Australian Gas Infrastructure Group

WEST ERREGULLA PROCESSING PLANT AND PIPELINE

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

E-PLN-034

Revision 1

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DOCUMENT CONTROL

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1 Introduction

1.1 Background

AGI Operations Pty Limited propose to construct and operate of a gas processing plant and pipeline near Dongara, Western Australia collectively referred to as the West Erregulla Gas Project (WER). The gas processing plant will process gas produced by Warrego Energy and Strike Energy from upstream wells. The processed gas will then be transported via a new interconnecting pipeline to tie into the Dampier to Bunbury Natural Gas Pipeline (DBNGP). The Proposed Action includes:

- A West Erregulla gas processing facility (WEF), with a nominal design flow capacity of 87 terajoules per day (TJ/d);
- A 16.5 km interconnecting buried gas pipeline between the WEF and the DBNGP tie-in point (WEP);
- A West Erregulla Custody Transfer metering facility (WEM) located at the Main Line Valve Compound MLV93 on the DBNGP approximately 400km North of Perth;
- Supporting infrastructure proposed to include but not limited to power generation, flare system, water treatment package, water evaporation pond, back-up diesel system, and communications within the WEF; and
- An onsite office facility and small self-contained accommodation unit to be installed as part of the project to support the plant operational needs.

A Development Envelope of 213 ha was surveyed to ensure siting to minimise environmental impacts. Total proposed disturbance is 90 hectares (ha). A breakdown of the disturbance footprint is outlined in Table 4-1.

A Construction Environmental Management Plan (CEMP - this plan) has been developed as part of the referral of the project for approval under the *Environmental Protection Act 1986*.

A pipeline license will also be requested under the Western Australian (WA) *Petroleum Pipelines Act 1969* (PP Act) to allow the pipeline to be operate.

The *Petroleum Pipelines (Environment) Regulations 2012* (the Regulations) require the development and implementation of an Environment Plan (EP) to the satisfaction of the Department of Mines, Industry Regulation and Safety (DMIRS). This Plan has been prepared to satisfy this requirement.

1.2 Proponent

The proponent and nominated operator is AGI Operations Pty Limited (AGIO), a related company to DBNGP Nominees (WA) Pty Ltd, the owner of the DBNGP. In future AGIO may nominate a related entity to own and operate the pipeline, which will also be the pipeline licence holder (pending DMIRS approval) and the grantee of all relevant land tenure and other licences or permits required for the Project.

AGIO is part of the Australian Gas Infrastucture Group (AGIG) and is a wholly owned subsidiary of a consortium comprising CK Infrastructure Holdings Limited, CK Asset Holdings Limited and Power Asset Holdings Limited, all of which are listed companies on the Hong Kong Stock Exchange having a combined market capitalisation of approximately A$84 billion (together the CKI Consortium) (refer Figure 1-1).

AGIO relies on the services of DBNGP (WA) Nominees Pty Ltd (DBP), the owner of the DBNGP, for the provision of labour and equipment to undertake its business. In this regard, AGIO adopts all AGIG and DBP policies and procedures across the operation of its business. The AGIG Vision and Values are incorporated in Figure 1-2.

