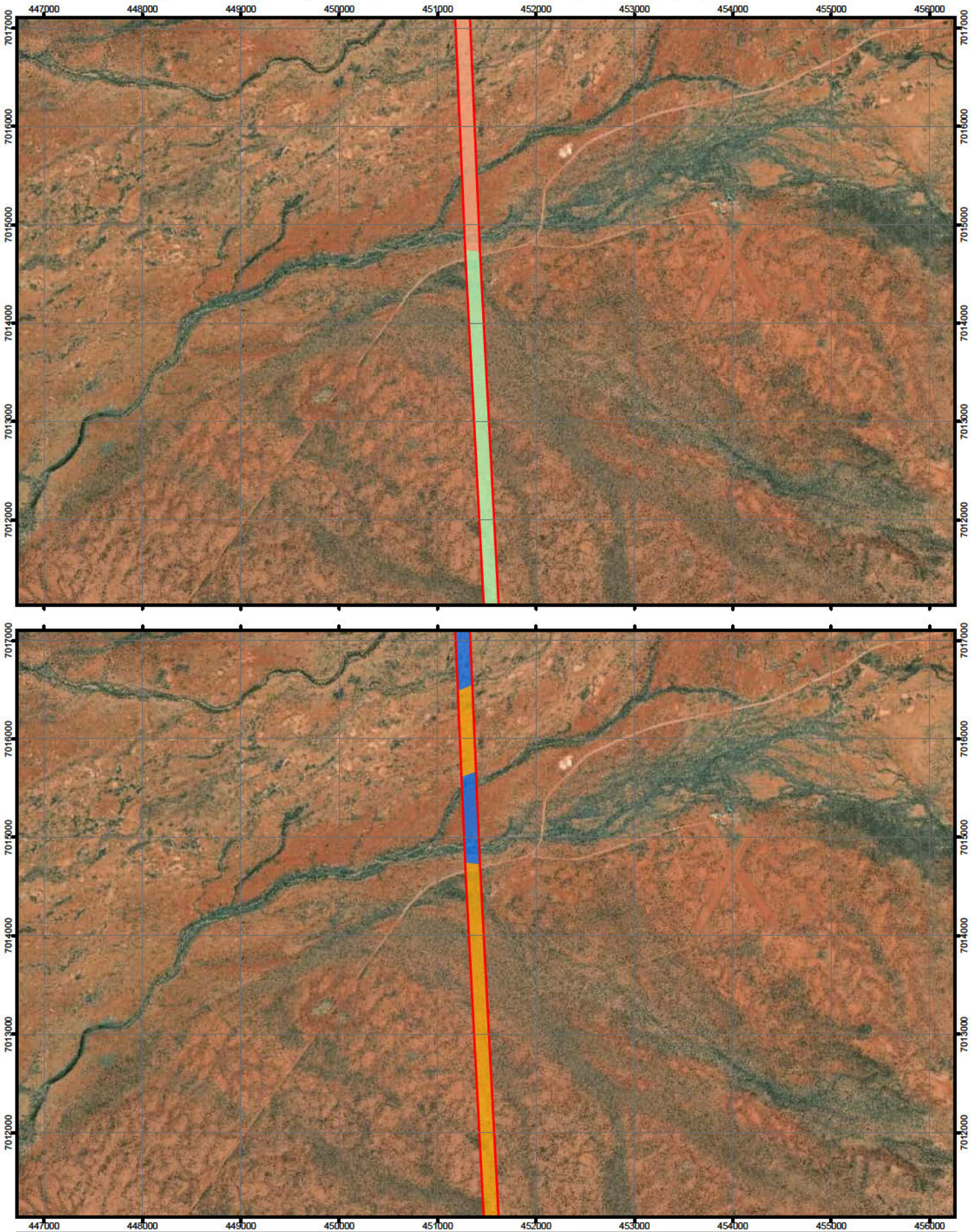

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Data sources:

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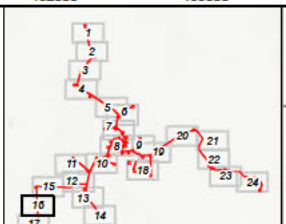
LEGEND

Vegetation Communities
- AiAbSa
- AiAtEf

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.16

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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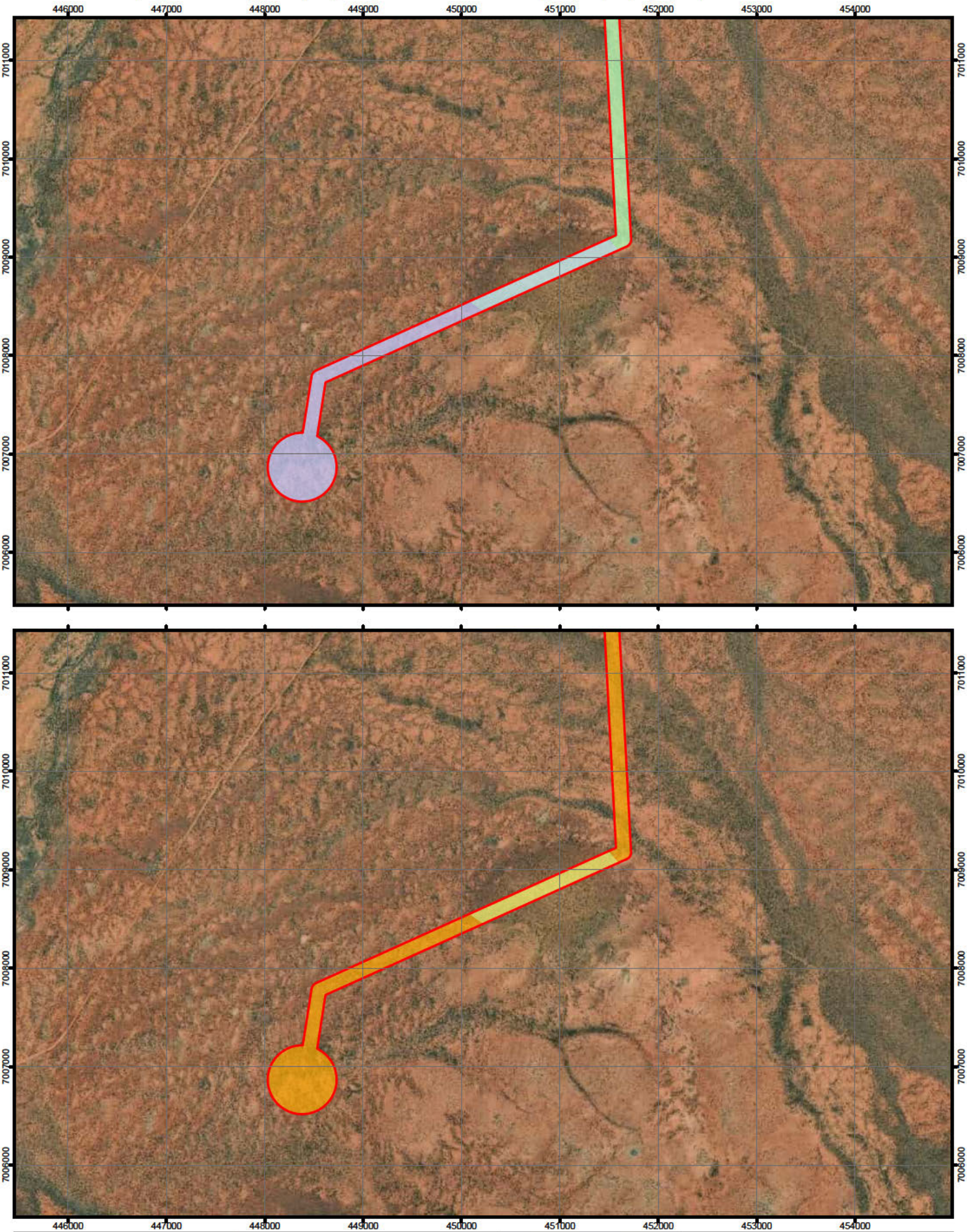

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Data sources:

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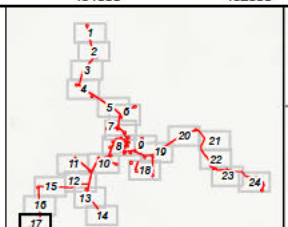
LEGEND

Vegetation Communities
- AaEcPo
- AiAtEf
- AiTdPb

Fauna Habitat
- Hardpan plain with intermittent sandplain
- Sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.17

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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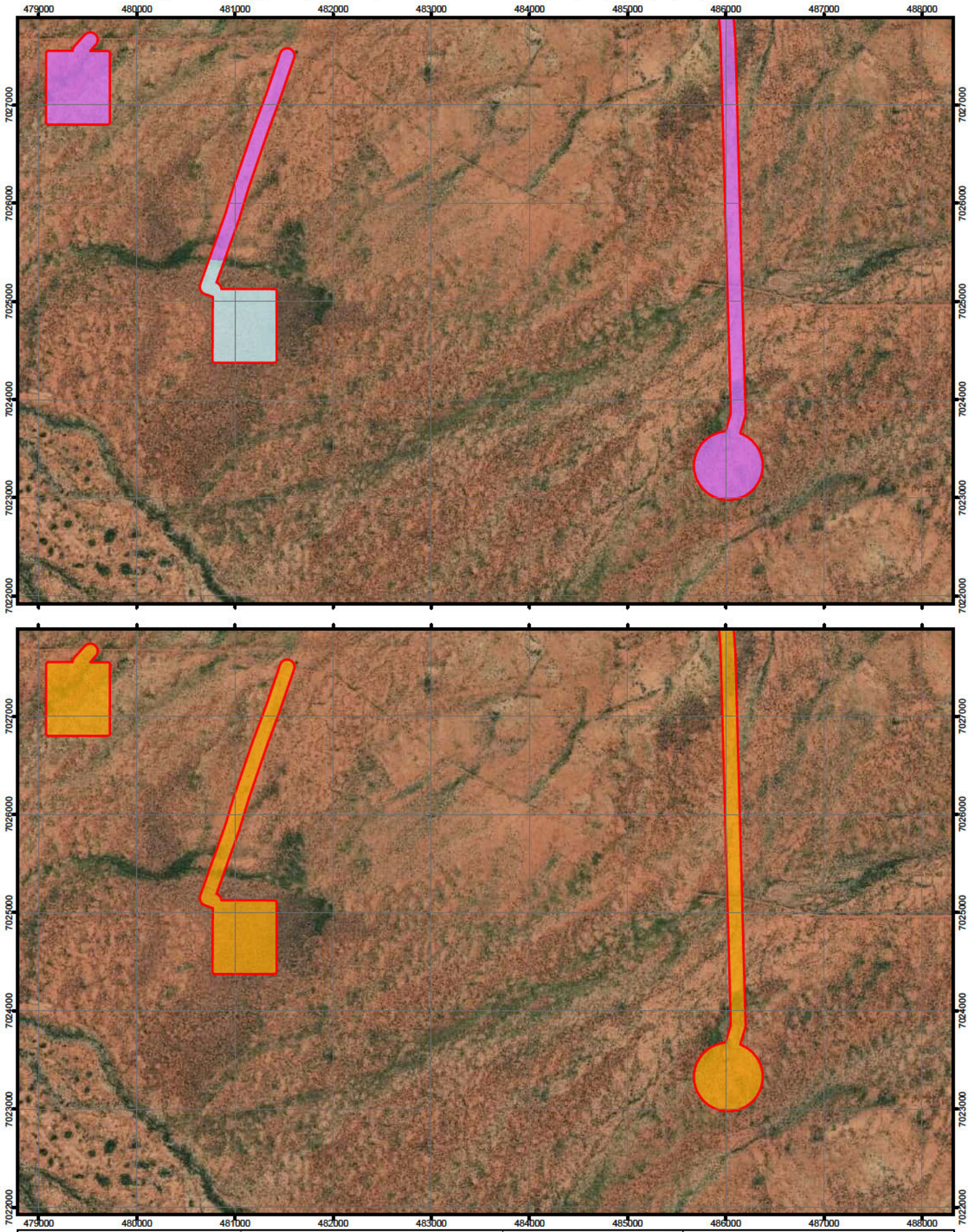

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metres

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Data sources:

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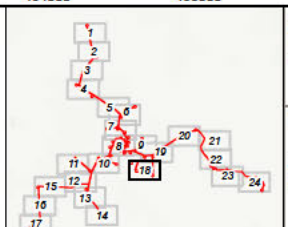
LEGEND

Vegetation Communities
- AaEcPo
- AfEfPo

Fauna Habitat
- Hardpan plain with intermittent sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.18

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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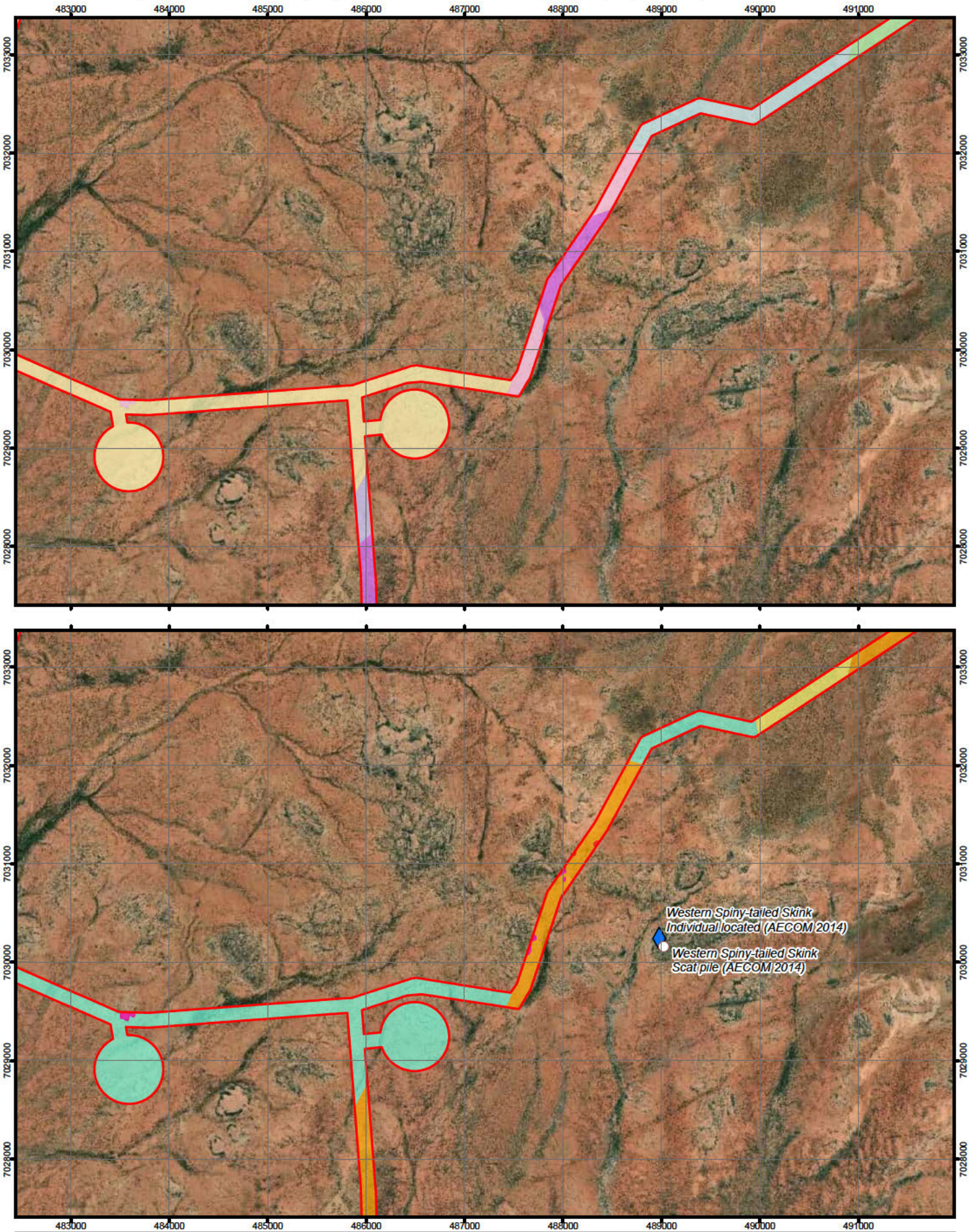

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metres

Data sources:

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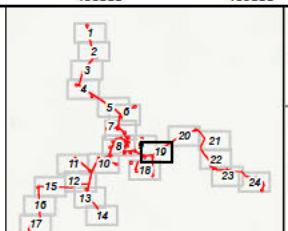
LEGEND

Vegetation Communities
- AaEcPo
- AfEfPo
- AfSa
- AiAtEf
- AiTdPb
- ArCc

Fauna Habitat
- Granite boulders and heaps
- Granite domes
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains
- Sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure 7.19