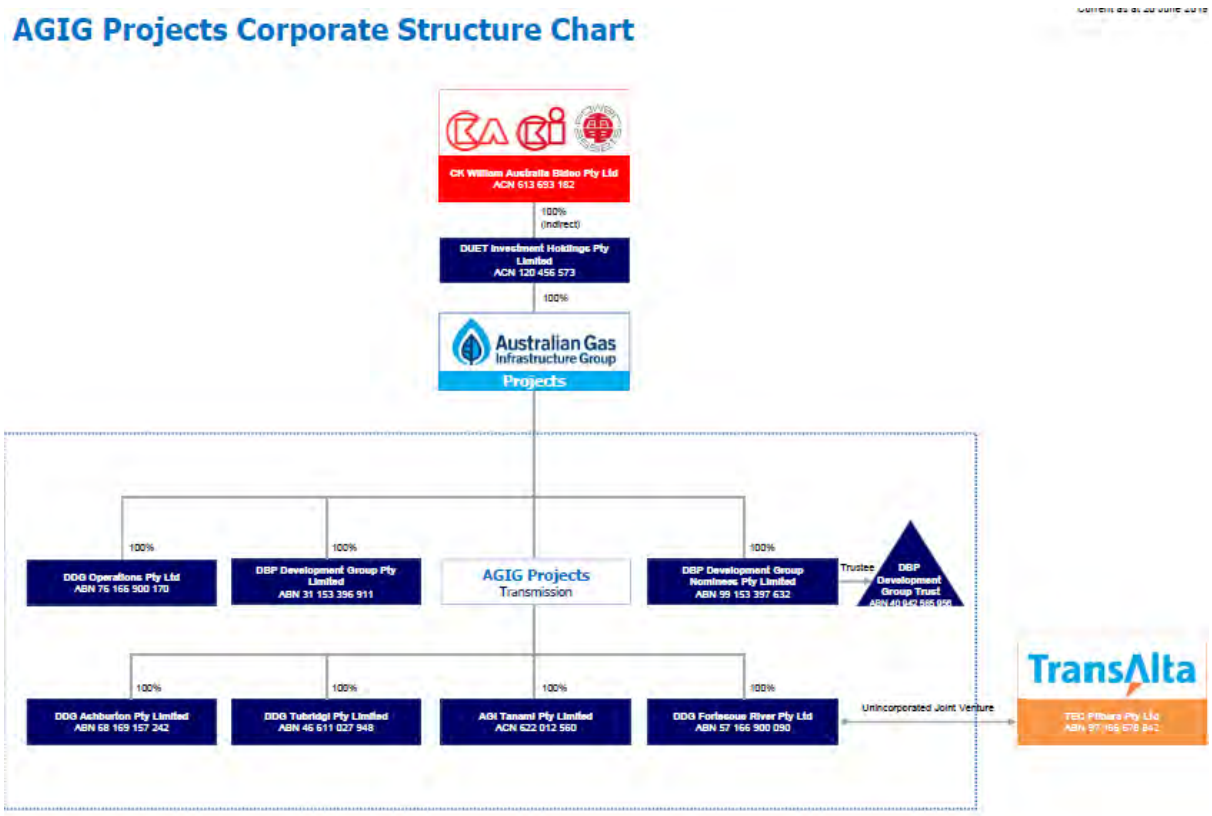

Figure 1-1 AGIG Projects Corporate Structure

Figure 1-2 AGIG Vision and Values

1.3 Objective

The objective of the WER CEMP is to demonstrate that AGIO provides and maintains an effective environmental management system that is capable of systematically and continually identifying, assessing and managing environmental aspects arising from the operation of the WER. The CEMP aims to establish suitable controls so as to eliminate or minimise the risks to environment to a level that is low, negligible or reduced to as low as is reasonably practicable (ALARP). The CEMP further seeks to provide a framework for measuring environmental performance against legislative requirements and internal policies and standards.

In order to achieve this overarching objective, the CEMP specifically aims to:

- Establish a set of performance standards and associated measurement criteria to inform the development of specific environmental controls procedures;
- Provide rational and practical environmental guidelines for the construction and operation of the WER, to ensure activities do not adversely affect adjacent environmental values;
- Ensure that any potential environmental impacts from the WER are managed in accordance with legislative requirements; and
- Develop environmental guidelines for conducting staff induction and training.

This CEMP is a dynamic document and when necessary it will be updated in consultation with the relevant regulatory authorities to account for changes in:

- Organisational structure and responsibility;
- Environmental management and standard operating procedures;
- New technologies;
- Legislation; and the
- AGIG Environmental Policy (Appendix A)

1.4 Scope

The scope of this CEMP includes all activities conducted by AGIO and its contractors in conducting pipeline operations under the relevant approvals. This CEMP has been developed to meet requirements of a CEMP assessed by the Environmental Protection Authority (EPA) under the Environmental Protection Act 1986 (EP Act), and an Environment Plan (EP) assessed by DMIRS under the *Petroleum Pipelines Act 1969.*

This CEMP also includes operational activities and controls (Sections 4 and 6) to outline the controls used throughout construction and operations.

In summary, this CEMP has been prepared in accordance with the following legislation and guidelines:

- *Guideline for the Development of Petroleum and Geothermal Environment Plans in Western Australia* (November 2016)
- *Instructions on how to prepare Environmental Protection Act 1986* (EP Act) *Part IV Environmental Management Plans* (September 2020)
- *Petroleum and Geothermal Resources (Environment) Regulations 2012*
- *Petroleum (Submerged Lands) (Environment) Regulations 2012*
- *Petroleum Pipelines (Environment) Regulations 2012*
- *Environmental Protection Act 1986.*

The CEMP should be read in conjunction with the following AGIO WER key management documents:

- WER Safety Report (Major Hazard Facility)
- WER Safety Case
- WER Asset Management Plan
- WER Asset Maintenance Plan
- WER Emergency Response Manual

For the purposes of this CEMP, DMIRS shall be advised at the commencement of operations (when this plan comes into effect) and at the cessation of activities. The design life of the pipeline is 60 years and the plant is 20 years. An Operations Environment Plan shall be developed for DMIRS approval towards completion of construction to ensure all operational environmental risks are minimised and controlled.

The Proposed Action is associated with the existing West Erregulla gas field activities and will operate within the same environment however this is not included in the Scope of this CEMP as this will be constructed and operated by a third party.

1.5 Location

Figure 1-3 outlines the location of the proposed project. The Proposed Action is located in the mid-west region of Western Australia approximately 350 km north of Perth and within the Shire of Irwin and the Shire of Three Springs. The Proposed Action is predominately situated in parcels of coastal scrub heath on sandplains. The Yardanogo Nature Reserve (approximately 4 km) and Beekeepers Nature Reserve (approximately 15 km) are located to the southwest of the Development Envelope.

The nearest population centres include Mingenew and Dongara, located approximately 25 km north-east (approximately 35 km by road) and approximately 30 km north-west (approximately 70 km by road) from the Proposed Action respectively.

Existing land uses in the region are petroleum and mineral exploration and operations, conservation, tourism and agricultural activities.

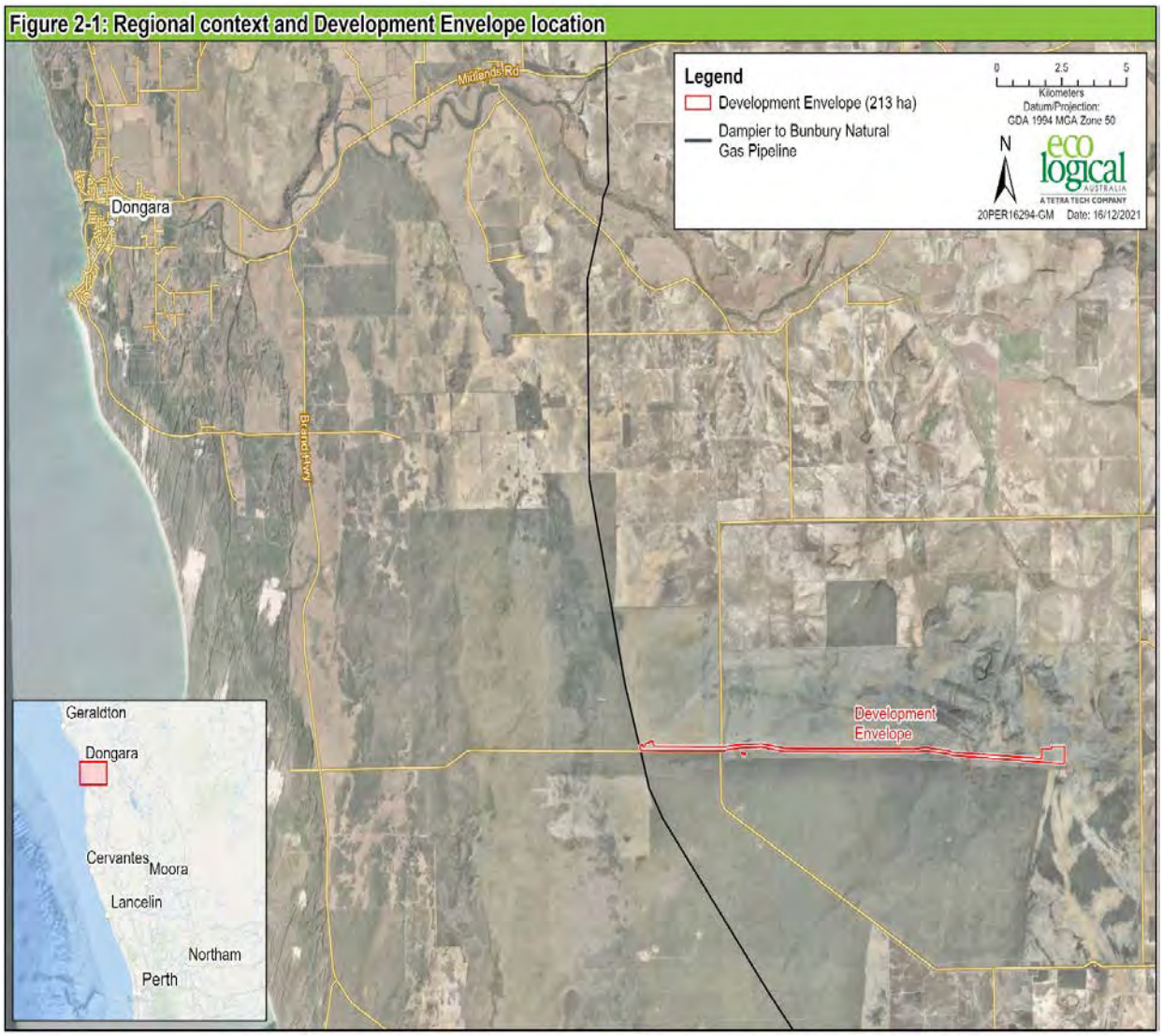

Figure 1-3 Location Map of the West Erregulla Gas Processing Plant and Pipeline

2. Environmental Management Framework

2.1 Policy

AGIG has a corporate culture which strives for Health, Safety and Environment (HSE) excellence driven by a corporate commitment to protect people and the environment. Central to this are the AGIG Health and Safety Policy and the Environmental Policy which are signed and endorsed by the Chief Executive Officer (CEO). This is supported by a Statement of Commitment signed by the AGIG Executive Team, and a set of core principles, called Zero Harm Principles which are aimed at establishing principles for undertaking activities that have been assessed as having the highest risk to AGIG and its workforce.