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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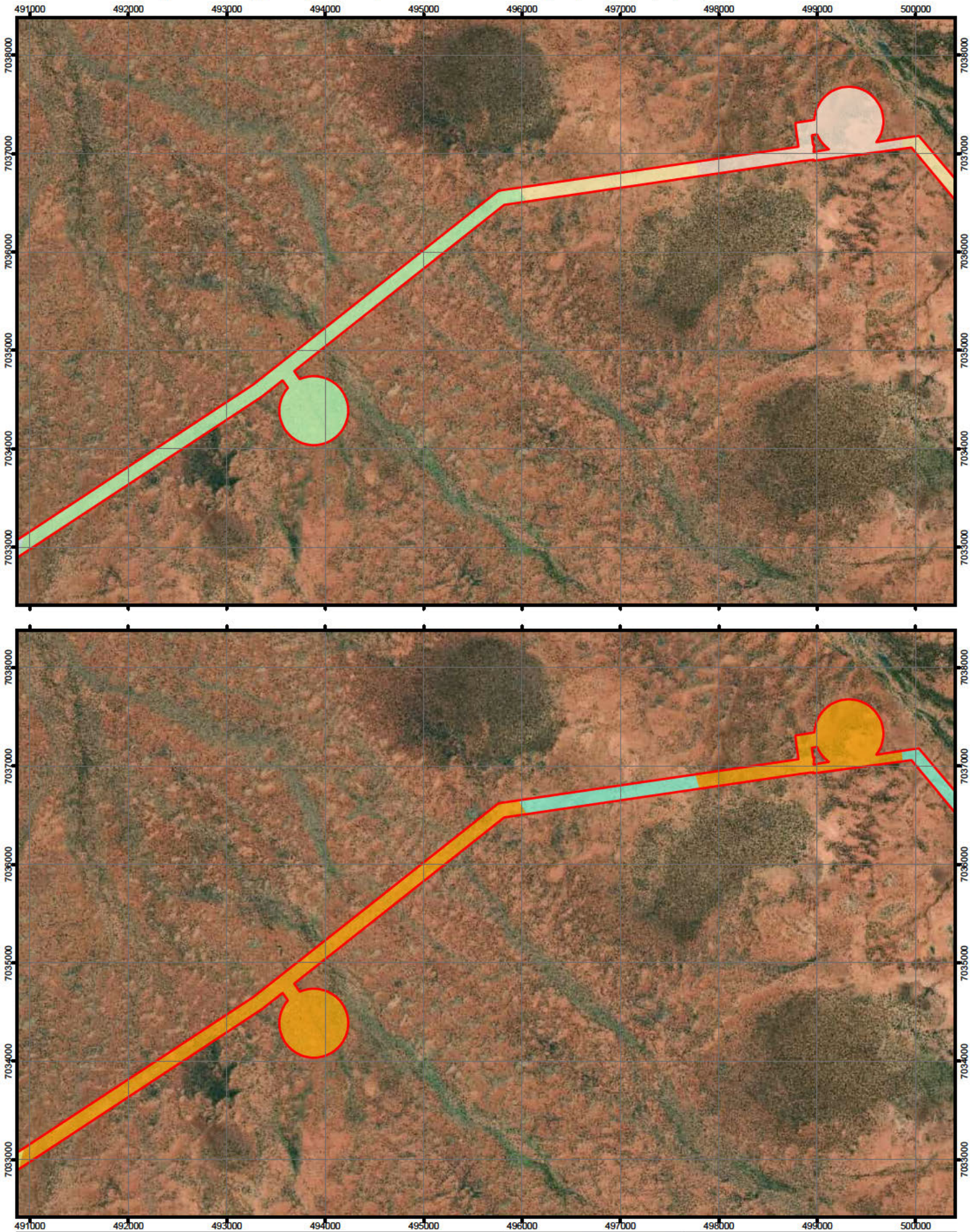

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metres

Data sources:

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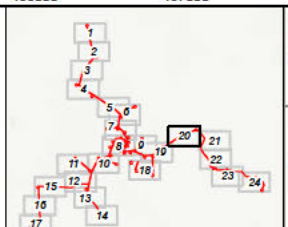
LEGEND

Vegetation Communities
- AaEcPo
- AfSa
- AiAtEf
- ApAgEf

Fauna Habitat
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains
- Sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.20

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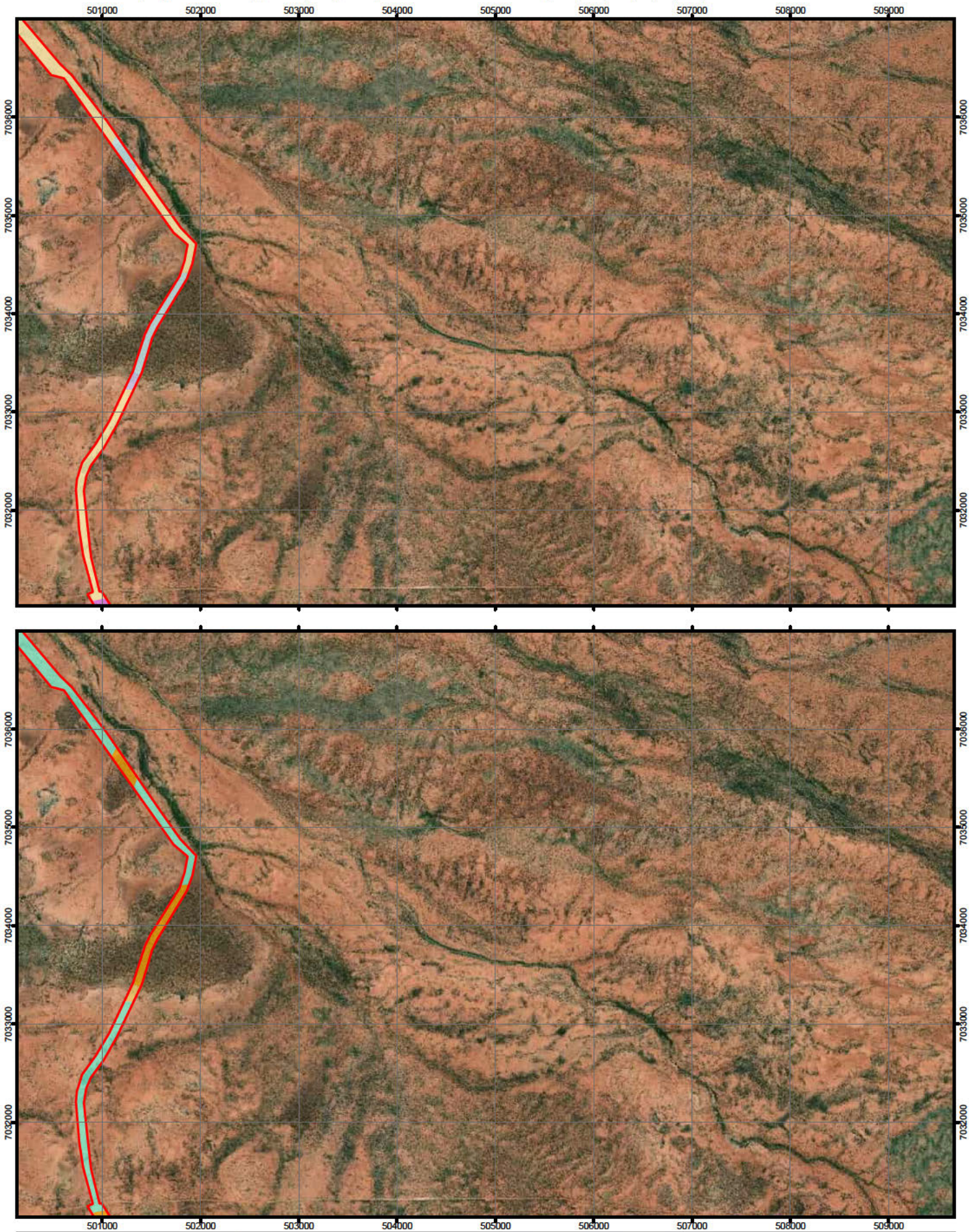

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0 250 500 750
metres

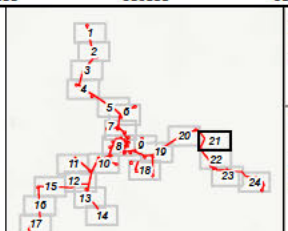
Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2021).Geoscience Australia, Streetpro

LEGEND

Vegetation Communities
- AaEcPo
- AfEfPo
- AfSa
- AiTdPb

Fauna Habitat
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains
- Saline lower footslopes below breakaways



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.21

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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metres
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(when printed at A4)

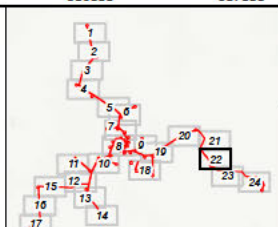
Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2021).Geoscience Australia, Streetpro

LEGEND

Vegetation Communities
- AaEcPo
- AfEfPo
- AfSa
- ArCc

Fauna Habitat
- Granite boulders and heaps
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains
- Rocky breakaway and plateau edges
- Saline lower footslopes below breakaways
- Sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.22

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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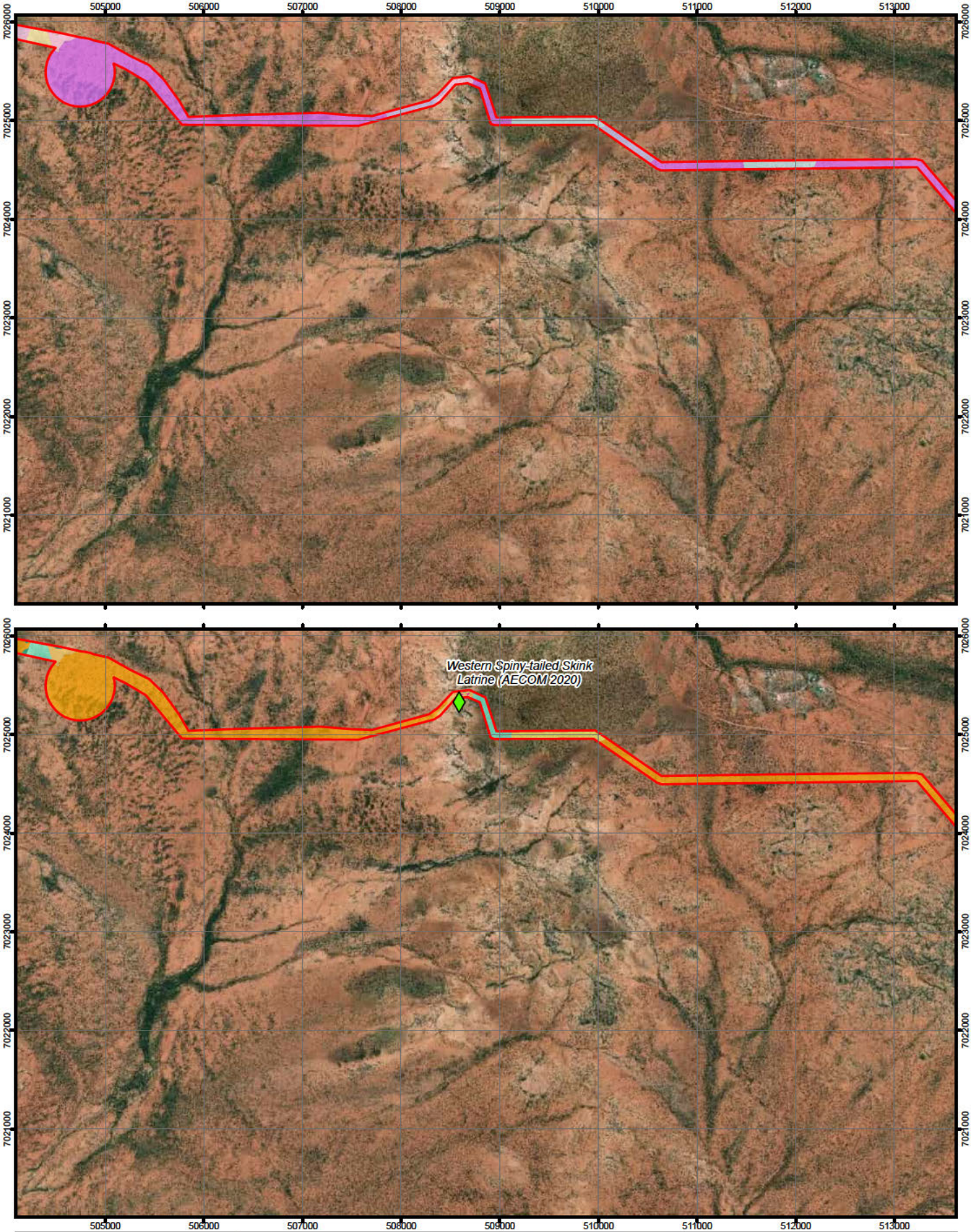

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(when printed at A4)

Datum: GDA 1994 MGA Zone 50
0 250 500 750
metres

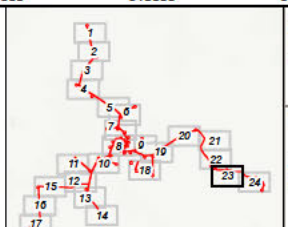
Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2021).Geoscience Australia, Streetpro

LEGEND

Vegetation Communities
- AaEcPo
- AfEfPo
- AfSa
- AiTdPb
- ArCc

Fauna Habitat
- Granite boulders and heaps
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains
- Rocky breakaway and plateau edges
- Saline lower footslopes below breakaways
- Sandplain



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure **7.23**

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

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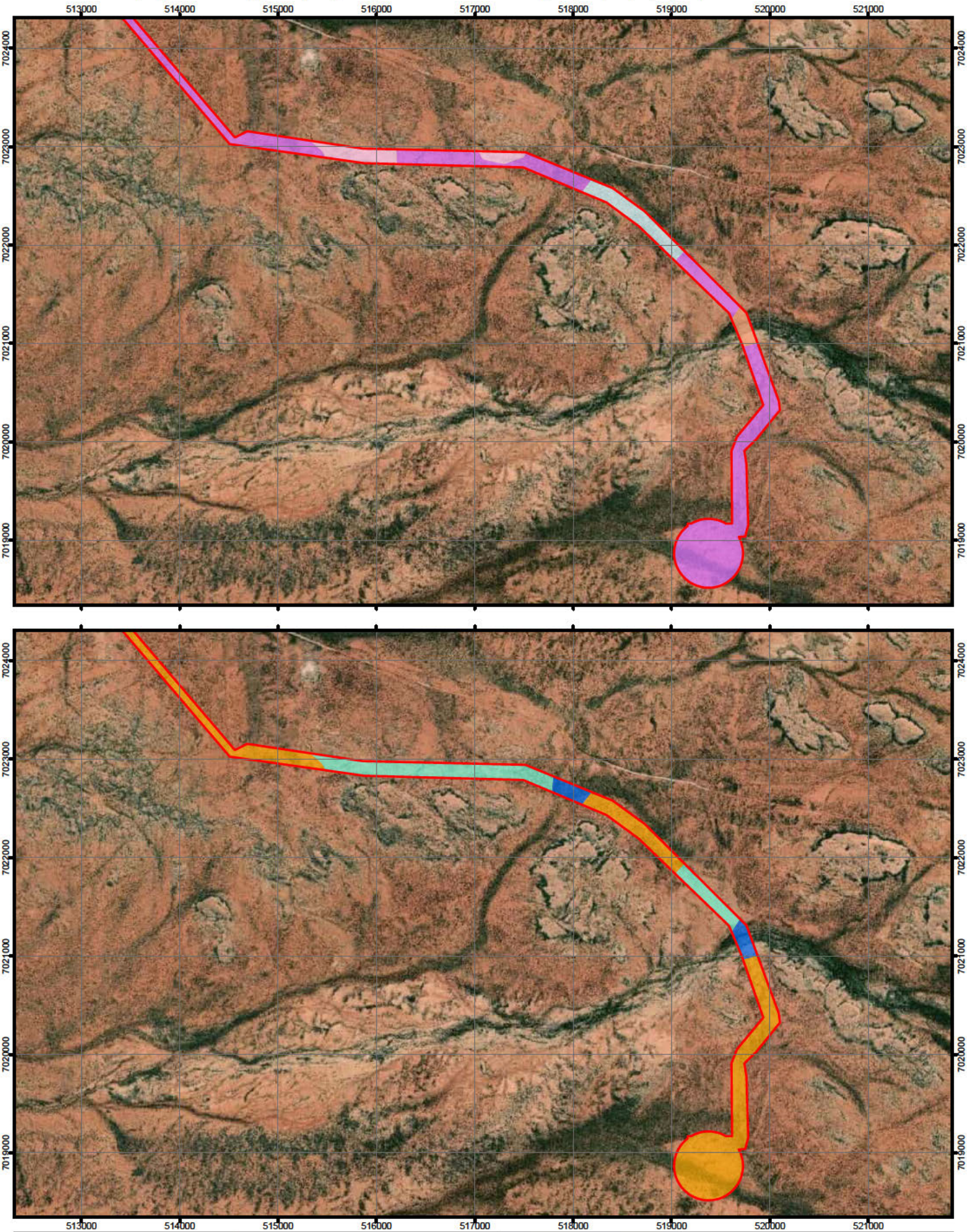

PROJECT ID	60647200
CREATED BY	WYATTK2
APPROVED BY	J.LEIGH
LAST MODIFIED	28 JAN 2021

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Datum: GDA 1994 MGA Zone 50

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(when printed at A4)

0 250 500 750
metres

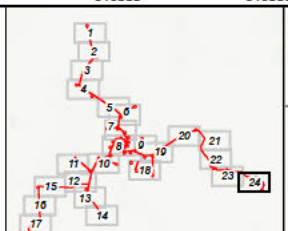
Data sources:

Base Data: (c) Based on information provided by and with the permission of the Western Australian Land Information Authority trading as Landgate (2021).Geoscience Australia, Streetpro

LEGEND

Vegetation Communities
- AaEcPo
- AfEfPo
- AiAbSa
- ArCc

Fauna Habitat
- Channels and creek line
- Hardpan plain with intermittent sandplain
- Non saline stony or gritty surfaced plains



Vegetation Communities, Fauna Habitats and Observations

WAJARRI CORPORATION

SQUARE KILOMETRE ARRAY – FLORA AND FAUNA ASSESSMENT

Figure
7.24

Map Document: \\AUPER1FP001.AU.AECOMNET.COM\Projects\606X\60647200\900_CAD_GIS\920_GIS\02_MXDs\02_Flora_Fauna_Assessment_Figures\60647200_SKA_Flora_Fauna_Assessment\60647200_SKA_Flora_Fauna_Assessment.aprx (WyattK2)