The relevant goals of the Environmental Policy are to:

- Conduct environmentally responsible operations to minimise environmental harm wherever possible;
- Create a culture and environment where every employee is personally committed to managing impact to the environment; and
- Act consistently with AGIG's values, including working in a safe and professional manner.

AGIG seeks to achieve these goals by:

- Embedding environmental considerations into business decisions and processes.
- Promoting environmental awareness and fostering a culture of respect for ecological values.
- Effectively consulting with our employees, contractors and key stakeholders on environmental matters and establishing an escalation mechanism for matters requiring management intervention.
- Driving a culture where employees and contractors take ownership and are accountable for environmental performance.
- Developing processes and systems to identify, assess and control environmental risks and to ensure the management of risk to as low as reasonably practicable.
- Establishing and maintaining pragmatic and flexible environmental management systems that are tailored to our risks, drives achievement of our vision and are regularly reviewed for currency, relevance and effectiveness.
- Allocating the appropriate resources and providing the necessary information, instruction, training and supervision to enable implementation of the environmental management systems.
- Effectively reporting, recording and investigating environmental incidents and near misses in the workplace and taking proactive measures to prevent recurrence.
- Maintaining preparedness to respond promptly to environmental incidents to mitigate the nature and scale of unintended impacts.
- Setting, monitoring and communicating meaningful performance measures to drive continuous improvement.
- Regularly auditing our operations to monitor compliance with statutory obligations and conducting accurate and transparent reporting on any findings.

A copy of the AGIG Environmental Policy and Statement of Commitment is provided in Appendix A.

The AGIG Environmental Policy is reviewed every two years, or when there is a significant change to the organisation or its activities, to ensure that the policy remains comprehensive

and current. Employees are consulted during the review process through a number of mechanisms including HSE Committees.

2.2 Structure and Responsibility

All staff are responsible for the environmental performance of their activities and for reporting any environmental hazards and incidents. Environmental responsibilities for staff and contractors are contained within position descriptions, relevant procedures and work instructions. Overarching environmental roles are described in Table 2-1 below and specific environmental responsibilities are addressed in Section 6. Although subject to change from time to time, a copy of the organisational structure current at the time of document submission is contained in Appendix B.

Table 2-1 Key Environmental Responsibilities

Position Title	Environmental Responsibilities
Executive Management Team	▪ Hold overall responsibility for environmental management of the WER ▪ Review, understand, approve and support implementation of this plan ▪ Ensure adequate resources are provided for the implementation of this plan
Executive General Manager Transmission Asset Management (EGM TAM)	▪ Ensure that environmental obligations are embedded into design of the WER and AGIG's systems and processes for satisfying compliance and due diligence requirements ▪ Ensure that proposed project additions and alterations obtain all necessary environmental approvals ▪ Manage and coordinate emergency response in accordance with the WER Emergency Response Plan
Executive General Manager Transmission Operations (EGM TO)	▪ Ensure that environmental obligations are embedded into the DBNGP and DBP's systems and processes for satisfying compliance and due diligence requirements ▪ Ensure operations personnel are adequately trained to carry out their environmental duties ▪ Facilitate the implementation of this plan in relation to operational activities ▪ Ensure incident reporting protocols are communicated and adhered to ▪ Respond to environmental incidents as required ▪ Remediate contaminated sites ▪ Maintain the corridor in accordance with this CEMP and relevant Pipeline Operating Polices and Standard Operating Procedures. ▪ Conduct Pipeline Ground Patrols ▪ Oversee completion of emergency response exercises annually ▪ Maintain spill response and emergency equipment ▪ Maintain full written records of all inspections, corridor works, surveys and checks ▪ Ensure Aerial Surveillance activities are undertaken as per CEMP requirements
Executive General Manager Commercial (EGM Comm)	▪ Ensure environmental obligations are embedded into the operation and despatching of the plant ▪ Control Room operators are adequately trained to carry out the despatching of the plan efficiently ▪ Manage and coordinate the emergency responses from the control room in support of the ERP and CMT ▪ Drive fuel efficiency operation of the plant ▪ Conduct operations in line with commitments in the GHG Management Plan
Relevant Managers	▪ Ensure operations personnel training plans reflect the environmental duties and the training is carried out ▪ Ensure this plan is embedded in an Asset Management tool

Position Title	Environmental Responsibilities
	▪ Ensure incident reporting protocols are followed and that all personnel report Events/Hazards and near misses ▪ Respond to environmental incidents as required
HSE Manager - Transmission	▪ Monitor implementation of and compliance with the CEMP and environmental risk assessment recommendations ▪ Facilitate and monitor EP Reviews ▪ Coordinate, undertake and conduct reviews of audit reports and monitor completion of required corrective actions ▪ Report significant environmental non-compliances with the CEMP and legislation internally to the DBP Executive Management Team and externally to regulatory authorities, as required ▪ Ensure all environmental obligations are added to the DBNGP Master Obligations Register and are kept current in that register ▪ Monitor compliance against environmental obligations ▪ Manage the Authorisation to Clear Vegetation permit process ▪ Assess changes to legislation and regulatory requirements and update the CEMP as required to ensure ongoing compliance ▪ Identify changes to operations and update the CEMP to address and manage any new environmental risks ▪ Review and maintain the CEMP to incorporate any internal changes including organisational and process changes ▪ Provide assistance and/or advice regarding implementation of the CEMP and any other environmental management concern ▪ Liaise with government agencies regarding environmental issues ▪ Assess environmental incidents to determine regulatory reporting requirements
Head of Transmission Engineering	▪ Ensure that any engineering works are undertaken in compliance of the requirements of the CEMP ▪ Ensure the Project Management Office conducts works in compliance to the CEMP ▪ Ensure the Project handover process has the CEMP obligations embedded into the handover
Head of Land Management	▪ Liaise with landholders, traditional owners, community representatives, contractors, councils, planning and local government authorities as well as utilities and infrastructure owners on land management and environmental matters as required ▪ Report on, and address as required, existing and emerging Native Title and Cultural Heritage issues
Person In Charge (PIC)	▪ PIC is the onsite role to manage and conduct onsite works including inspections, permitting, daily rounds and planned and corrective maintenance tasks ▪ Ensure all personnel working onsite aware of Stop Work Authority ▪ Ensure risk assessment processes are implemented prior and during work activities ▪ Onsite leadership and management for personnel, contractors and visitors ▪ Conduct or delegate site specific induction requirements ▪ Conduct or delegate site testing / sampling requirements in line with approved plans and procedures ▪ Provide incident management and reporting advise to personnel ▪ Participate in annul environmental review process (e.g. GHG)
Training Manager	▪ Facilitate the maintenance, implementation and ongoing improvement of training and induction programs
All Personnel	▪ Read, understand and implement the control measures detailed within Section 6 of this plan ▪ Report all observed non-compliances to a supervisor ▪ Report all observed incidents, hazards and near misses

Position Title	Environmental Responsibilities
	▪ Understand requirements for response to an environmental incident or hazard ▪ Participate in environmental training and emergency response exercises. ▪ Continually seek to identify areas for improvement of environmental management and report these to the HSE Manager

2.3 Legislation

Key environmental legislation and other requirements that may apply to the WER are presented in Table 2-2 below.

Table 2-2 Associated Environmental Legislation and Other Requirements

Commonwealth Legislation	
Aboriginal and Torres Straits Islander Heritage Protection Act 1984	An Act to ensure the protection of Cultural Heritage which requires that any new development in previously undisturbed areas is reviewed to assess potential heritage impacts and ensure appropriate approvals are in place prior to commencing works. Any modifications or enhancements (projects) include a heritage impact assessment. Awareness of the requirements under this Act and the State Act ensure knowledge of assessment requirements and identification of heritage artifacts and Native Title aspects of the local area.
Environmental Protection and Biodiversity Conservation Act 1999	An Act to identify and ensure the protection of Matters of National Environmental Significance (MNES). Approval requirements are set out for any new developments either undertaken on Commonwealth Land or considered to have potential to impact upon MNES. A Referral has been submitted to the relevant Department under the EPBC Act for the project due to the potential impacts to MNES species (Carnaby's Cockatoo).
National Greenhouse and Energy Reporting Act 2007	This Act requires the monitoring and if required, reporting of greenhouse gas and energy production / consumption. This is completed annually and relates to fuel gas use, gas venting and diesel fuel use. Additionally this Act sets out the definition of emissions scopes (i.e. Scope 1 emissions).
Native Title Act 1993	An Act to ensure Native Title holders' rights are protected throughout development within proclaimed areas. Any modifications or enhancements (projects) include a heritage impact assessment and respect for the local Native Title requirements.
Western Australian Legislation and Associated Regulations	
Aboriginal Heritage Act 1972	All sites of Aboriginal archaeology are protected and will require pre-clearance survey and permit if materials are to be disturbed. Declared heritage places are protected and will need to be avoided or consent obtained if site is to be disturbed. The WER included a heritage impact assessment as well as ensuring personnel are aware of their requirements to protect any heritage identified.
Biodiversity Conservation Act 2016	Supersedes Wildlife Conservation Act and requires management of impacts to threatened species, ecological communities and conservation reserves. Includes requirements under regulations