A4 size

Appendix A

Desktop Results

A1 EPBC Protected Matters Search

A2 Flora Desktop

A3 Fauna Desktop

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

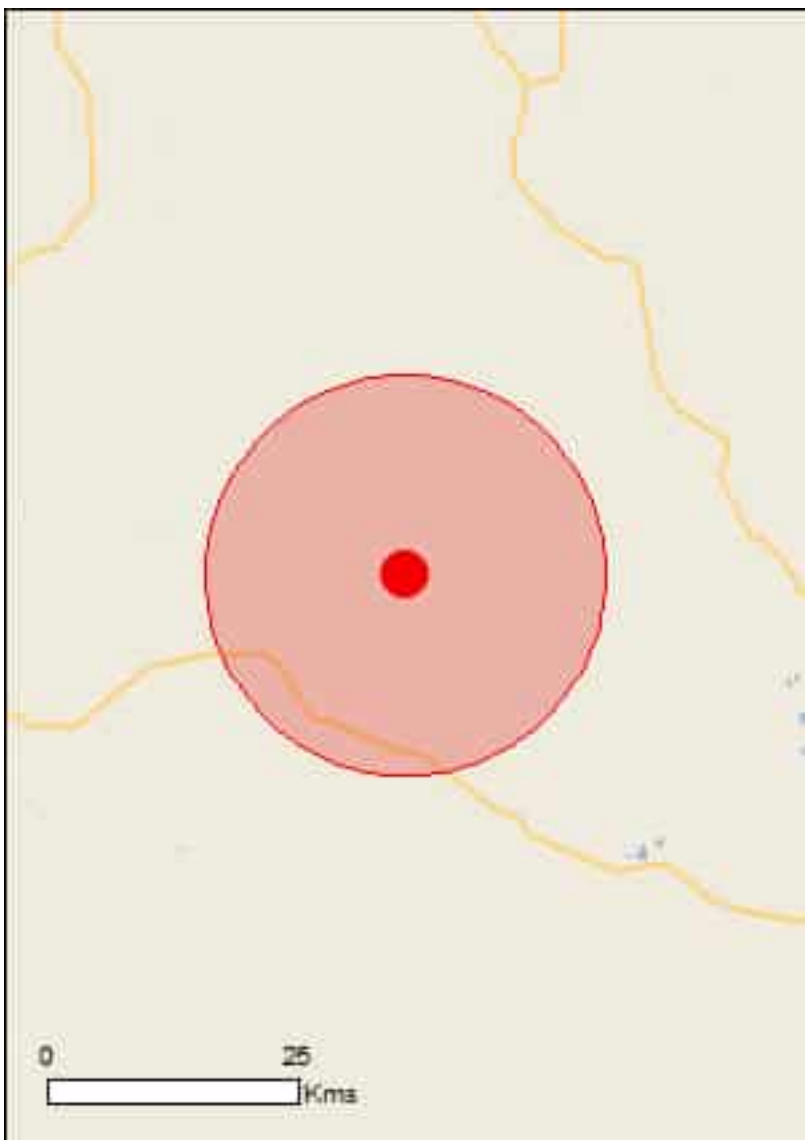
Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

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

Report created: 09/11/20 12:30:53

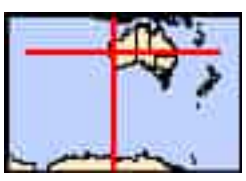
Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements



Coordinates

Buffer: 20.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	5
Listed Migratory Species:	6

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:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	7
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Other		
Idiosoma nigrum Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider [66798]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Egernia stokesii badia Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink [64483]	Endangered	Species or species habitat known to occur within area

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

Name	Threatened	Type of Presence
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat may occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans		
Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea		
Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

Extra Information

Invasive Species [Resource Information]

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

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

Caveat

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

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

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

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

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

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

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

- migratory and
- marine

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

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

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

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

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

Coordinates

[redacted]

Acknowledgements

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

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

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

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

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Appendix A2 Flora Desktop Results

Species	WA Cons. Code	Habitat[1]	Likelihood	Justification	Count Date
Acacia atopa	P3	Red clay & red loam. Sometimes in rocky situations. Distributed in the Canarvon, Gascoyne and Murchison IBRA Regions	Unlikely	Located 38 km from SW arm of survey corridor, habitat may be present in survey area	1/10/2011
Acacia dilloniorum	P1	found on red clay loam over exposed dolerite outcropping in Weld Range	Unlikely	Located on adjacent BIF range, located outside project area	25/08/2011
Acacia sp. Jack Hills (R. Meissner & Y. Caruso 4)	P1	Tall shrub to 2 m high, found on rocky banded iron formation on Jack Hills within the Shire of Meekatharra	Unlikely	Located 47 km from N arm of survey corridor, on BIF outcropping	21/11/2013
Acacia sp. Muggon Station (S. Patrick & D. Edinger SP 3235)	P2	Erect, single-stemmed tuberous, perennial, herb (with succulent green leaves), to 0.1 m high. Fl. white, Sep. Sand patches inside rocks, brown sandy clay, granite. Depressions in rock outcrops, breakaways, flats.	Unlikely	Located 37 km from survey area, habitat may be present	/10/1985
Acacia speckii	P4	Decumbent or ascending annual, herb, 0.06-0.1(-0.21) m high. Fl. yellow, Sep to Dec. Sandy or clayey soils. Salt swamps & pans. More records towards coast i.e. Shark Bay	Unlikely	Habitat may be present, but located a substantial distance from Survey Area	15/07/2010
Anacampseros sp. Eremaean (F. Hort, J. Hort & J. Shanks 3248)	P1	Low rounded shrub, to 1 m high. Fl. pink, Aug. Brown loam. Breakaway. 400+ km west of Wiluna.	Unlikely	Recorded long distance from survey area, only one record	19/08/2008
Angianthus microcephalus	P2	Decumbent or ascending annual, herb, 0.06-0.1(-0.21) m high. Fl. yellow, Sep to Dec. Sandy or clayey soils. Salt swamps & pans.	May	Recorded in survey area, very old record	28/10/1953
Baeckea sp. Mount Barloweerie (J.Z. Weber 5079)	P1	Shrub, 0.4-0.75 m high. Fl. pink/white, Aug or Oct. Sandy clay.	May	Located 7.5 km from suvey area, habitat present	30/08/2008
Beyeria lapidicola	P1	Shrub to 1 m high, found on ironstone outcrops/breakaways on the midslopes of ranges. Found in three disjointed areas across the midwest of Western Australia (inlcuding Weld Range)	Unlikely	Located on Weld Range, far from survey area.	10/03/2009
Calandrinia butcherensis	P1	Red sands on flats	Likely	Located directly adjacent to survey area, habitat present	18/10/2016
Calandrinia sp. Boolardy Station (P. Jayasekara 719-JHR-01)	P1	Flat. Low plain. Red/orange sand/clay.	Likely	Recorded close to survey area between the two southern arms.	18/10/2006
Calotis sp. Perrinvale Station (R.J. Cranfield 7096)	P3	Red Loam and red-orange sand clay-loam over banded ironstone formation	Unlikely	Long distance >30km from survey area, habitat may be present	9/09/2016
Calytrix verruculosa	P3	Sandy clay.	May	Unlikely, habitat 30 km from survey area	15/09/2009
Chamelaucium sp. Yalgoo (Y. Chadwick 1816)	P1	Granite outcrops	Unlikely	Far from survey area >60 km	12/09/2009
Chthonocephalus muellerianus	P2	Red sand.	Unlikely	Unlikely, habitat 30 km from survey area	11/09/2016
Dicrastylis linearifolia	P3	Red sand. Sandplain.	Unlikely	Old record, >30 km from survey area	4/11/1997
Dicrastylis sp. Cue (A.A. Mitchell 764)	P1	Drainage area, near granite. Located in the Cue Local Government Area	Unlikely	Old record, >30 km from survey area	17/10/1980
Dodonaea amplisemina	P4	Red-brown sandy clay on basalt and gabbro and banded ironstone or on dolerite and quartzite. Rocky hills.	Unlikely	Located on Weld Range, far from survey area.	16/08/2009
Drosera eremaea	P1	Prostrate annual, herb, flowers minute. Fl. brown/brown &yellow, Aug to Sep. Red loam or clay. Near water.	Unlikely	Located on Weld Range, far from survey area, old record	21/07/1981
Eleocharis papillosa	P3	Red clay over granite, open clay flats. Claypans.	Unlikely	Long distance from survey area, relatively old record	19/08/1999
Eremophila margarethae subsp. straight sepals (G. Cockerton & B. McLean LCH 31310)	P1	On top of banded ironstone hill found in one location on a banded ironstone hill, at Jack Hills, Meekatharra	Unlikely	Long distance >40 km from survey area	25/08/2011
Eremophila muelleriana	P3	Red sand, sandy clay, lateritic sand. Flats, sand dunes, hills.	Likely	Recorded within the Project area directly adjacent to the survey area, habitat present	7/10/2016
Eremophila obliquisepala	P3	Sand. Open hardpan plains in Meekatharra and Upper Gascoyne	Unlikely	Located >40 km from survey area	10/05/1995
Eremophila rhegos	P1	Skeletal stony loam over granite. Meekatharra and Upper Gascoyne	Unlikely	Only recorded at Mt Weld	2/08/1995
Eremophila shonae subsp*. diffusa*	P3	Stony yellow or red sandy soils. Found in the Gascoyne and Murchison IBRA regions	Unlikely	Only recorded at Mt Weld	11/06/2009
Eremophila simulans subsp*. megacalyx*	P3	Found on rangeland plains road verge with red, sandy gravel laterite.	Likely	Recorded within survey area	16/08/2009
Eremophila sp. Ironstone (G. Cockerton & B. McLean LCH 31311)	P1	Open, densely-leaved shrub, 0.3-0.6 m high. Laterite. Hills, salty places.	Unlikely	One record, over 50 km from survey area on BIF outcropping	25/08/2011
Eremophila sp. Murgoo (S.J.J. Davies s.n. 15/8/1960)	P3	Shrub, 0.5-2.3 m high, sometimes widely spreading with several stems or branches from the base. Red-orange sandy clay, orange-yellow sandy clay to clayey loam, coarse gravel, banded ironstone, laterite, quartz, basalt. Gently undulating plains, dry creek beds, hillcrests, ridges.	Unlikely	Old record, far from survey area	15/08/1960
Frankenia confusa	P4	Annual, herb.	May	Recorded during 2014 surveys however suitable habitat unlikely to be present.	19/09/1997

Appendix A2 Flora Desktop Results

Species	WA Cons. Code	Habitat[1]	Likelihood	Justification	Count Date
Goodenia berringbinensis	P4	Red sandy loam. Along watercourses.	Unlikely	Recorded >30 km from survey area	12/06/2009
Goodenia grandiflora	P1	Sandy, gravelly soils. Rocky slopes & breakaways.	Unlikely	Only recorded at Mt Weld	23/08/2006
Goodenia neogoodenia	P4	Red loam or clay. Near water.	May	recorded near (<7.5 km) from survey area, habitat may be present	19/08/1999
Grevillea inconspicua	P4	Erect shrub, 0.2-0.5 m high. Fl. white-cream, Sep. Red sandy soils.	Unlikely	Only recorded at Mt Weld	24/06/2011
Gunniopsis divisa	P3	Loam, quartz. Roadsides. IN the Murchison, Yalgoo IBRA regions	Likely	Recorded during 2014 surveys.	10/09/2016
Hemigenia exilis	P4	Prostrate herb. Fl. white, Sep to Oct. Sandy soils. Colluvial plains.	Unlikely	Recorded >40 km from survey area	24/08/2011
Hemigenia tysonii	P3	Red Sands, plains and gently undulating dunes.	Likely	Recorded during 2014 surveys, suitable habitat may be present.	8/09/2016
Hemigenia virescens	P3	Brown very rocky sand, on Beebyn and Madonga stations. In the Shire of Meekatharra	Unlikely	Recorded adjacent to Weld Range, long way from survey area	7/03/2011
Hibiscus krichauffianus	P3	Red sandy soils in disjointed populations recorded across the arid areas of Gascoyne, Wheatbelt and Nullabor Plain	Unlikely	Old record, far from survey area	/03/1981
Hibiscus sp. Nookawarra Station (S.J.J. Davies s.n. 1/3/1960)	P1	Found on breakaways in three locations within the Murchison Local Government Area	Unlikely	Recorded far from survey area, old record	26/03/1971
Homalocalyx echinulatus	P3	Shrub, to 1 m high, differs from other varieties in the linear acuminate leaves 6-20 mm long; cilia to 1.2 mm long. Fl. other, Sep to Oct. White sand, gravel. Open woodland. More common north east of Perth.	Unlikely	Recorded at Weld Range, far from survey area	13/09/2009
Indigofera eriophylla	P1	Sand on rises in the Canarvon and Murchison Local Governnement Areas	Unlikely	Recorded 25 km from survey area SW arm, habitat likely to be present	5/10/2016
Indigofera fractiflexa subsp. *augustensis*	P2	crest of banded ironstone with shallow red brown sandy loam soils.	Unlikely	Recorded >50 km from survey area on BIF	24/08/2005
Lepidium scandens	P3	Red sand, clay.	Unlikely	Old records, far from survey area	23/08/1931
Maireana murrayana	P3	Red clayey sand, dissected sandstone in the Murchison, Meekatharra and Upper Gascoyne Local Government Areas	Unlikely	Old records, within 10 km of survey area	/11/1908
Maireana prosthecochaeta	P3	Laterite. Hills, salty places in the Central Kimberley, Gascoyne and Murchison IBRA regions	May	Recorded within survey area, record date not available	-
Micromyrtus placoides	P3	Red-orange sandy clay, orange-yellow sandy clay to clayey loam, coarse gravel, banded ironstone, laterite, quartz, basalt. Gently undulating. In the Cue, Greater Geraldton and Murchison Local Government Areas	May	Recorded 11 km from survey area, habitat present in survey area	27/08/2008
Neotysonia phyllostegia	P1	Found in 1908 and 1910 on Mount Narryer	Unlikely	very old record	/09/1910
Petrophile pauciflora	P3	Decaying & dissected granite breakaways.In the inland semi-arid Midwest region of Western Australia	May	Recorded within 10 km of survey area, habitat present, old records	9/10/2016
Petrophile vana	P1	Shallow, white, gritty clay-soil pockets, laterite. Breakaways.	Unlikely	Recorded far from survey area, old records	17/09/1987
Philotheca citrina	P1	Granite breakaways in the Murchison LGA	Unlikely	Recorded within 10 km of survey area, habitat present, old records	/10/1985
Phyllanthus baeckeoides	P3	Red lateritic & sandy clay soils. Granite outcrops. In the Eastern Murchison, Shieldand Western Murchison IBRA subregions	Unlikely	Recorded at Weld Range, far from survey area	28/08/2005
Prostanthera ferricola	P3	Shallow red-brown skeletal sandy loam on banded ironstone, laterite, basalt or quartz. Gently inclined mid to upper slopes of hills, rocky crests, outcrops.	Unlikely	Recorded on Mt Weld and northern BIF hil, both far from survey area	29/08/2007
Prostanthera petrophila	P3	Lateritic soil	Unlikely	Recorded on BIF hills far from survey area,	10/09/2006
Prostanthera tysoniana	P3	Red sandy soils in the Murchison LGA	May	Habitat present, recorded ~8 km from survey area	8/09/2016
Psammomoya ephedroides	P3	Deep yellow or red sandy loams.	Unlikely	recorded far from survey area	4/10/2016
Ptilotus beardii	P3	Clayey soils. Saline flats, low breakaways.	Likely	Recorded during 2014 surveys, suitable habitat present.	14/10/2016
Ptilotus crosslandii	P3	Sandy soils. Colluvial plains in the Murchison and Upper Gascoyne LGAs	Unlikely	Recorded in survey area, extremely old record	26/02/1905
Ptilotus lazaridis	P3	Clay loam. Floodplains.	Unlikely	Recorded >70 km from survey area	/08/1985
Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	P3	Red sand. Plains.	Likely	Recorded during 2014 surveys, suitable habitat present.	13/10/2016
Seringia exastia	T	Found on the Pindan Sandplain, deep red sands	Unlikely	Old record, ~100 km from survey area	/09/1981
Solanum pycnotrichum	P2	Banded Iron outcrops and shallow dry creeklines forming shallow gully on rocky siltstone hills. Red silty clay soil.	Unlikely	habitat present within survey area, recorded within 14 km of survey area	27/08/2008
Stackhousia clementii	P3	Skeletal soils. Sandstone hills. Sparsely distributed across Northern Western Australia north or Geraldton	Unlikely	Old record, >50 km from survey area	19/06/1985
Stenanthemum patens	P1	Rocky hillsides in the Murchison IBRA region	Unlikely	Recorded at Weld Range, far from survey area	24/08/2011
Verticordia jamiesonii	P3	Sandy clay soils. Lateritic breakaways.	Likely	Recorded during 2014 surveys, suitable habitat present.	15/08/2009
Wurmbea murchisoniana	P4	Clay, sandy clay, loam. Seasonally inundated clay hollows, rock pools.	Unlikely	Recorded 83 km from survey area	25/08/1988

Appendix A2 Flora Desktop Results

Species	WA Cons. Code	Habitat[1]	Likelihood	Justification	Count Date
Wurmbea sp. Muggon (T.D. Macfarlane & R. Davis TDM 3336)	P1	Stony slope of weathered sandstone.	Unlikely	Recorded 55 km from survey area	28/05/2014

1. Habitat derived from DAWE (2020) and Florabase (WAH, 1998-) unless otherwise cited

Appendix A3 Fauna Desktop Results

Species	Common Name	Conservation Status		DBCA		PMST	Ecology	Likelihood of Occurrence
		State	Federal	Last Record	Total Records			
Actitis hypoleucos	Common Sandpiper	MI	Marine / Migratory	1980	2	+	The Common Sandpiper is widespread throughout Australia, with few important sites on the continent. They visit Australia during the non-breeding season. Preferred habitat is coastal wetlands with muddy margins or rocky shores but has also been recorded in inland wetlands and dams (DotE, 2015).	Unlikely
Apus pacificus	Fork-tailed Swift	MI	Marine / Migratory	-	-	+	The Fork-tailed Swift is almost exclusively aerial, and a non-breeding visitor to Australia (DotE, 2015). They are rarely seen roosting on land.	Unlikely
Calidris acuminata	Sharp-tailed Sandpiper	MI	Marine / Migratory	1978	3	+	The Sharp-tailed Sandpiper is a small to medium sized wader with a length of 17 to 22 cm and weighing 65g. They are widespread in Western Australia from the Pilbara region to the south-west. They prefer muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation (DotEE, 2020).	Unlikely
Calidris ferruginea	Curlew Sandpiper	CR	CE	1978	2	+	The Curlew Sandpiper is a small, slim weighing 57 g. In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. In Western Australia, they are widespread around coastal and sub coastal plains from Cape Arid to the south-west Kimberley. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas and less often recorded inland around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	May
Calidris subminuta	Long-toed Stint	MI	Marine / Migratory	1978	3	+	The Long-toed Stint is a very small sandpiper and member of the Calidridinae family. The species is characterised by its distinctive shape; a small head, long slim neck, rounded belly, short rear-end, long legs (often held flexed), short straight bill tapering to finely pointed tip, folded primaries that fall level with the tail and show little or no primary projection beyond the tertials (Higgins & Davies, 1996). In Western Australia this species is found mainly along the coast, with a few scattered inland records. It is distributed along most of the Australian coastline with large densities on the Victorian and Tasmanian coasts. The Red-necked Stint has been recorded in all coastal regions, and found inland in all states when conditions are suitable.	May
Egernia stokesii badia	Western Spiny-tailed Skink	VU	E	2013	45	+	The Western Spiny-tailed Skink belongs to a group of moderately large, rock-dwelling reptiles (Chapple, 2003). Two colour forms exist; the brown form and black form, the latter is delineated from the former by its black colouration, lack of patterning in adults and differing head and scale morphology (DotE, 2015). The black form occupies rock crevices in large, isolated rocky outcrops, typically granite (Duffield & and Bull, 2002). Crevices occupied by the black form of Western Spiny-tailed Skink are usually identifiable by a “latrine” or scat pile, resulting from regular defecation of all family members, in close proximity to the entrance (Chapple, 2003).	Likely
Falco peregrinus	Peregrine Falcon	OS	-	2011	7	-	The Peregrine Falcon is a medium-sized raptor (length 35-55cm; wingspan 80-105cm) with slate-grey back, a striking charcoal black head and face which contrast with a pale cream bib on the neck and breast (Birdlife Australia, 2020). A well-known falcon, the Peregrine inhabits a vast array of environs in Australia. Usually uncommon and migratory (Pizzey & Knight, 2007). This species lays its eggs in recesses of cliff faces, tree hollows or large abandoned nests (Bamford, 2009)	Likely
Gelochelidon nilotica	Gull-billed Tern	MI	MI	2006	12	+	The Gull-billed Tern is entirely white, except for a black crown from bill to nape, a grey back and upper wings and darker flight feathers. The iris is dark brown, bill and legs black. The sexes are similar. In non-breeding plumage, the head is mainly white, the crown streaked brownish-grey and the ear coverts are dull black. Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean.	May
Idiosoma clypeatum	Northern Shield-backed Trapdoor Spider	P3	-	2014	847	-	*Idiosoma clypeatum* is one of seven highly autapomorphic species in the polyphyletic ‘sigillate complex’. *Idiosoma clypeatum* (formerly known by WAM identification code ‘MYG018’) has a widespread distribution in Western Australia’s inland arid zone, principally throughout the Yalgoo and Murchison bioregions where it is the only known species in the nigrum-group (excluding a population of *I. formosum* from the southern Yalgoo. It extends from near Paynes Find, the Blue Hill Range, Kadji Kadji Nature Reserve, and Karara in the south, north and north-east to at least Coolcalalaya Homestead, Jack Hills, Albion Downs, Yakabindie, and Yeelirrie. This distribution seems to be strongly correlated with annual rainfall of less than 250 mm. At the southern extent of its range it abuts the northern limit of the closely related species I. kopejtkaorum, and on the Geraldton Sandplains is replaced by *I. arenaceum* and *I. kwongan* (Rix *et al.*, 2018)	Likely
Leipoa ocellata	Malleefowl	VU	VU	-	1	+	The Malleefowl is a large, ground-dwellin gbird with strong feet and a short bill. It is found principally in the semi-arid to arid zone in shrublands and low woodlands dominated by mallee and associated habitats such as such as Broombush (*Melaleuca uncinata*) and Scrub Pine (*Callitris verrucosa*). In WA Malleefowl distribution was associated with landscapes that had lower rainfall, greater amounts of mallee and shrubland that occur as large remnants, and lighter soil surface textures (Benshemesh, 2007). At a finer scale, malleefowl occurrence was associated with mallee/shrubland and thicket vegetation with woodland representing poor habitat for the species (Parsons, 2008).	Unlikely
Ninox connivens subsp. connivens	Barking Owl (southwest pop P2), Barking Owl	P2	-	-	-	-	The Barking Owl is a medium-sized hawk-owl. Hawk-owls lack the definite heart-shaped face of the tyto-owls (Birdlife Australia, 2020). Adult Barking Owls are grey-brown above, with white spots on the wings, and whitish below, heavily streaked with grey-brown. The head is almost entirely grey-brown, and the eyes are large and yellow. Barking Owls are nocturnal birds, although they may sometimes be seen hunting during the day (Birdlife Australia, 2020). Barking Owls are found in open woodlands and the edges of forests, often adjacent to farmland. They are less likely to use the interior of forested habitat. They are usually found in habitats that are dominated by eucalytpus species, and prefer woodlands and forests with a high density of large trees and particularly sites with hollows. Ninox connivens connivens occurs in eastern, south-eastern and south-western Australia (Birdlife Australia, 2020).	Unlikely

Species	Common Name	Conservation Status		DBCA		PMST	Ecology	Likelihood of Occurrence
		State	Federal	Last Record	Total Records			
Oxyura australis	Blue-billed Duck	P4	-	2009	2	-	The Blue-billed Duck is a compact diving duck with males having a large scooped bright, light blue bill. The tail is dark with stiff pointed feather tips and is usually held flat on the surface of the water except when in display (Birdlife Australia, 2019). The Blue-billed Duck is endemic to south eastern and south western Australia. It prefers deep water in large permanent wetlands and swamps with aquatic vegetation. This species of duck is fully aquatic and rarely comes onto land (OoEH, 2018)	May
Plegadis falcinellus	Glossy Ibis	MI	Marine / Migratory	2006	4	+	The Glossy Ibis is the smallest ibis known in Australia. The neck is reddish-brown and the body is a bronze-brown with a metallic iridescent sheen on the wings. The Glossy Ibis has a distinctive long, downwards curved bill that is olive-brown in colour. The facial skin is blue-grey with a white line that extends around the eyes. Within Australia, the Glossy Ibis is generally located east of the Kimberley in Western Australia and Eyre Peninsula in South Australia. The species is also known to be patchily distributed in the rest of Western Australia. The Glossy Ibis' preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation. Glossy Ibis roost in trees or shrubs usually near, but sometimes far, from water bodies (Brown *et al* ., 1982; Marchant & Higgins, 1990).	Unlikely
Rostratula australis	Australian Painted Snipe	EN	EN	2015	5	+	The Australian Painted Snipe is a stocky wading bird around 220–250 mm in length with a long pinkish bill. It has been recorded less frequently at a smaller number of more scattered locations farther west in South Australia, the Northern Territory and Western Australia. The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains.	May
Tringa glareola	Wood Sandpiper	MI	Marine / Migratory	1978	2	+	The Wood Sandpiper is a small thin wader and member of the Tringinae family. The species has a length of 19–23 cm, a wingspan of 56–57 cm and a weight of 55 g. The species has a short straight bill and long legs. The Wood Sandpiper uses well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. They are typically associated with emergent, aquatic plants or grass, and dominated by taller fringing vegetation, such as dense stands of rushes or reeds, shrubs, or dead or live trees, especially Melaleuca and River Red Gums *Eucalyptus camaldulensis* and often with fallen timber. They also frequent inundated grasslands, short herbage or wooded floodplains, where floodwaters are temporary or receding, and irrigated crops. They are also found at some small wetlands only when they are drying. This species uses artificial wetlands, including open sewage ponds, reservoirs, large farm dams, and bore drains (Higgins & Davies, 1996).	May
Tringa nebularia	Common Greenshank	MI	Marine / Migratory	2004	1	+	The Common Greenshank is a largely built wader, weighing up to 190 g for both sexes. The species is found in inland wetlands and sheltered coastal habitats (DotE, 2015). The Common Greenshank is generally absent from the Western Deserts although there are a few records from the Great Sandy Desert and the Nullarbor Plain. It occurs around most of the coast from Cape Arid in the south to Carnarvon in the north-west. In the Kimberleys it is recorded in the south-west and the north-east, with isolated records from the Bonaparte Archipelago (Higgins & Davies 1996).	May
Hypseleotris aurea	Golden Gudgeon	P2	-	-	-	-	Inhabits rocky pools amongst dense clumps of submerged water weeds and dead branches. Presumably the species has a high tolerance to increased salinity levels and water temperatures, which typically occur in the habitat during drought periods. The species is found in the Murchison and Gascoyne Rivers of south-central Western Australia.	Unlikely
Pezoporus occidentalis	Night Parrot	CR	E	-	-	-	Night parrot roosting and nesting sites are in clumps of dense vegetation, primarily old and large spinifex (Triodia) clumps, but sometimes other vegetation types. Often the vegetation in these habitats will be naturally fragmented and therefore well protected from fire. Little is known about foraging sites, but favoured sites are likely to vary across the range of the species.	Unlikely
Aspidites ramsayi (southwest subpop.)	Woma	P1	E	-	-	-	The Woma is grey-brown or golden-brown on its back with dark brown bands across its body and a yellow or white belly. Unlike other pythons, the Woma has a narrow, pointed head causing it to often be mistaken for a venomous snake. The south west Woma subpopulation is distributed from North to Yuna, south to Boddington, inland to Menzies and east to the western edge of the Nullarbor Plain (Cogger *et al* ., 1993). The species is nocturnal and primarily inhabits sandplains characterised by woodlands, shrublands, or heath, often with spinifex. but may also inhabit rocky areas as well.	Unlikely
Ogyris subterrestris petrina	Arid Bronze Azure Butterfly	CR	CE	-	-	-	At the two known extant sites where this butterfly occurs, the vegetation is mature mixed gimlet *Eucalyptus salubris / E. salmonophloia* woodlands on red-brown loam soils, with an open understorey. In addition to gimlet and salmon gum, other smooth-barked eucalyptus at these sites which have basal ant colonies include *E. capilosa wandoo* , smooth-barked *E. loxophleba lissophloia* and *E. sheathiana* . The species is dependent on a host ant species (*Camponotus* sp. nr. *terebrans)* to raise its young.	Unlikely
Sminthopsis longicaudata	Long-Tailed Dunnart	P4	-	-	-	-	The Long-tailed Dunnart is unique among dunnarts in that its tail is twice the length of the head and body. They are grey with a very pale underbelly, white legs and feet. The head is flattened and it has a long snout and large black eyes. Adults weigh 15-20 g. *Sminthopsis longicaudata* inhabits exposed rock and stony soils with hummock grasses and shrubs. Flat-topped hills, lateritic plateaus, sandstone ranges and breakaways. Sparse mulga over spinifex. The species has been recorded in distjunct populations across arid Australia with populations recorded in the southern Canarvon Basin.	May

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Appendix B

Flora Species by Family by Community Matrix

Appendix B - Flora Species by Family by Community Matrix

Family	Taxon	Vegetation Community										
		AaEcPo	AcAsTd	AfEfPo	AfSa	AiAbSa	AiAtEf	AiTdPb	ApAgEf	ArCc	AvEp	Granite
Aizoaceae												
	Trianthema pilosa				x				x			
Amaranthaceae												
	Ptilotus aervoides	x		x							x	
	Ptilotus drummondii	x	x	x			x	x				
	Ptilotus obovatus	x		x	x		x	x	x	x	x	x
	Ptilotus schwartzii	x		x								
	Ptilotus stirlingii								x		x	
Apocynaceae												
	Marsdenia australis				x				x			
Asteraceae												
	Calocephalus knappii		x									
	Cephalipterum drummondii			x								
	Gnephosis arachnoides			x								
	Gnephosis eriocephala										x	
	Gnephosis tenuissima	x		x			x	x				x
	Helipterum craspedioides								x			
	Myriocephalus rudallii						x					
	Pluchea rubelliflora					x						
	Pogonolepis stricta	x									x	
	Rhodanthe chlorocephala subsp. *splendida*				x							
	*Sonchus oleraceus**		x									
Boraginaceae												
	Heliotropium curassavicum		x									
Boryaceae												
	Borya sphaerocephala							x				
Brassicaceae												
	Lepidium oxytrichum			x			x					
Campanulaceae												
	Wahlenbergia tumidifructa		x									
Caryophyllaceae												
	*Spergula pentandra**										x	
Casuarinaceae												
	Allocasuarina campestris		x			x					x	
Chenopodiaceae												
	?Enchylaena tomentosa			x								
	Atriplex ?amnicola										x	
	Maireana convexa				x							
	Maireana planifolia	x		x	x		x	x	x		x	x
	Rhagodia eremaea			x	x	x			x			x
	Sclerolaena cuneata				x			x			x	
	Sclerolaena densiflora		x	x								
	Sclerolaena gardneri			x	x							
	Sclerolaena recurvicupsis										x	
	Tecticornia ?indica		x									
	Tecticornia halocnemoides										x	

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Family	Taxon	Vegetation Community										
		AaEcPo	AcAsTd	AfEfPo	AfSa	AiAbSa	AiAtEf	AiTdPb	ApAgEf	ArCc	AvEp	Granite
	Tecticornia indica										x	
Convolvulaceae												
	*Cuscuta planiflora**										x	
Cyperaceae												
	Cyperus gymnocaulos					x						
Euphorbiaceae												
	Euphorbia ?boophthona								x			
	Euphorbia boophthona	x			x				x	x		
	Euphorbia drummondii		x									
Fabaceae												
	Acacia ?aptaneura						x					
	Acacia ?caesaneura			x			x					
	Acacia ?distans			x								
	Acacia ?aneura	x		x				x				x
	Acacia ?cuthbertsonii			x								
	Acacia aneura	x		x					x		x	
	Acacia aptaneura	x		x				x		x		
	Acacia aulacophylla	x					x	x		x		
	Acacia burkittii		x				x					
	Acacia caesaneura	x		x	x		x	x		x		
	Acacia caesaneura (narrow phyllode variant)						x		x			
	acacia celastrocarpa						x					
	Acacia collegialis			x						x		
	Acacia craspedocarpa						x					
	Acacia cuthbertsonii	x		x								
	Acacia cuthbertsonii subsp. *cuthbertsonii*			x			x					x
	Acacia fuscaneura	x		x	x		x	x				
	Acacia grasbyi	x		x	x		x		x		x	x
	Acacia incurvaneura	x		x			x	x		x		x
	Acacia kempeana	x		x					x		x	
	Acacia oswaldii			x	x		x		x			
	Acacia palustris				x							
	Acacia pruinocarpa	x		x			x					
	Acacia pteraneura								x		x	
	Acacia quadrimarginea			x								
	Acacia ramulosa var. *linophylla*								x			
	Acacia rhodophloia									x		
	Acacia sclerosperma subsp. *sclerosperma*		x			x					x	
	Acacia synchronicia				x							
	Acacia tetragonophylla	x	x	x	x		x	x	x		x	x
	Acacia victoriae subsp. *victoriae*		x	x			x				x	
	Chorizema ?racemosum			x		x						
	Mirbelia rhagodioides						x	x				
	Senna artemisioides subsp. *filifolia*	x	x			x					x	x
	Senna artemisioides subsp. *helmsii*	x	x	x	x	x	x		x	x	x	

Appendix B - Flora Species by Family by Community Matrix

Family	Taxon	Vegetation Community										
		AaEcPo	AcAsTd	AfEfPo	AfSa	AiAbSa	AiAtEf	AiTdPb	ApAgEf	ArCc	AvEp	Granite
	Senna artemisioides subsp. *oligophylla*	x	x	x	x						x	x
	Senna artemisioides subsp. *petiolaris*	x		x	x		x		x			
	Senna sp. Meekatharra (E. Bailey 1-26)	x	x	x	x		x	x	x		x	x
	Senna stricta										x	
Frankeniaceae												
	Frankenia pauciflora var. *pauciflora*										x	
Geraniaceae												
	*Erodium aureum**			x					x		x	
Goodeniaceae												
	Goodenia berardiana										x	
	Goodenia mimuloides										x	
	Scaevola spinescens	x	x	x		x	x				x	
Hemerocallidaceae												
	Dianella revoluta			x								
Lamiaceae												
	Spartothamnella teucriiflora						x					
Loranthaceae												
	Amyema fitzgeraldii					x	x					
	Amyema nestor		x									
Malvaceae												
	?Androcalva luteiflora				x		x					
	Alogyne pinoniana											x
	Alyogyne pinoniana									x		
	Corchorus crozophorifolius	x								x		
	Sida ?calyxhymenia				x							x
	Sida sp. dark green fruits (S. van Leeuwen 2260)			x								
Myoporaceae												
	Eremophila compacta						x					
	Eremophila compacta subsp. *compacta*				x		x					
	Eremophila forrestii subsp. *forrestii*			x	x		x		x	x	x	
	Eremophila fraseri subsp. *parva*			x	x		x		x			
	Eremophila latrobei			x	x		x		x			
	Eremophila mackinlayi subsp. *spathulata*				x							
	Eremophila pantonii						x					
	Eremophila phyllopoda						x					
	Eremophila phyllopoda subsp. *phyllopooda*						x					
	Eremophila platycalyx						x					
	Eremophila platycalyx subsp. *platycalyx*									x		
	Eremophila pterocarpa subsp. *pterocarpa*										x	
	Eremophila serrulata			x								
	Eremophila shonae subsp. *shonae*				x							
	Eremophila spuria								x			
Myrtaceae												
	Aluta aspera subsp. *hesperia*	x										
	Calytrix desolata											x
	Chamelaucium pauciflorum								x			