	for licensing to take or impact native flora and fauna as will be required during construction of the WER. Clearing, operational and vegetation maintenance activities can impact on rare flora or fauna but these are limited in the proposal area.
Biodiversity Conservation Regulations 2018	Fauna licensing for any fauna handling along the pipeline route or in the compounds. Additionally includes threatened flora and communities licensing requirements for impacts to conservation significant species. The WER does not impact any TEC areas but Fauna licenses will be required for fauna handlers on the project.
Biosecurity and Agriculture Management Act 2007	Includes obligations for the management of declared weeds within WA and the need for the identification and management of weed species. Declared weeds may occur along the pipeline route or in the plant area and require management and landholder consultation for best management practices.
Bushfires Act 1954	Sets out requirements for fire protection matters including firebreaks around compounds and fire ban controls. Total Fire Ban exemptions and conditions for work have been built into hot works and other fire prevention controls. Recent updates to the regulations also include no hot works during catastrophic fire rating days and this is discussed in Section 6.4.
Dampier to Bunbury Pipeline Act 1997	An Act that sets out the controls and responsibilities for access to the Dampier to Bunbury pipeline corridor (easement) including access authority and granting of access for third parties. The West Erregulla meter station shall meet these requirements as part of connection to the DBNGP.
Dangerous Goods Safety Act 2004	An Act that outlines the management of Major Hazard Facilities which includes the WER Plant. The Act also outlines requirements for the storage, handling and transport of dangerous goods and reference to the Australian Dangerous Goods Code.
Environmental Protection Act 1986	Act to ensure the protection of the Environment. Includes requirements for referral of projects, licensing of scheduled activities and obligation to prevent pollution and minimise impacts to the environment. This includes the reporting of any pollution. Section 2.4 sets out the current related approvals.
Environmental Protection Regulations 1987	Regulations (including sub regulations) in terms of the management of noise, clearing of native vegetation, controlled wastes, unauthorised discharges and litter is managed on site. Main interaction is the Ministerial approval or clearing permit used for activities to ensure safe pipeline operations and included in Section 2.4 and 6.2. Management of noise and discharge of wastes is also required under this Act to ensure no negative impacts to receptors.
Environmental Protection Regulations (Abrasive Blasting) 1988	Management of environmental risks relating to abrasive blasting activities including noise, dust and waste management. Abrasive blasting may occur occasionally during construction or operations but is restricted to construction or compound areas.
Environmental Protection Regulations (Clearing of Native Vegetation) 2004	Regulations specific to the clearing of native vegetation and includes potential exemptions under Petroleum related legislation and activities.
Environmental Protection Regulations (Noise) 1997	Controls in relation to noise levels at environmental receptors. Includes management of activities that could breach levels including timing of activity, duration, notification to stakeholders and noise monitoring.

Petroleum Pipelines Act 1969	Manages the pipeline license area for operations and includes pipeline safety and Safety Case obligations and the obligation to minimise environmental impacts.
Petroleum Pipelines (Environment) Regulations 2012	Sets out specific requirements including the development and approval of the CEMP and the need to manage environmental impacts.
Rights in Water and Irrigation Act 1914	Requirements for management of impacts to water bodies including surface and ground water. Specific to WER can include the construction of a well (bore) and abstraction of water from the well for use in the facility as per the regulations.
Rights in Water and Irrigation Regulations 2000	Includes the licensing and management requirements for the construction of a well/bore, abstraction of water and any impacts to beds and banks. Water abstraction may be required during operations and as such the relevant licenses will be applied for, however no Beds and Banks permit is currently planned due to lack of surface water impacts in the project area.
International Conventions	
Convention on Biological Diversity	International agreement which obliges the Australian Government to have policies and procedures to protect biodiversity and plan for biological conservation outcomes.
Migratory Birds – China	International agreement to provide an important mechanism for pursuing conservation outcomes for migratory bird species with China. Refer to Section 3.1
Migratory Birds – Japan	International agreement to provide an important mechanism for pursuing conservation outcomes for migratory bird species with Japan. Refer to Section 3.1
Migratory Birds – Republic of Korea	International agreement to provide an important mechanism for pursuing conservation outcomes for migratory bird species with the Republic of Korea. Refer to Section 3.1
Standards	
AS2885 Pipelines – Gas and Liquid Petroleum	Pipeline design requirements as well as specific to line of sight clearing requirements (vegetation maintenance) and pigging requirements.
AS1940:2017 The storage and handling of flammable and combustible liquids	Ensure the bunding of hydrocarbons and odorant on site is managed according to this standard.
AS1697: 2005 Installation and maintenance of steel pipe gas systems	Installation and maintenance of steel pipe systems including design criteria to ensure containment.
AS1692:2006 Tanks for flammable and combustible liquids	Pressure vessel requirements for waste oil, oil and the odorant tanks to ensure design and maintenance to ensure containment.
AS3780:2008 The storage and handling of corrosive substances	Any minor storage of corrosives on site will meet this standard.
AS2507 :1998 The storage and handling of pesticides	Any minor / temporary storage of pesticides and herbicides will meet this standard.
Codes and Guidelines	
Australian Pipeline and Gas Association (APGA) Code of Environmental Practice	Code for the implementation of environmental controls during construction and operations of pipelines.
Australian Dangerous Goods Code	Code that defines what is a Dangerous Good and requirements for the transport, storage and handling applicable to chemicals and odorant utilised for this activity.

Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) ANZECC.	Guideline that provides values for water discharge levels to the environment under the National Water Quality Strategy. See Section 6.8
Guideline – Treatment and Management of soil and water in ASS landscapes (DWER, 2015).	Department of Water and Environmental Regulation (DWER) Guideline in relation to management and treatment of Acid Sulphate Soils (ASS). The WER is unlikely to intersect with areas of potential ASS but may conduct excavation activities in these areas periodically. See Section 6.1
Identification and investigation of acid sulphate soils and acidic landscapes (DEC, 2013).	Guidelines that sets out the requirements for assessing ASS presence, likelihood of impacts and triggers for treatment. This links to the above Guideline in developing an ASS Management Plan. See Section 6.1
Water Quality Protection Note 13 – Dewatering of soils at construction sites	DWER Guidance Note on how to minimise impacts from dewatering and outlines approval requirements, discharge management and sets out an indicative water quality for discharge. See Section 6.8.

2.4 Project Approvals

The anticipated approval requirements for the project are set out in Table 2-3.

The Proposal has not yet been assessed under Part IV of the EP Act or the EPBC Act. The referral process is currently in progress.

This CEMP outlines the management approach to the construction and operation of the Proposal with the proposed conditions (Section 6) to ensure environmental outcomes and objectives are achieved.

Table 2-3 Summary of environmental approvals

Approval	Activity	Description
Pipeline Licence	Construction and Operation of a gas pipeline	As part of issuing a Pipeline Licence, DMIRS requires an approved Environment Plan to be in place for the management of environmental risks and impacts of the project.
Environmental Protection Act Approval	An activity that may have significant environmental impacts	Referral to the Environmental Protection Authority for the project based on potential significant impacts.
EPBC Act Approval	Activity that significantly impacts Matters of National Environmental Significance (MNES)	Referral made 24 February 2021 for assessment under the Act for impacts to MNES species (*Paracaleana dixonii.* and Carnaby's Cockatoo)
Major Hazard Facility	Construction and Operation of a gas processing plant	Requirement under the Dangerous Goods Act to have the plant location licensed as a major hazard facility.
DWER Works Approval and Prescribed Premises Licence	Construction and Operation of a gas processing plant	Works Approval and license for the WER where it meets the threshold levels for emissions from the plant above those set out in Schedule 1 of the Regulations.
Licence to Take Fauna	Construction works	Requirements for DPAW and DWER to ensure all fauna handling is conducted under a license.

3. Existing Environment

3.1 Surveys and study findings

A number of studies have been undertaken of the Development Envelope to assess the key environmental factor (see Section 1.4) baseline conditions. These studies and results are summarised in Table 3-1.

Table 3-1 Overview of studies undertaken in proximity to the Development Envelope