Appendix B - Flora Species by Family by Community Matrix

Family	Taxon	Vegetation Community									
		AaEcPo	AcAsTd	AfEfPo	AfSa	AiAbSa	AiAtEf	AiTdPb	ApAgEf	ArCc	AvEp	Granite
	Cheyniana microphylla			x								x
	Eucalyptus mannensis					x						
	Eucalyptus victrix					x	x					
	Melaleuca stereophloia		x									
	Micromyrtus sulphurea							x				
	Thryptomene decussata	x		x				x		x		
Nyctaginaceae		x										x
	Boerhavia coccinea	x										x
Phyllanthaceae		x										
	Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	x										
Poaceae												
	Aristida contorta			x								
	Aristida sp.	x		x			x					
	Cymbopogon ambiguus							x		x		x
	Eragrostis eriopoda						x	x	x			
	Eriachne sp.			x								
	Tripogon loliiformis						x					
Portulacaceae												
	Calandrinia polymorpha								x			
	Portulaca oleracea		x								x	
Primulaceae												
	Samolus repens var. *floribundus*		x								x	
Proteaceae												
	Grevillea berryana	x					x				x	
	Grevillea deflexa			x	x		x	x				
	Grevillea hakeoides subsp. *stenophylla*		x									
	Grevillea nematophylla subsp. *supraplana*										x	
	Hakea lorea subsp. *lorea*			x								
	Hakea preissii			x				x	x		x	x
	Hakea recurva subsp. *arida*			x	x							
	Petrophile pauciflora											x
Rubiaceae												
	Psydrax rigidula	x		x				x				
Santalaceae												
	Santalum acuminatum	x										
	Santalum lanceolatum										x	
	Santalum spicatum						x					x
Sapindaceae												
	?Dodonaea viscosa						x					
	Dodonaea pachyneura			x				x				
Scrophulariaceae												
	Eremophila compacta	x		x			x	x			x	
	Eremophila exilifolia			x								x
	Eremophila forrestii	x		x			x	x				
	Eremophila fraseri	x		x			x	x				x
	Eremophila gilesii	x										

Appendix B - Flora Species by Family by Community Matrix

Family	Taxon	Vegetation Community									
		AaEcPo	AcAsTd	AfEfPo	AfSa	AiAbSa	AiAtEf	AiTdPb	ApAgEf	ArCc	AvEp	Granite
	Eremophila glutinosa			x								
	Eremophila latrobei			x			x					
	Eremophila latrobei subsp. *latrobei*			x	x		x	x		x		x
	Eremophila longifolia			x			x				x	
	Eremophila mackinlayi subsp. *spathulata*			x								
	Eremophila maitlandii						x	x				x
	Eremophila pterocarpa			x								
	Eremophila simulans	x								x		
Solanaceae												
	Nicotiana occidentalis subsp. *occidentalis*		x									
	Solanum lasiophyllum	x		x	x		x	x	x	x	x	x
Zygophyllaceae												
	Zygophyllum aurantiacum										x	
	Zygophyllum simile										x	

Appendix C

Flora Site Data

Appendix C – Flora Site Data

Site No: LC V01 **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: Sand, Clay

Topography: MS

Soil Description: RedDry

Outcrops: Granite, Quartz

Fire: 10+

Condition: Very Good

Condition Notes: Cattle, dead plants

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia incurvaneura	500	2
	Eremophila forrestii subsp. *forrestii*	50	0.1
	Senna artemisioides subsp. *petiolaris*	70	0.05
	Eremophila fraseri subsp. *parva*	100	0.1
	Cephalipterum drummondii	5	0.01

Taxon		Ht (cm)	Foliage (%)
	Ptilotus aervoides	1	0.01
	Ptilotus obovatus	30	0.5
	Sclerolaena densiflora	10	0.05
	Sclerolaena gardneri	20	0.01
	Senna artemisioides subsp. *helmsii*	110	0.1
	Senna artemisioides subsp. *oligophylla*	50	0.05
	Senna sp. Meekatharra (E. Bailey 1-26)	40	2
	Solanum lasiophyllum	20	0.01
	*Erodium aureum**	5	0.01

Site No: LC V02	**Date**: 2014	[redacted]	[redacted]

Type: Quadrat

Soil Types: Sand, Clay

Topography: Plains

Soil Description: RedDry

Outcrops:

Fire: 10+

Condition: Very Good

Condition Notes: Dead plants

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia tetragonophylla	200	0.1
	?Enchylaena tomentosa	10	0.01
	Acacia fuscaneura	600	5
	Acacia fuscaneura	500	0.5
	Acacia ?cuthbertsonii	60	0.02
	Eremophila forrestii subsp. *forrestii*	160	10
	Eriachne sp.	20	0.01
	Hakea recurva subsp. *arida*	250	0.2

Taxon		Ht (cm)	Foliage (%)
	Maireana planifolia	30	0.01
	Gnephosis tenuissima	1	0.01
	Ptilotus obovatus	40	0.01
	Ptilotus drummondii	30	0.1
	Rhagodia eremaea	200	0.05
	Scaevola spinescens	180	0.1
	Senna artemisioides subsp. *helmsii*	200	1
	Senna sp. Meekatharra (E. Bailey 1-26)	200	0.1
	Solanum lasiophyllum	10	0.01

Site No: LC V03 **Date**: 2014 [redacted]

Type: Quadrat **Soil Types**: Sand, Clay

Topography: Plains **Soil Description**: RedDry

Outcrops: **Fire**: 10+

Condition: Very Good **Condition Notes**: Dead plants, cattle

Vegetation Type: ApAgEf

Vegetation Description: *Acacia pteraneura* low woodland to open woodland over *Acacia grasbyi* and *Acacia tetragonophylla* tall sparse shrubland over *Eremophila forrestii* subsp. *forrestii*, *Senna artemisioides* subsp. *helmsii* and *Eremophila fraseri* subsp. *parva* mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia oswaldii	200	2
	Acacia tetragonophylla	200	0.2
	Acacia ramulosa var. *linophylla*	400	0.3
	Acacia pteraneura	500	8
	Chamelaucium pauciflorum	25	0.01
	Eremophila forrestii subsp. *forrestii*	50	2
	Senna artemisioides subsp. *petiolaris*	20	0.01
	Eremophila fraseri subsp. *parva*	60	0.1
	Eremophila forrestii subsp. *forrestii*	50	2

Taxon		Ht (cm)	Foliage (%)
	Eremophila spuria	50	0.02
	Euphorbia boophthona	40	0.05
	Maireana planifolia	15	0.01
	Ptilotus obovatus	20	0.1
	Rhagodia eremaea	70	0.01
	Senna artemisioides subsp. *helmsii*	100	1
	Senna sp. Meekatharra (E. Bailey 1-26)	130	2
	Solanum lasiophyllum	40	0.2
	Trianthema pilosa	1	0.1
	Marsdenia australis		0.01

Site No: LC V04 **Date**: 2014 [redacted]

Type: Quadrat **Soil Types**: Clay

Topography: Plains **Soil Description**: RedDry

Outcrops: **Fire**: 10+

Condition: Very Good **Condition Notes**: Dead plants

Vegetation Type: AfSa

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and occasional *Acacia pruinocarpa* low open woodland over *Senna artemisioides* subsp. *helmsii*, *Acacia tetragonophylla* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid to tall sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia fuscaneura	600	10
	Acacia oswaldii	150	0.2
	Acacia tetragonophylla	200	0.5
	Eremophila forrestii subsp. *forrestii*	40	0.01
	Senna artemisioides subsp. *petiolaris*	100	0.05
	Eremophila fraseri subsp. *parva*	30	0.01
	Eremophila latrobei	40	0.2
	Euphorbia boophthona	50	0.01
	Grevillea deflexa	50	0.04

Taxon		Ht (cm)	Foliage (%)
	Hakea recurva subsp. *arida*	100	0.04
	?Androcalva luteiflora	70	0.01
	Ptilotus obovatus	30	0.1
	Senna artemisioides subsp. *helmsii*	140	2
	Senna sp. Meekatharra (E. Bailey 1-26)	40	0.1
	Solanum lasiophyllum	60	0.03
	Marsdenia australis		0.01

Site No: LC V05 **Date**: 2014 [redacted]

Type: Quadrat **Soil Types**: Sand, Clay

Topography: Plains **Soil Description**: RedDry

Outcrops: **Fire**: 10+

Condition: Very Good **Condition Notes**: Cattle, dead plants

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia fuscaneura	400	3
	Acacia oswaldii	180	0.2
	Acacia fuscaneura	700	4
	Acacia tetragonophylla	200	0.1
	Acacia caesaneura (narrow phyllode variant)	60	0.05
	Eragrostis eriopoda	10	0.1
	Eremophila compacta subsp. *compacta*	50	1
	Eremophila forrestii subsp. *forrestii*	60	0.5

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii subsp. *forrestii*	240	0.5
	Tripogon loliiformis	6	0.01
	Mirbelia rhagodioides	40	0.01
	Senna artemisioides subsp. *helmsii*	160	0.5
	Senna sp. Meekatharra (E. Bailey 1-26)	50	0.2

Site No: LE V02 **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: Sand, Clay

Topography: Plains

Soil Description: Red, scattered rocksDry

Outcrops: Granite, Quartz

Fire: 10+

Condition: Very Good

Condition Notes: Dead plants

Vegetation Type: AfSa

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and occasional *Acacia pruinocarpa* low open woodland over *Senna artemisioides* subsp. *helmsii*, *Acacia tetragonophylla* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid to tall sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia fuscaneura	400	4
	Acacia oswaldii	130	0.2
	Acacia grasbyi	160	1
	Acacia tetragonophylla	130	0.5
	Acacia palustris	110	0.02
	Senna artemisioides subsp. *petiolaris*	60	1
	Eremophila fraseri subsp. *parva*	50	0.1
	Eremophila forrestii subsp. *forrestii*	110	0.1
	Eremophila shonae subsp. *shonae*	100	3

Taxon		Ht (cm)	Foliage (%)
	Eremophila mackinlayi subsp. *spathulata*	60	0.1
	Rhodanthe chlorocephala subsp. *splendida*	7	0.02
	Maireana convexa	50	0.01
	Maireana planifolia	25	0.01
	Ptilotus obovatus	30	0.1
	Sclerolaena gardneri	10	0.01
	Senna artemisioides subsp. *helmsii*	130	6
	Senna sp. Meekatharra (E. Bailey 1-26)	100	0.5
	Sida ?calyxhymenia	40	0.01
	Solanum lasiophyllum	40	0.02
	Trianthema pilosa	1	0.01

Site No: LE V03 **Date**: 2014 [redacted]

Type: Quadrat **Soil Types**: Clay

Topography: Flat **Soil Description**: RedDry

Outcrops: **Fire**: 10+

Condition: Very Good **Condition Notes**: Dead plants

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland

Taxon		Ht (cm)	Foliage (%)
	Acacia fuscaneura	400	0.3
	Acacia incurvaneura	600	4
	Acacia oswaldii	400	0.5
	Acacia tetragonophylla	200	3
	Acacia cuthbertsonii subsp. *cuthbertsonii*	60	0.05
	Senna artemisioides subsp. *petiolaris*	30	0.01
	Eremophila forrestii subsp. *forrestii*	40	0.1
	Eremophila fraseri subsp. *parva*	200	0.3

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii subsp. *forrestii*	100	2
	Eremophila latrobei	50	0.05
	Eremophila serrulata	120	0.01
	Grevillea deflexa	40	0.1
	Maireana planifolia	10	0.01
	Rhagodia eremaea	130	0.1
	Senna artemisioides subsp. *helmsii*	130	0.2
	Senna sp. Meekatharra (E. Bailey 1-26)	100	0.1
	Solanum lasiophyllum	40	0.03

Site No: LE V05_rapid **Date**: 2014 [redacted]

Type: Quadrat

Topography: Outcrop

Outcrops: Granite

Condition: Very Good

Vegetation Type: ArCc

Soil Types: Sand, loam

Soil Description: Light Brown OrangeDry

Fire: 10+

Condition Notes:

Vegetation Description: *Acacia rhodophloia* low open woodland over *Corchorus crozophorifolius*, *Cymbopogon ambiguus* and *Eremophila platycalyx* subsp. *platycalyx* mixed low to mid shrub and grassland.

	Taxon	Ht (cm)	Foliage (%)
	Acacia rhodophloia	400	10
	Corchorus crozophorifolius	40	2
	Cymbopogon ambiguus	40	1
	Eremophila forrestii subsp. *forrestii*	150	5
	Eremophila platycalyx subsp. *platycalyx*	150	0.5
	Euphorbia boophthona	30	0.5

Taxon		Ht (cm)	Foliage (%)
	Alyogyne pinoniana	50	1
	Ptilotus obovatus	50	3
	Senna artemisioides subsp. *helmsii*	70	2
	Solanum lasiophyllum	50	1
	Thryptomene decussata	120	0.1

Site No: LN V03 **Date**: 2014 [redacted]

Type: Quadrat **Soil Types**: Clay

Topography: Flat **Soil Description**: RedDry

Outcrops: **Fire**: 10+

Condition: Very Good **Condition Notes**: Dead plants, evidence of cattle

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia craspedocarpa	350	6
	Acacia fuscaneura	400	0.1
	Acacia incurvaneura	600	10
	Acacia tetragonophylla	300	5
	Eremophila phyllopoda subsp. *phyllopooda*	200	0.1
	Eremophila platycalyx	320	0.1
	Gnephosis tenuissima	5	0.01
	Myriocephalus rudallii	10	0.01

Site No: LN V04 **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: S

Topography: Drainage

Soil Description: Beigey redDry

Outcrops: Granite

Fire: 10+

Condition: Very Good

Condition Notes: Dead plants

Vegetation Type: AcAsTd

Vegetation Description: *Allocasuarina campestris* low to mid woodland over *Acacia sclerosperma* subsp. *sclerosperma*, *Exocarpos aphyllus* and *Scaevola spinescens* mid to tall open shrubland over *Tecticornia doliiformis*, *Atriplex amnicola* and *Tecticornia ?indica* mid chenopod shrubland.

	Taxon	Ht (cm)	Foliage (%)
	Acacia sclerosperma subsp. *sclerosperma*	300	1
	Acacia tetragonophylla	300	1
	Acacia burkittii	800	10
	Acacia victoriae subsp. *victoriae*	400	0.5
	Allocasuarina campestris	1000	30
	Amyema nestor		0.1
	Euphorbia drummondii	5	0.02
	Grevillea hakeoides subsp. *stenophylla*	400	0.5

Taxon		Ht (cm)	Foliage (%)
	Tecticornia ?indica	20	0.01
	Heliotropium curassavicum	20	0.1
	Samolus repens var. *floribundus*	40	0.01
	Melaleuca stereophloia	700	2
	Nicotiana occidentalis subsp. *occidentalis*	30	0.01
	Nicotiana occidentalis subsp. *occidentalis*	50	0.01
	Calocephalus knappii	3	0.01
	Portulaca oleracea	5	0.01
	Ptilotus drummondii	30	0.1
	Scaevola spinescens	40	0.2
	Sclerolaena densiflora	15	0.01
	Senna artemisioides subsp. *filifolia*	200	0.2
	Senna artemisioides subsp. *helmsii*	5	0.02
	Senna artemisioides subsp. *oligophylla*	40	0.02
	Senna sp. Meekatharra (E. Bailey 1-26)	6	0.02
	*Sonchus oleraceus**	40	0.01
	Wahlenbergia tumidifructa	20	0.01

Site No: LN V05 **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: Clay

Topography: Flat

Soil Description: RedDry

Outcrops: Iron, Quartz

Fire: 10+

Condition: Very Good

Condition Notes: Dead plants

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	?Dodonaea viscosa	50	0.01
	Acacia fuscaneura	500	0.3
	Acacia incurvaneura	600	8
	Acacia oswaldii	250	0.2
	Acacia pruinocarpa	800	
	Acacia grasbyi	160	0.1
	Acacia tetragonophylla	200	1
	Acacia caesaneura (narrow phyllode variant)	160	0.1

Taxon		Ht (cm)	Foliage (%)
	?Androcalva luteiflora	30	0.1
	Eremophila fraseri subsp. *parva*	130	1.5
	Eremophila latrobei	20	0.01
	Eremophila phyllopoda	60	0.2
	Eremophila compacta	100	0.1
	Grevillea deflexa	60	0.01
	Maireana planifolia	15	
	Senna artemisioides subsp. *helmsii*	100	0.2
	Senna sp. Meekatharra (E. Bailey 1-26)	180	0.1
	Spartothamnella teucriiflora	70	0.02

Site No: LN V07 **Date**: 2014 [redacted]

Type: Quadrat **Soil Types**: Clay

Topography: Flat **Soil Description**: RedDry

Outcrops: **Fire**: 10+

Condition: Very Good **Condition Notes**: Cattle, dead plants

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia craspedocarpa	200	1
	Acacia caesaneura (narrow phyllode variant)	500	1
	Acacia incurvaneura	600	6
	Acacia oswaldii	200	1
	Acacia pruinocarpa	700	1
	Acacia tetragonophylla	200	2
	Acacia victoriae subsp. *victoriae*	600	1
	Santalum spicatum	400	0.2

Taxon		Ht (cm)	Foliage (%)
	Eremophila fraseri subsp. *parva*	150	0.3
	Eremophila latrobei	20	0.01
	Ptilotus obovatus	40	0.01
	Senna artemisioides subsp. *helmsii*	20	0.05
	Senna sp. Meekatharra (E. Bailey 1-26)	120	1
	Solanum lasiophyllum	30	0.01

Site No: LN V08 **Date**: 2014 [redacted]

Type: Quadrat **Soil Types**: Clay

Topography: Flat **Soil Description**: RedDry

Outcrops: **Fire**: 10+

Condition: Very Good **Condition Notes**: Cattle, dead plants

Vegetation Type: AfSa

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and occasional *Acacia pruinocarpa* low open woodland over *Senna artemisioides* subsp. *helmsii*, *Acacia tetragonophylla* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid to tall sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia fuscaneura	600	2
	Acacia fuscaneura	500	1
	Acacia synchronicia	200	1
	Acacia tetragonophylla	200	1
	Eremophila forrestii subsp. *forrestii*	20	0.1
	Eremophila compacta subsp. *compacta*	40	0.05
	Maireana planifolia	20	0.01
	Ptilotus obovatus	20	0.1
	Rhagodia eremaea	30	0.02

Taxon		Ht (cm)	Foliage (%)
	Sclerolaena cuneata	10	0.01
	Senna artemisioides subsp. *helmsii*	110	10
	Senna artemisioides subsp. *oligophylla*	50	2
	Senna sp. Meekatharra (E. Bailey 1-26)	50	0.1
	Solanum lasiophyllum	20	0.01

Site No: LS V04 **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: Sand, loam

Topography: Flat, Plains

Soil Description: Red-BrownDry

Outcrops:

Fire: 10+

Condition: Very Good

Condition Notes: No weeds observed, however bare ground due to perhaps a combination of reduced soil profile, grazing and lack of frequent rainfall.

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia craspedocarpa	400	30
	Acacia victoriae subsp. *victoriae*	100	0
	Acacia tetragonophylla	350	5
	Eremophila fraseri subsp. *parva*	120	1

Taxon		Ht (cm)	Foliage (%)
	Eremophila pantonii	120	0
	Grevillea berryana	500	0
	Scaevola spinescens	150	2
	Senna artemisioides subsp. *helmsii*	100	2

Site No: LS V05 **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: Sand, loam

Topography: Flat, Plains

Soil Description: Red-brownDry

Outcrops:

Fire: 10+

Condition: Very Good

Condition Notes: Area appears to be more heavily grazed. Hardwash plain with minimal soil.

Vegetation Type: AvEp

Vegetation Description: *Acacia victoriae* subsp. *victoriae*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia tetragonophylla* tall shrubland over *Eremophila pterocarpa* subsp. *pterocarpa*, *Senna* sp. Meekatharra (E. Bailey 1-26) and *Atriplex amnicola* mixed chenopod shrubland

Taxon		Ht (cm)	Foliage (%)
	Zygophyllum aurantiacum	10	1
	Acacia victoriae subsp. *victoriae*	300	10
	Acacia tetragonophylla	400	20
	Pogonolepis stricta	4	0.1
	Atriplex ?amnicola	100	5

Taxon		Ht (cm)	Foliage (%)
	*Cuscuta planiflora**	1	0.01
	Eremophila pterocarpa subsp. *pterocarpa*	200	10
	*Erodium aureum**	5	0.1
	Frankenia pauciflora var. *pauciflora*	30	0
	Goodenia berardiana	5	0.1
	Goodenia mimuloides	4	0.1
	Grevillea berryana	700	2
	Portulaca oleracea	2	1
	Ptilotus obovatus	30	0.5
	Ptilotus aervoides	1	0.01
	Ptilotus stirlingii	5	0.01

Site No: LS V06 **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: Sand, loam

Topography: Plains

Soil Description: Red-BrownDry

Outcrops:

Fire: 10+

Condition: Very Good

Condition Notes: Area has been heavily used by livestock. Many dead stag trees and shrubs

Vegetation Type: ApAgEf

Vegetation Description: *Acacia pteraneura* low woodland to open woodland over *Acacia grasbyi* and *Acacia tetragonophylla* tall sparse shrubland over *Eremophila forrestii* subsp. *forrestii*, *Senna artemisioides* subsp. *helmsii* and *Eremophila fraseri* subsp. *parva* mid shrubland

	Taxon	Ht (cm)	Foliage (%)
	Acacia aneura	600	5
	Acacia caesaneura (narrow phyllode variant)	200	2
	Acacia pteraneura	500	3
	Acacia kempeana	250	1
	Acacia tetragonophylla	300	5
	Eremophila forrestii subsp. *forrestii*	40	1
	Eremophila fraseri subsp. *parva*	120	2
	Eremophila latrobei	30	0.5
	Ptilotus obovatus	30	1

Taxon		Ht (cm)	Foliage (%)
	Senna artemisioides subsp. *helmsii*	170	1

Site No: LS V06 **Date**: 2014 [redacted]

Type: Quadrat **Soil Types**: Sand, loam

Topography: Flat, Plains **Soil Description**: Red-BrownDry

Outcrops: **Fire**: 10+

Condition: Very Good **Condition Notes**:

Vegetation Type:

Vegetation Description:

Taxon		Ht (cm)	Foliage (%)
	Acacia pteraneura		5
	Acacia grasbyi	250	7
	Acacia ramulosa var. *linophylla*	400	1
	Acacia tetragonophylla	150	1
	Calandrinia polymorpha	2	1
	Helipterum craspedioides	7	0.1

Taxon		Ht (cm)	Foliage (%)
	Eragrostis eriopoda	20	0.5
	Eremophila forrestii subsp. *forrestii*	120	5
	Eremophila forrestii subsp. *forrestii*	50	0.1
	*Erodium aureum**	5	1
	Euphorbia ?boophthona	40	0.3
	Hakea preissii	300	1
	Maireana planifolia	30	0.5
	Ptilotus obovatus	40	0.5
	Ptilotus stirlingii	7	0.1
	Senna artemisioides subsp. *helmsii*	100	2
	Solanum lasiophyllum	40	1

Site No: LS V07 **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: Sand, loam

Topography: Flat, Drainage

Soil Description: Red-BrownDry

Outcrops:

Fire: 10+

Condition: Very Good

Condition Notes:

Vegetation Type: AvEp

Vegetation Description: *Acacia victoriae* subsp. *victoriae*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia tetragonophylla* tall shrubland over *Eremophila pterocarpa* subsp. *pterocarpa*, *Senna* sp. Meekatharra (E. Bailey 1-26) and *Atriplex amnicola* mixed chenopod shrubland

Taxon		Ht (cm)	Foliage (%)
	Acacia aneura	700	5
	Acacia sclerosperma subsp. *sclerosperma*	180	1
	Acacia kempeana	170	1
	Acacia victoriae subsp. *victoriae*	200	2
	Acacia tetragonophylla	200	2

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii subsp. *forrestii*	140	5
	Eremophila pterocarpa subsp. *pterocarpa*	150	1
	Pogonolepis stricta	2	0.5
	Hakea preissii	50	0.1
	Sclerolaena recurvicupsis	15	0.2
	Gnephosis eriocephala	2	0.1
	Ptilotus stirlingii	2	0.5
	Ptilotus stirlingii	2	0.5
	Sclerolaena cuneata	15	0.2
	Senna artemisioides subsp. *filifolia*	60	1
	Senna artemisioides subsp. *helmsii*	100	2
	Senna sp. Meekatharra (E. Bailey 1-26)	100	10
	Solanum lasiophyllum	30	0.1

Site No: LS V09_rapid **Date**: 2014 [redacted]

Type: Quadrat

Soil Types: Sandy clay loam

Topography: Drainage

Soil Description: Light BrownMoist

Outcrops:

Fire: 10+

Condition: Good

Condition Notes: Waterway is heavily used by cattle with frequent pugging and soil disturbance

Vegetation Type: AvEp

Vegetation Description: *Acacia victoriae* subsp. *victoriae*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia tetragonophylla* tall shrubland over *Eremophila pterocarpa* subsp. *pterocarpa*, *Senna* sp. Meekatharra (E. Bailey 1-26) and *Atriplex amnicola* mixed chenopod shrubland

Taxon		Ht (cm)	Foliage (%)
	Allocasuarina campestris	700	40
	Samolus repens var. *floribundus*	40	0.1
	*Spergula pentandra**	10	0.5
	Zygophyllum simile	15	10
	Tecticornia halocnemoides	40	80

Taxon		Ht (cm)	Foliage (%)
	Tecticornia halocnemoides	20	1
	Tecticornia indica	30	5

Site No: LS V11	**Date**: 2014	[redacted]	[redacted]

Type: Quadrat

Soil Types: Loam

Topography: Flat, Plains

Soil Description: Red brownDry

Outcrops:

Fire: 10+

Condition: Very Good

Condition Notes:

Vegetation Type: AvEp

Vegetation Description: *Acacia victoriae* subsp. *victoriae*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia tetragonophylla* tall shrubland over *Eremophila pterocarpa* subsp. *pterocarpa*, *Senna* sp. Meekatharra (E. Bailey 1-26) and *Atriplex amnicola* mixed chenopod shrubland

Taxon		Ht (cm)	Foliage (%)
	Acacia victoriae subsp. *victoriae*	250	2
	Acacia sclerosperma subsp. *sclerosperma*	400	20
	Acacia victoriae subsp. *victoriae*	350	1
	Acacia tetragonophylla	400	2
	Atriplex ?amnicola	40	0.5
	Zygophylla aurantiacus	10	0.1
	Grevillea berryana	700	1
	Grevillea nematophylla subsp. *supraplana*	800	2
	Ptilotus obovatus		0.1
	*Spergula pentandra**	10	0.1
	Santalum lanceolatum	600	1
	Scaevola spinescens	50	0.5
	Senna sp. Meekatharra (E. Bailey 1-26)	50	1

Site No: 01R **Date**: 20/11/2020 [redacted]

Type: Releve

Soil Types: clay, sand on surface

Topography: flat

Surface: bare 95%

Outcrops: none

Litter: twigs sticks

Condition: Very Good

Condition Notes: climate, grazing

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia incurvaneura	400	5
	Acacia tetragonophylla	150	0.5
	Aristida contorta	5	0.1
	Eremophila fraseri	100	1
	Eremophila longifolia	50	0.5

Taxon		Ht (cm)	Foliage (%)
	Lepidium oxytrichum	2	0.1
	Maireana planifolia	30	1
	Ptilotus drummondii	10	0.1
	Ptilotus obovatus	30	1
	Senna artemisioides subsp. *oligophylla*	100	1
	Sida sp. dark green fruits (S. van Leeuwen 2260)	10	0.1
	Solanum lasiophyllum	30	0.1

Site No: 03R **Date**: 20/11/2020 [redacted]

Type: Releve

Soil Types: clay hard

Topography: flat

Surface: rocky quarts, peso and granite

Outcrops: none

Litter: none

Condition: very good

Condition Notes:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia fuscaneura		
	Acacia incurvaneura		
	Acacia victoriae subsp. *victoriae*	300	0.1
	Eremophila fraseri	80	2
	Eremophila longifolia	80	1

Taxon		Ht (cm)	Foliage (%)
	Maireana planifolia	5	0.1
	Ptilotus obovatus	30	0.1
	Rhagodia eremaea		
	Senna artemisioides subsp. *helmsii*	80	0.1
	Senna artemisioides subsp. *oligophylla*	80	0.1
	Senna artemisioides subsp. *petiolaris*	80	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)		
	Solanum lasiophyllum		0.1

Site No: 02R **Date**: 20/11/2020 [redacted]

Type: Releve

Soil Types: sand over clay

Topography: drainage

Surface: bare 80%, some quarts patches

Outcrops: none

Litter: twigs sticks

Condition: very good

Condition Notes:

Vegetation Type: AvEp

Vegetation Description: *Acacia victoriae* subsp. *victoriae*, *Acacia sclerosperma* subsp. *sclerosperma* and *Acacia tetragonophylla* tall shrubland over *Eremophila pterocarpa* subsp. *pterocarpa*, *Senna* sp. Meekatharra (E. Bailey 1-26) and *Atriplex amnicola* mixed chenopod shrubland

Taxon		Ht (cm)	Foliage (%)
	Acacia grasbyi	400	0.5
	Acacia kempeana	100	1
	Acacia pteraneura	150	0.1
	Acacia sclerosperma subsp. *sclerosperma*	200	2
	Acacia sclerosperma subsp. *sclerosperma*	200	0.1

Taxon		Ht (cm)	Foliage (%)
	Acacia tetragonophylla	200	2
	Acacia victoriae subsp. *victoriae*	300	4
	Eremophila compacta	40	0.1
	Eremophila longifolia	40	1
	Hakea preissii	200	2
	Maireana planifolia	30	0.1
	Ptilotus obovatus	30	0.1
	Scaevola spinescens	40	0.5
	Sclerolaena cuneata	5	0.1
	Senna artemisioides subsp. *helmsii*	140	8
	Senna artemisioides subsp. *oligophylla*	140	4
	Senna sp. Meekatharra (E. Bailey 1-26)	140	5
	Senna sp. Meekatharra (E. Bailey 1-26)	30	1
	Senna stricta	100	0.1
	Solanum lasiophyllum	30	0.1

Site No: 04R	**Date**: 20/11/2020	**Longitude**: [redacted]

Type: Releve

Soil Types: hard clay

Topography: flat

Surface: bare 90%

Outcrops: none

Litter: leaves twigs branches

Condition: very good

Condition Notes: dry

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	acacia celastrocarpa	200	0.5
	Acacia incurvaneura	500	2
	Acacia tetragonophylla	200	2
	Eremophila compacta	50	0.1
	Eremophila forrestii	80	0.1

Taxon		Ht (cm)	Foliage (%)
	Eremophila fraseri	80	0.1
	Eremophila latrobei	50	2
	Eremophila longifolia	80	4
	Lepidium oxytrichum	5	0.1
	Ptilotus drummondii	20	0.1
	Ptilotus obovatus	30	0.1
	Senna artemisioides subsp. *helmsii*	100	1
	Senna artemisioides subsp. *petiolaris*	40	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)	80	0.1
	Solanum lasiophyllum		

Site No: 05R **Date**: 20/11/2020 [redacted]

Type: Releve

Soil Types: clay

Topography: ephemeral drainage

Surface: bare 50%

Outcrops: none

Litter: leaves, twigs, branches, logs

Condition: very good

Condition Notes:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus, Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia cuthbertsonii subsp. *cuthbertsonii*		0.1
	Acacia grasbyi	200	4
	Acacia incurvaneura	600	12
	Acacia tetragonophylla		0.1
	Eremophila forrestii	80	1

Taxon		Ht (cm)	Foliage (%)
	Eremophila fraseri		opp
	Eremophila latrobei		0.1
	Eremophila longifolia	50	1
	Eremophila mackinlayi subsp. *spathulata*	50	0.5
	Gnephosis arachnoides	10	4
	Gnephosis tenuissima		
	Hakea preissii		
	Ptilotus drummondii	30	3
	Ptilotus obovatus	30	0.1
	Ptilotus schwartzii	20	0.1
	Senna artemisioides subsp. *helmsii*	100	0.1

Site No: 06R **Date**: 20/11/2020 [redacted]

Type: Releve **Soil Types**: clay

Topography: drainage **Surface**: bare 60%

Outcrops: none **Litter**: leaves, twigs, shrubs

Condition: very good **Condition Notes**:

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia ?aptaneura	500	1
	Acacia ?caesaneura	200	1
	Acacia burkittii	500	1
	Acacia cuthbertsonii subsp. *cuthbertsonii*	300	8
	Acacia incurvaneura	500	16

Taxon		Ht (cm)	Foliage (%)
	Acacia tetragonophylla	400	12
	Amyema fitzgeraldii	0	0.1
	Aristida sp.	10	2
	Eremophila fraseri	150	0.5
	Eremophila longifolia	400	0.5
	Eremophila maitlandii	300	0.5
	Eucalyptus victrix	500	1

Site No: 07R	**Date**: 20/11/2020	[redacted]	[redacted]

Type: Releve

Soil Types: sandy

Topography: flat

Surface: bare 95%

Outcrops: granite boulders and domes

Litter:

Condition: very good

Condition Notes:

Vegetation Type: Granite

Vegetation Description:

Taxon		Ht (cm)	Foliage (%)
	Acacia ?aneura	200	3
	Acacia cuthbertsonii subsp. *cuthbertsonii*	200	0.5
	Acacia incurvaneura	200	1
	Acacia tetragonophylla	150	3
	Alogyne pinoniana	50	0.1
	Boerhavia coccinea	0	0.1

Taxon		Ht (cm)	Foliage (%)
	Cymbopogon ambiguus	30	0.1
	Eremophila fraseri	50	2
	Euphorbia boopthona	30	0.1
	Gnephosis tenuissima		
	Hakea preissii	50	0.1
	Ptilotus obovatus	30	3
	Rhagodia eremaea	30	0.1
	Santalum spicatum	200	0.1
	Senna artemisioides subsp. *filifolia*	50	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)	150	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)	50	0.1
	Sida ?calyxhymenia		
	Solanum lasiophyllum	30	1

Site No: 08R	**Date**: 21/11/2020	[redacted]	[redacted]

Type: Releve

Soil Types: clay, sand on surface

Topography: flat

Surface: bare 95%

Outcrops:

Litter: twigs branches

Condition: very good

Condition Notes:

Vegetation Type: AaEcPo

Vegetation Description: *Acacia aptaneura*, *Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta*, *Eremophila simulans* and *Eremophila gilesii* mid open shrubland over *Ptilotus obovatus*, *Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia anuera	400	1
	Acacia aptaneura	400	12
	Acacia fuscaneura		
	Acacia incurvaneura	150	0.1

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii		
	Eremophila fraseri	150	1
	Gnephosis tenuissima		
	Maireana planifolia	50	0.1
	Ptilotus aervoides	0	0.1
	Ptilotus drummondii	30	0.1
	Ptilotus obovatus	30	0.1
	Senna artemisioides subsp. *helmsii*	100	0.5
	Senna artemisioides subsp. *oligophylla*		
	Senna sp. Meekatharra (E. Bailey 1-26)		

Site No: 09R **Date**: 21/11/2020 [redacted]

Type: Releve

Soil Types: clay sand on surface

Topography: flat

Surface: bare 99%

Outcrops: granite domes

Litter:

Condition: very good

Condition Notes:

Vegetation Type: Granite

Vegetation Description: Granite

Taxon		Ht (cm)	Foliage (%)
	Acacia grasbyi	400	2
	Acacia incurvaneura	400	1
	Acacia tetragonophylla	200	0.5
	Eremophila latrobei subsp. *latrobei*	80	0.1
	Eremophila maitlandii	100	4
	Maireana planifolia		
	Ptilotus obovatus	30	0.1

Taxon		Ht (cm)	Foliage (%)
	Senna artemisioides subsp. *oligophylla*	80	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)		
	Solanum lasiophyllum	20	0.1

Site No: 10R **Date**: 21/11/2020 [redacted]

Type: Releve **Soil Types**: clay with surface sand

Topography: flat **Surface**: bare

Outcrops: none **Litter**: sticks

Condition: very good **Condition Notes**:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

	Taxon	Ht (cm)	Foliage (%)
	Acacia ?caesaneura		
	Acacia incurvaneura	500	4
	Acacia pruinocarpa	500	0.1
	Acacia tetragonophylla	200	2
	Eremophila exilifolia		

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii		
	Eremophila fraseri	100	1
	Ptilotus obovatus	30	0.1
	Senna artemisioides subsp. *helmsii*	100	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)	150	1

Site No: 11R	**Date**: 21/11/2020	[redacted]	[redacted]

Type: Releve

Soil Types: sandy

Topography: undulating

Surface: bare

Outcrops: none

Litter: sticks branches leaves

Condition: very good

Condition Notes:

Vegetation Type: AaEcPo

Vegetation Description: *Acacia aptaneura*, *Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta*, *Eremophila simulans* and *Eremophila gilesii* mid open shrubland over *Ptilotus obovatus, Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia aptaneura	400	5
	Acacia incurvaneura	300	0.5
	Acacia pruinocarpa	1000	1
	Acacia tetragonophylla	200	1

Taxon		Ht (cm)	Foliage (%)
	Aristida sp.	20	5
	Boerhavia coccinea	0	0.1
	Eremophila compacta	60	12
	Eremophila forrestii	80	0.5
	Eremophila gilesii	100	2
	Euphorbia boopthona	Euphorbiaceae	Herb
	Ptilotus obovatus	50	0.5
	Senna sp. Meekatharra (E. Bailey 1-26)	130	2
	Solanum lasiophyllum	50	1
	Thryptomene decussata	200	0.5

Site No: 12R **Date**: 21/11/2020 [redacted]

Type: Releve

Soil Types: sand and clay

Topography: flat

Surface: bare 85%

Outcrops: none

Litter: bushes, sticks

Condition: very good

Condition Notes:

Vegetation Type: AaEcPo

Vegetation Description: *Acacia aptaneura*, *Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta*, *Eremophila simulans* and *Eremophila gilesii* mid open shrubland over *Ptilotus obovatus*, *Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia anuera	80	0.1
	Acacia aptaneura	400	15
	Acacia incurvaneura	400	1
	Aristida sp.	20	1
	Eremophila compacta	50	4

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii	100	0.5
	Eremophila gilesii	80	1
	Ptilotus obovatus	30	1
	Scaevola spinescens	80	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)	80	0.1
	Solanum lasiophyllum	80	0.1
	Thryptomene decussata	50	0.5
	Thryptomene decussata	30	4

Site No: 13R **Date**: 21/11/2020 [redacted]

Type: Releve **Soil Types**: clay

Topography: undulating **Surface**: pesolyte black gravel

Outcrops: none **Litter**:

Condition: very good **Condition Notes**:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia ?distans	150	1
	Acacia anuera	200	0.1
	Acacia aptaneura	500	1
	Acacia incurvaneura	500	2
	Dodonaea pachyneura	150	0.1

Taxon		Ht (cm)	Foliage (%)
	Eremophila compacta	40	0.1
	Eremophila forrestii	130	0.1
	Eremophila glutinosa	100	0.1
	Thryptomene decussata	200	2

Site No: 14R **Date**: 21/11/2020 [redacted]

Type: Releve

Soil Types: sand

Topography: scarp, breakaway

Surface: rocks

Outcrops: boulders, rocks, gravel

Litter: twigs

Condition: very good

Condition Notes:

Vegetation Type: AiTdPb

Vegetation Description: *Acacia incurvaneura*, *Acacia fuscaneura* and *Acacia caesaneura* low isolated clumps of trees over *Thryptomene decussata*, *Eremophila forrestii* subsp. *forrestii* and *Acacia oswaldii* mid open shrubland over *Ptilotus drummondii*, *Eragrostis eriopoda* and *Solanum lasiophyllum* low sparse mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia ?aneura	200	0.5
	Acacia aptaneura		2
	Acacia fuscaneura	250	0.1
	Acacia incurvaneura	600	6
	Cymbopogon ambiguus	20	0.5

Taxon		Ht (cm)	Foliage (%)
	Dodonaea pachyneura	120	0.1
	Eremophila compacta	50	0.1
	Eremophila maitlandii	100	0.1
	Psydrax rigidula		
	Solanum lasiophyllum	30	0.1
	Thryptomene decussata		0.1

Site No: 15R **Date**: 21/11/2020 [redacted]

Type: Releve

Soil Types: ckay some sand

Topography: flat

Surface: domes and rocks

Outcrops: domes granite

Litter: sticks shrubs

Condition: very good

Condition Notes:

Vegetation Type: AiTdPb

Vegetation Description: *Acacia incurvaneura*, *Acacia fuscaneura* and *Acacia caesaneura* low isolated clumps of trees over *Thryptomene decussata*, *Eremophila forrestii* subsp. *forrestii* and *Acacia oswaldii* mid open shrubland over *Ptilotus drummondii*, *Eragrostis eriopoda* and *Solanum lasiophyllum* low sparse mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia aptaneura	80	0.1
	Acacia fuscaneura	500	5
	Acacia incurvaneura	500	4
	Acacia tetragonophylla	400	0.5
	Eremophila fraseri	40	0.1

Taxon		Ht (cm)	Foliage (%)
	Eremophila maitlandii	100	0.1
	Sclerolaena cuneata		
	Solanum lasiophyllum	30	0.1

Site No: 16R **Date**: 21/11/2020 [redacted]

Type: Releve **Soil Types**: sand

Topography: slope **Surface**: rocky

Outcrops: granite solid **Litter**: twigs

Condition: very good **Condition Notes**:

Vegetation Type: AiTdPb

Vegetation Description: *Acacia incurvaneura*, *Acacia fuscaneura* and *Acacia caesaneura* low isolated clumps of trees over *Thryptomene decussata, Eremophila forrestii* subsp. *forrestii* and *Acacia oswaldii* mid open shrubland over *Ptilotus drummondii*, *Eragrostis eriopoda* and *Solanum lasiophyllum* low sparse mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia aulacophylla	80	0.1
	Acacia fuscaneura		
	Acacia incurvaneura	200	1
	Borya sphaerocephala	5	0.1
	Dodonaea pachyneura	80	1

Taxon		Ht (cm)	Foliage (%)
	Eremophila latrobei subsp. *latrobei*	5	0.1
	Hakea preissii	30	0.1
	Micromyrtus sulphurea	30	0.5
	Mirbelia rhagodioides	40	0.1
	Ptilotus drummondii	20	0.1
	Ptilotus obovatus	30	0.5
	Thryptomene decussata	60	2

Site No: 17R **Date**: 21/11/2020 [redacted]

Type: Releve

Soil Types: clay sand soft

Topography: flat

Surface: minor erosion

Outcrops: none

Litter: branches, twigs

Condition: very good

Condition Notes:

Vegetation Type: AaEcPo

Vegetation Description: *Acacia aptaneura*, *Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta*, *Eremophila simulans* and *Eremophila gilesii* mid open shrubland over *Ptilotus obovatus*, *Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia anuera	400	0.1
	Acacia aptaneura	350	15
	Acacia pruniocarpa	200	0.5
	Aristida sp.	20	0.1
	Eremophila gilesii	100	4

Taxon		Ht (cm)	Foliage (%)
	Eremophila simulans	100	8
	Solanum lasiophyllum	80	0.1

Site No: 18R **Date**: 22/11/2020 [redacted]

Type: Releve **Soil Types**: clay hard

Topography: flat **Surface**: calcretr

Outcrops: nearby **Litter**: branches

Condition: very good **Condition Notes**:

Vegetation Type: AfSa

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and occasional *Acacia pruinocarpa* low open woodland over *Senna artemisioides* subsp. *helmsii*, *Acacia tetragonophylla* and *Senna* sp. Meekatharra (E. Bailey 1-26) mid to tall sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia caesaneura	200	0.1
	Acacia fuscaneura	350	10

Taxon		Ht (cm)	Foliage (%)
	Acacia grasbyi	300	0.5
	Eremophila latrobei subsp. *latrobei*		
	Ptilotus obovatus	30	0.1
	Senna artemisioides subsp. *petiolaris*	80	0.5
	Solanum lasiophyllum	30	0.1

Site No: 19R **Date**: 22/11/2020 [redacted]

Type: Releve

Soil Types: gravel

Topography: rise

Surface: rocky, bare 98%

Outcrops: numerous granite loose and solid

Litter: sticks

Condition: very good

Condition Notes:

Vegetation Type: ArCc

Vegetation Description: *Acacia rhodophloia* low open woodland over *Corchorus crozophorifolius*, *Cymbopogon ambiguus* and *Eremophila platycalyx* subsp. *platycalyx* mixed low to mid shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia aptaneura	250	4
	Acacia aulacophylla	120	0.1
	Acacia caesaneura	200	0.5
	Acacia collegialis	200	1
	Acacia incurvaneura	300	5
	Eremophila latrobei subsp. *latrobei*	80	0.5
	Eremophila simulans	100	0.1

Site No: 20R **Date**: 22/11/2020 [redacted]

Type: Releve

Soil Types: sand, clay, some crust on surface

Topography: flat

Surface: bare 85%

Outcrops: none

Litter: leaves, twigs

Condition: very good

Condition Notes:

Vegetation Type: AaEcPo

Vegetation Description: *Acacia aptaneura*, *Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta*, *Eremophila simulans* and *Eremophila gilesii* mid open

Site No: 20R **Date**: 22/11/2020 **Longitude**: 117.03559 **Latitude**: -26.88488

shrubland over *Ptilotus obovatus*, *Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia ?aneura	200	1
	Acacia aptaneura	400	15
	Acacia caesaneura	200	1
	Corchorus crozophorifolius		
	Eremophila forrestii	100	2
	Eremophila simulans	130	6
	Maireana planifolia	30	0.1
	Ptilotus drummondii	20	0.1
	Ptilotus obovatus	30	0.1
	Solanum lasiophyllum	50	0.5
	Thryptomene decussata	300	0.1

Site No: 21R **Date**: 22/11/2020 [redacted]

Type: Releve

Soil Types: sand, some clay

Topography: undulating

Surface: bare 85%

Outcrops: none

Litter: twigs leaves

Condition: very good

Condition Notes:

Vegetation Type: AaEcPo

Vegetation Description: *Acacia aptaneura*, *Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta*, *Eremophila simulans* and *Eremophila gilesii* mid open shrubland over *Ptilotus obovatus*, *Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia aulacophylla	300	10
	Acacia pruinocarpa		
	Eremophila compacta	50	0.1
	Eremophila forrestii	100	1
	Eremophila simulans	100	4

Taxon		Ht (cm)	Foliage (%)
	Grevillea berryana	400	3
	Ptilotus drummondii	30	0.1
	Santalum acuminatum	200	0.1
	Senna artemisioides subsp. *petiolaris*	150	0.1
	Solanum lasiophyllum	50	0.1
	Thryptomene decussata		

Site No: 22R **Date**: 22/11/2020 [redacted]

Type: Releve **Soil Types**: clay hard, some sand

Topography: slope **Surface**: gravel 90%

Outcrops: rocks small **Litter**:

Condition: very good **Condition Notes**:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia caesaneura	400	2
	Acacia collegialis	200	6
	Acacia incurvaneura	350	3
	Cheyniana microphylla		
	Dodonaea pachyneura	80	0.1

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii		
	Eremophila latrobei subsp. *latrobei*	50	0.1
	Hakea lorea subsp. *lorea*		
	Psydrax rigidula	250	0.1

Site No: 23R **Date**: 22/11/2020 [redacted]

Type: Releve

Soil Types: clay, sand on surface

Topography: flat undulating

Surface: some quartz

Outcrops: none

Litter: sticks

Condition: very good

Condition Notes:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia collegialis		
	Acacia fuscaneura		2
	Acacia grasbyi	250	2
	Acacia incurvaneura	500	4
	Acacia tetragonophylla	150	1

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii		0.1
	Maireana planifolia		0.1
	Ptilotus obovatus		
	Senna artemisioides subsp. *helmsii*	80	0.5
	Senna artemisioides subsp. *petiolaris*		0.1
	Senna sp. Meekatharra (E. Bailey 1-26)	80	0.5
	Solanum lasiophyllum	50	0.1

Site No: 24R **Date**: 22/11/2020 [redacted]

Type: Releve **Soil Types**: clay

Topography: flat **Surface**: bare 95%

Outcrops: none **Litter**: twigs

Condition: very good **Condition Notes**:

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia aulacophylla	100	0.1
	Acacia caesaneura	200	2
	Acacia fuscaneura		
	Acacia incurvaneura	400	3
	Acacia tetragonophylla	200	1

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii	120	0.1
	Eremophila fraseri	150	1
	Ptilotus obovatus	30	0.1
	Senna artemisioides subsp. *helmsii*	100	0.1
	Solanum lasiophyllum	40	0.1

Site No: 25R **Date**: 22/11/2020 [redacted]

Type: Releve

Soil Types: clay

Topography: undulating

Surface: rocky

Outcrops: intermittent domes and breakaways

Litter: branches

Condition: very good

Condition Notes:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia ?aneura	60	0.1
	Acacia fuscaneura	400	2
	Acacia incurvaneura	400	3
	Acacia tetragonophylla	200	0.1
	Eremophila exilifolia	80	2

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii	100	0.1
	Eremophila fraseri	100	2
	Eremophila glutinosa		
	Eremophila pterocarpa		
	Ptilotus obovatus	30	0.1
	Senna artemisioides subsp. *helmsii*	150	1
	Senna artemisioides subsp. *petiolaris*	150	0.1

Site No: 26R **Date**: 22/11/2020 [redacted]

Type: Releve **Soil Types**: sand over clay

Topography: flat **Surface**: bare 75%

Outcrops: none **Litter**: leaves, twigs

Condition: very good **Condition Notes**:

Vegetation Type: AaEcPo

Vegetation Description: *Acacia aptaneura*, *Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta*, *Eremophila simulans* and *Eremophila gilesii* mid open shrubland over *Ptilotus obovatus*, *Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia caesaneura	300	2
	Acacia fuscaneura	500	4
	Acacia incurvaneura	500	4
	Acacia kempeana	80	0.1
	Aristida sp.	20	3

Taxon		Ht (cm)	Foliage (%)
	Eremophila compacta	50	8
	Eremophila gilesii	80	0.1
	Euphorbia boopthona		0.1
	Pogonolepis stricta	1	0.5
	Senna artemisioides subsp. *filifolia*	100	0.1
	Senna artemisioides subsp. *helmsii*	120	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)	100	0.5
	Solanum lasiophyllum	30	0.1

Site No: 27R **Date**: 22/11/2020 [redacted]

Type: Releve

Soil Types: clay, some sand on surface

Topography: flat

Surface: bare 90%

Outcrops: none

Litter: leaves sticks

Condition: very good

Condition Notes:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia cuthbertsonii		
	Acacia fuscaneura	300	0.5
	Acacia incurvaneura	500	8
	Acacia kempeana	200	0.5
	Acacia quadrimarginea		

Taxon		Ht (cm)	Foliage (%)
	Acacia tetragonophylla	200	0.5
	Eremophila forrestii		
	Eremophila fraseri	150	1
	Ptilotus obovatus	30	1
	Senna artemisioides subsp. *helmsii*	130	2
	Senna sp. Meekatharra (E. Bailey 1-26)	100	0.1
	Solanum lasiophyllum	50	0.1

Site No: 28R **Date**: 22/11/2020 [redacted]

Type: Releve

Soil Types: hard clay

Topography: flat

Surface: bare 95%

Outcrops: none

Litter: leaves twigs small logs

Condition: very good

Condition Notes:

Vegetation Type: AfEfPo

Vegetation Description: *Acacia fuscaneura*, *Acacia incurvaneura* and *Acacia victoriae* subsp. *victoriae* low open woodland over *Eremophila forrestii* subsp. *forrestii*, *Acacia tetragonophylla* and *Eremophila phyllopoda* low to tall open shrubland over *Ptilotus obovatus*, *Solanum lasiophyllum* and *Maireana planifolia* low sparse shrubland.

	Taxon	Ht (cm)	Foliage (%)
	Acacia anuera	500	1
	Acacia cuthbertsonii	200	0.1
	Acacia fuscaneura	600	2
	Acacia incurvaneura	600	8
	Acacia kempeana	200	1

Taxon		Ht (cm)	Foliage (%)
	Acacia tetragonophylla	200	0.5
	Aristida sp.	30	0.1
	Chorizema ?racemosum	80	0.1
	Dianella revoluta	40	0.1
	Eremophila forrestii	50	0.5
	Eremophila fraseri	150	1
	Gnephosis arachnoides	10	0.1
	Gnephosis tenuissima	3	0.1
	Psydrax rigidula	300	0.1
	Senna artemisioides subsp. *helmsii*	50	0.5
	Senna sp. Meekatharra (E. Bailey 1-26)	130	2
	Senna sp. Meekatharra (E. Bailey 1-26)	150	0.5
	Solanum lasiophyllum	50	0.1

Site No: 29R **Date**: 22/11/2020 [redacted]

Type: Releve

Soil Types: sand, clay banks

Topography: river

Surface: bare 99%

Outcrops: none

Litter: none

Condition: very good

Condition Notes: cows

Vegetation Type: AiAbSa

Vegetation Description: *Acacia incurvaneura*, *Acacia fuscaneura* and *Acacia caesaneura* low isolated clumps of trees over *Thryptomene decussata*, *Eremophila forrestii* subsp. forrestii and *Acacia oswaldii* mid open shrubland over *Ptilotus drummondii*, *Eragrostis eriopoda* and *Solanum lasiophyllum* low sparse mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia sclerosperma subsp. *sclerosperma*	150	10
	Allocasuarina campestris	500	5
	Amyema fitzgeraldii	0	0.1
	Chorizema ?racemosum	80	0.5
	Cyperus gymnocaulos	100	0.1

Taxon		Ht (cm)	Foliage (%)
	Eucalyptus mannensis	600	0.1
	Eucalyptus victrix	800	4
	Pluchea rubelliflora	5	0.1
	Rhagodia eremaea	100	0.1
	Scaevola spinescens	80	3
	Senna artemisioides subsp. *filifolia*	80	0.1
	Senna artemisioides subsp. *helmsii*	80	1

Site No: 30R **Date**: 23/11/2020 [redacted]

Type: Releve

Soil Types: sand over hard clay

Topography: flat

Surface: bare 90%

Outcrops: none

Litter: twigs

Condition: very good

Condition Notes:

Vegetation Type: AiTdPb

Vegetation Description: *Acacia incurvaneura*, *Acacia fuscaneura* and *Acacia caesaneura* low isolated clumps of trees over *Thryptomene decussata*, *Eremophila forrestii* subsp. *forrestii* and *Acacia oswaldii* mid open shrubland over *Ptilotus drummondii*, *Eragrostis eriopoda* and *Solanum lasiophyllum* low sparse mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia aptaneura		
	Acacia caesaneura	400	1
	Acacia fuscaneura		
	Acacia incurvaneura	400	5
	Acacia tetragonophylla	200	0.1

Taxon		Ht (cm)	Foliage (%)
	Eragrostis eriopoda	30	2
	Eremophila forrestii	100	3
	Eremophila fraseri	150	0.1
	Eremophila latrobei subsp. *latrobei*	80	0.1
	Gnephosis tenuissima	2	0.1
	Gnephosis tenuissima	2	0.1
	Grevillea deflexa	30	0.5
	Maireana planifolia	50	0.1
	Psydrax rigidula	150	0.1
	Ptilotus drummondii	20	0.1
	Ptilotus obovatus	30	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)	150	0.5
	Solanum lasiophyllum	30	0.1
	Thryptomene decussata	200	0.1

Site No: 31R **Date**: 23/11/2020 [redacted]

Type: Releve **Soil Types**: sand

Topography: hill **Surface**: bate 80%

Outcrops: none **Litter**: leaves twigs

Condition: very good **Condition Notes**:

Vegetation Type: AaEcPo

Vegetation Description: *Acacia aptaneura*, *Acacia aneura* and *Acacia incurvaneura* low open woodland over *Eremophila compacta*, *Eremophila simulans* and *Eremophila gilesii* mid open shrubland over *Ptilotus obovatus*, *Ptilotus drummondii* and *Aristida* sp. low mixed shrub and grassland.

Taxon		Ht (cm)	Foliage (%)
	Acacia aptaneura	200	0.5
	Acacia cuthbertsonii	180	0.1
	Acacia grasbyi	200	0.1
	Aluta aspera subsp. *hesperia*	100	18
	Aristida sp.	30	2

Taxon		Ht (cm)	Foliage (%)
	Eremophila forrestii	80	0.5
	Eremophila simulans	100	2
	Psydrax rigidula	200	0.1
	Ptilotus drummondii	30	0.1
	Ptilotus schwartzii	20	0.1
	Sauropus sp. Woolgorong (M. Officer s.n. 10/8/94)	20	0.1
	Solanum lasiophyllum	30	0.1
	Thryptomene decussata	300	1

Site No: 32R	Date: 23/11/2020	[redacted]	[redacted]

Type: Releve

Soil Types: clay

Topography: flat

Surface: bare 95%

Outcrops: none

Litter: branches

Condition: very good

Condition Notes:

Vegetation Type: AiAtEf

Vegetation Description: *Acacia incurvaneura*, *Acacia craspedocarpa* and *Acacia fuscaneura* low open woodland over *Acacia tetragonophylla*, *Acacia kempeana* and *Acacia oswaldii* sparse tall shrubland over *Eremophila fraseri* subsp. *parva*, *Senna artemisioides* subsp. *helmsii* and *Eremophila macmillaniana* sparse mid shrubland.

Taxon		Ht (cm)	Foliage (%)
	Acacia caesaneura	300	1
	Acacia craspedocarpa	300	1
	Acacia incurvaneura	400	6
	Acacia pruinocarpa	500	1
	Acacia tetragonophylla	180	1

Taxon		Ht (cm)	Foliage (%)
	Eremophila fraseri	100	1
	Eremophila latrobei subsp. *latrobei*	30	0.1
	Senna artemisioides subsp. *helmsii*	80	0.1
	Senna sp. Meekatharra (E. Bailey 1-26)		

Appendix D

Fauna Inventory

Appendix D: Inventory of fauna species recorded in the survey area in 2014 and 2020

Genus	Species	Subspecies	Vernacular	Status	EPBC Act Status	BC Act / WA Status	BAM Act Status	2014	2020	2020 Observations
Acridotheres	*tristis*		Common Myna	Introduced	-	-	Declared Pest - Prohibited s12 (C1 Prohibited)	-	+	Observed at infrastructure towards centre of survey area
Aegotheles	*cristatus*	*cristatus*	Australian Owlet-nightjar	Native	-	-	-	-	+	Individual observed in open woodland to north of survey area
Charadrius	*melanops*		Black-fronted Dotterel	Native	-	-	-	+	-	-
Vanellus	*miles*		Masked Lapwing	Native	-	-	-	+	-	-
Vanellus	*tricolor*		Banded Lapwing	Native	-	-	-	+	-	-
Ardea	*pacifica*		White-necked Heron	Native	-	-	-	+	-	-
Threskiornis	*spinicollis*		Straw-necked Ibis	Native	Marine	-	-	+	-	-
Phaps	*chalcoptera*		Common Bronzewing	Native	-	-	-	+	-	-
Ocyphaps	*lophotes*		Crested Pigeon	Native	-	-	-	+	+	Flock of approximately 20 observed to north of survey area
Circus	*assimilis*		Spotted Harrier	Native	-	-	-	+	-	-
Aquila	*audax*		Wedge-tailed Eagle	Native	-	-	-	+	+	One bird observed flying over survey area
Hamirostra	*melanosternon*		Black-breasted Buzzard	Native	-	-	-	+	+	Individual observed flying over northern survey area
Haliastur	*sphenurus*		Whistling Kite	Native	Marine	-	-	+	+	Observed several times in survey and surrounding area - including one record nesting in large tree near infrastructure towards centre of survey area
Falco	*berigora*		Brown Falcon	Native	-	-	-	+	+	Observed a few times throughout the survey and surrounding area
Falco	*cenchroides*		Australian Kestrel	Native	Marine	-	-	+	+	Observed towards north of survey area in open woodland
Falco	*longipennis*		Australian Hobby	Native	-	-	-	+	-	-
Acanthiza	*apicalis*		Broad-tailed Thornbill (Inland Thornb	Native	-	-	-	+	-	-
Acanthiza	*uropygialis*		Chestnut-rumped Thornbill	Native	-	-	-	+	-	-
Artamus	*cinereus*		Black-faced Woodswallow	Native	-	-	-	+	-	-
Artamus	*minor*		Little Woodswallow	Native	-	-	-	+	+	Nesting in breakaway
Artamus	*personatus*		Masked Woodswallow	Native	-	-	-	+	+	Directly observed in open woodland towards southeast of survey area
Lalage	*tricolor*		White-winged Triller	Native	-	-	-	+	-	-
Psophodes	*occidentalis*		Chiming Wedgebill	Native	-	-	-	+	+	Heard in the southwest of the survey area
Corvus	*bennetti*		Little Crow	Native	-	-	-	+	-	-
Corvus	*orru*		Torresian Crow	Native	-	-	-	+	-	-
Cracticus	*nigrogularis*		Pied Butcherbird	Native	-	-	-	+	+	Observed in open woodlands several times in survey and surrounding area
Cracticus	*tibicen*		Australian Magpie	Native	-	-	-	+	-	-
Cracticus	*torquatus*		Grey Butcherbird	Native	-	-	-	+	-	-
Coracina	*novaehollandiae*		Black-faced Cuckoo-shrike	Native	Marine	-	-	-	+	Observed in the southwest of the survey area
Grallina	*cyanoleuca*		Magpie-lark	Native	Marine	-	-	+	+	Observed towards centre of survey area on watered lawns
Rhipidura	*leucophrys*		Willie Wagtail	Native	-	-	-	+	+	Observed near infrastructure towards centre of survey area
Petrochelidon	*ariel*		Fairy Martin	Native	-	-	-	+	+	Observed small flock near infrastructure towards centre of survey area
Hirundo	*neoxena*		Welcome Swallow	Native	Marine	-	-	+	+	Observed near infrastructure towards centre of survey area
Malurus	*lamberti*		Variegated Fairy-wren	Native	-	-	-	+	+	Family group observed in shrubs towards centre of survey area
Malurus	*splendens*		Splendid Fairy-wren	Native	-	-	-	+	-	-
Epthianura	*albifrons*		White-fronted Chat	Native	-	-	-	+	-	-
Manorina	*flavigula*		Yellow-throated Miner	Native	-	-	-	+	-	-
Lichmera	*indistincta*		Brown Honeyeater	Native	-	-	-	+	-	-
Lichenostomus	*penicillatus*		White-plumed Honeyeater	Native	-	-	-	+	-	-
Lichenostomus	*plumulus*		Grey-fronted Honeyeater	Native	-	-	-	+	-	-
Acanthagenys	*rufogularis*		Spiny-cheeked Honeyeater	Native	-	-	-	+	-	-
Melanodryas	*cucullata*		Hooded Robin	Native	-	-	-	-	+	Flock of six observed in open woodland
Epthianura	*tricolor*		Crimson Chat	Native	-	-	-	+	+	Observed twice in well vegetated areas to the central and southwest of the survey area
Gavicalis	*virescens*	*virescens*	Singing Honeyeater	Native	-	-	-	+	+	Several birds observed directly and indirectly in open woodland to north of survey area
Anthus	*australis*		Australian Pipit	Native	Marine	-	-	+	+	-
Daphoenositta	*chrysoptera*		Varied Sittella	Native	-	-	-	+	-	-

Appendix D: Inventory of fauna species recorded in the survey area in 2014 and 2020

Genus	Species	Subspecies	Vernacular	Status	EPBC Act Status	BC Act / WA Status	BAM Act Status	2014	2020	2020 Observations
Oreoica	*gutturalis*		Crested Bellbird	Southern Subspecies P4	-	-	-	+	-	-
Colluricincla	*harmonica*		Grey Shrike-thrush	Native	-	-	-	+	-	-
Pachycephala	*rufiventris*		Rufous Whistler	Native	-	-	-	+	-	-
Pardalotus	*striatus*		Striated Pardalote	Native	-	-	-	+	+	Heard in survey area
Microeca	*fascinans*		Jacky Winter	Native	-	-	-	+	+	Observed several times in open woodland in the survey area
Petroica	*goodenovii*		Red-capped Robin	Native	-	-	-	+	-	-
Purnella	*albifrons*		White-fronted Honeyeater	Native	-	-	-	-	+	Several birds heard in open woodland to north of survey area
Pomatostomus	*superciliosus*		White-browed Babbler	Native	-	-	-	+	+	Observed several individuals in open woodland towards centre of survey area, with nests observed commonly thoughout survey area
Pomatostomus	*temporalis*		Grey-crowned Babbler	Native	-	-	-	+	+	Nests observed commonly thoughout survey area
Cacatua	*roseicapilla*		Galah	Native	-	-	-	+	+	Observed towards centre of survey area
Cacatua	*sanguinea*		Little Corella	Native	-	-	-	+	+	Observed in larger planted eucalypts near infrastructure
Platycercus	*varius*		Mulga Parrot	Native	-	-	-	+	+	Observed several times in survey area. Generally in pairs
Platycercus	*zonarius*		Australian Ringneck	Native	-	-	-	+	-	-
Taeniopygia	*guttata*	*castanotis*	Zebra Finch	Native	-	-	-	-	+	Small flock observed in open woodland towards centre of survey area
Dromaius	*novaehollandiae*		Emu	Native	-	-	-	+	+	Observed directly a couple of times (father with young), and scat observed very commonly throughout survey area
Capra	*hircus*		Goat	Introduced	-	-	Declared Pest - s22(2) (C3 Exempt)	+	+	Scat recorded commonly thoughout survey and surrounding area, and carcus recorded to the north of the survey area
Bos	*taurus*		European Cattle	Introduced	-	-	Permitted - s11	+	+	Cattle observed directly at water trough adjacent survey area, and scat observed commonly throughout survey area
Camelus	*dromedarius*		Dromedary, Camel	Introduced	-	-	Declared Pest - s22(2) (C3 Exempt)	+	+	Scat observed throughout survey and surrounding area
Canis	*familiaris*		Dog	Introduced	-	-	Declared Pest - s22(2) (C3 Exempt)	+	+	Scat observed on occasion throughout survey area
Vulpes	*vulpes*		Red Fox	Introduced	-	-	Declared Pest - s22(2) (C1 Prohibited, C3 Prohibited)	-	+	Probably fox scat recorded to north of survey area
Felis	*catus*		Cat	Introduced	-	-	Declared Pest - s22(2)	+		-
Sminthopsis	*crassicaudata*		Fat-tailed Dunnart	Native	-	-	-	+	-	-
Notomys sp.			Hopping Mouse	Native	-	-	-	-	+	Tracks oberserved commonly throughout survey area, and carcus located (likely to be either Mitchell's of Spinifex Hopping Mouse)
Macropus	*fuliginosus*	*melanops*	Western Grey Kangaroo	Native	-	-	-	+	+	Observed multiple times in survey and surrounding area
Macropus	*robustus*	*erubescens*	Euro, Biggada	Native	-	-	-	+	+	Observed directly a couple of times in survey area
Osphranter	*rufus*		Red Kangaroo, Marlu	Native	-	-	-	+	+	Observed several times in survey and surrounding area
Oryctolagus	*cuniculus*		Rabbit	Introduced	-	-	Declared Pest - s22(2) (C3 Prohibited)	+	+	Scat, diggings and / or tracks observed in several locations in survey and surrounding area
Tachyglossus	*aculeatus*		Short-beaked Echidna	Native	-	-	-	+	+	Tracks and scat observed several times throughout survey and surrounding area
Equus	*caballus*		Horse	Introduced	-	-	Declared Pest - s22(2) (C3 Exempt)	+	-	-
Ctenophorus	*caudicinctus*		Western Ring-tailed Dragon	Native	-	-	-	+	+	Observed once on track in survey and surrounding area
Pogona	*minor*		*Beared Dragon*	Native	-	-	-	+	-	-
Ctenophorus	*scutulatus*		Lozenge-marked Dragon	Native	-	-	-	+	+	Observed in open woodland

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Genus	Species	Subspecies	Vernacular	Status	EPBC Act Status	BC Act / WA Status	BAM Act Status	2014	2020	2020 Observations
Gehyra	*punctata*		*Gehyra punctata*	Native	-	-	-	+	-	-
Gehyra	*variegata*		*Gehyra variegata*	Native	-	-	-	+	-	-
Morethia	*butleri*		*Morethia butleri*	Native	-	-	-	+	-	-
Lerista	*gascoynensis*		*Lerista gascoynensis*	Native	-	-	-	+	-	-
Lerista	*timida*		-	Native	-	-	-	-	+	Observed once in leaf litter and fallen logs on sandy soils
Menetia	*greyii*		*Menetia greyii*	Native	-	-	-	+	-	-
Cryptoblepharus	*plagiocephalus*		*Cryptoblepharus plagiocephalus*	Native	-	-	-	+	-	-
Ctenotus	*schomburgkii*		-	Native	-	-	-	-	+	Observed several times in survey area
Ctenotus	*severus*		*Ctenotus severus*	Native	-	-	-	+	-	-
Egernia	*stokesii*	*badia*	Western Spiny-tailed Skink	Native	EN	VU	-	+	+	Typical latrine recorded in granite outcrop
Varanus	*gouldii*		Bungarra or Sand Monitor	Native	-	-	-	+	+	Observed several times in survey and surrounding area
Litoria	*rubella*		Little Red Tree Frog	Native	-	-	-	-	+	Observed directly and indirectly (calls) multiple times around the camp
Chelodina	*steindachneri*		Flat-shelled Turtle	Native	-	-	-	+	-	
Idiosoma	*clypeatum*		Northern Shield-backed Trapdoor Spider	Native	-	P3	-	+		Trapdoor burrow was observed in original southeastern arm.