Reference	Survey type and location	Key Outcomes
West Erregulla Targeted Flora Survey (Mattiske December 2021 survey)	A targeted flora survey of the West Erregulla Pipeline Project to identify the location of threatened and priority flora, with particular focus on the presence of *Paracaleana dixonii.*	One individual *Paracaleana dixonii* was recorded within the Development Envelope. The survey also identified a number of Priority flora taxa.[1]
West Erregulla Pipeline Flora and Fauna survey (ELA 2020a).	Detailed and Targeted flora survey and vegetation condition assessment, Basic fauna survey, Targeted Black Cockatoo habitat assessment and Targeted Malleefowl survey (of the Development Envelope).	No individuals of the targeted threatened taxa *Paracaleana dixonii.* No individuals of the targeted threatened species Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and Malleefowl (*Leipoa ocellata).* **Priority flora:** 8 confirmed taxa. No Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs) were recorded.
West Erregulla Plant and Pipeline Hydrology Survey (ELA 2020b)	Baseline and Preliminary Impact Assessment Survey including flood monitoring, surface water features, current bore network and groundwater depth.	No significant surface water features in development envelope. Groundwater was >100 m below ground level (mbgl) and would not be impacted by the project.
Review of key potential flora, vegetation and fauna values on the proposed pipeline for Strike Energy near Dongara (Mattiske 2020)	Desktop assessment of the potential flora, vegetation and fauna values present (within the ELA 2020a survey area).	12 threatened and 18 priority flora species have the potential to occur. 4 TECs and 6 PECs have the potential to occur. 10 threatened fauna species have the potential to occur.
West Erregulla targeted threatened flora survey (ecologia 2018)	Targeted threatened flora survey (within the current survey area)	No individuals of the targeted threatened taxa *Thelymitra stellata, Paracaleana dixonii* and *Eucalyptus crispata*. No TECs and PECs were recorded.

[1] Due to the date of the survey, the full survey report is not yet available and a brief outline has been provided above to assist the assessment process. The full survey report will be available in February/March 2022.

West Erregulla Project Flora and Vegetation Assessment (Woodman 2013)	Detailed flora and vegetation survey (within the current survey area)	Threatened (Declared Rare Flora) flora: *Thelymitra stellata*, *Paracaleana dixonii*, *Eucalyptus crispata.* Priority flora: 23 confirmed taxa. No TECs and PECs were recorded.

The following sections provide a description of the local and regional existing environment.

3.2 Climate

The region experiences a warm, Mediterranean climate with hot dry summers and mild wet winters (Mitchell et al. 2002). Based on climate data from the nearby Bureau of Meteorology (BoM) Dongara weather station (station number 8044; climate data 1844 – current; located approximately 50 km north-west km of the Development Envelope), the area receives an annual average rainfall of 454.4 mm, most of which occurs during late autumn and winter (May – August) (BoM 2020; Table 3-2).

Table 3-2: Long-term rainfall recorded at the Dongara weather station (8044)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean	5.4	10.6	13.8	22.3	68.1	108.3	91.8	66.3	35.2	18.7	8.7	4.3	**454.4**
Highest	64.0	156.2	185.5	105.2	268.6	356.1	244.1	175.3	125.0	111.8	57.0	44.0	**953.2**
Lowest	0.0	0.0	0.0	0.0	0.5	11.4	14.2	4.8	1.4	0.0	0.0	0.0	**243.6**

Source: BoM 2020 (1896 – current)

3.3 Landforms, geology and soils

The Interim Biogeographic Regionalisation for Australia (IBRA) currently classifies 89 bioregions across Australia, based on a range of biotic and abiotic factors such as climate, vegetation, fauna, geology and landform (Thackway and Cresswell 1995; DAWE 2020). The Development Envelope is located in the Geraldton sandplain bioregion (Lesueur sandplain subregion, GS3). The Geraldton sandplain bioregion that comprises mainly proteaceous shrub-heaths on extensive, undulating and lateritic sandplain (Desmond and Chant 2001).

3.3.1 Geology

The Proposal is located within the north to north-west trending onshore Northern Perth extensional Basin, comprising predominantly Permian to Jurassic continental clastic rocks (Geoscience Australia 2021). The Northern Perth Basin represents a deep, 12 km thick trough (Dandaragan Trough) that rises gently northwards towards the Allanooka High to then step up via a series of terraces at its northern and western margins. In the east the Basin warps against the regional north-south trending Darling Fault System (Geoscience Australia 2021).

3.3.2 Landforms and soils

The Lesueur sandplain subregion comprises coastal Aeolian and limestones, Jurassic siltstones and sandstones of central Perth Basin. Alluvials are associated with drainage systems and there

are extensive yellow sandplains in south-eastern parts. Shrub-heaths rich in endemics occur on a mosaic of lateritic mesas, sandplains, coastal sands and limestones, and heath on lateritised sandplains along the subregions north-eastern margins (Desmond and Chant 2001).

Soils in this region are described as yellow sands inland and leached sandy soils near the coast, which overlay laterite. Four broad geology soil units (Table 3-3) and two soil units (Table 3-4) have been mapped across the Development Envelope.

The Development Envelope has not been assessed nor classified under the WA Acid Sulfate Soil (ASS) Risk Assessment Framework (DWER 2021a). From previous site inspections no ASS materials have been identified.

Table 3-3 Broad geology soil units of the Development Envelope

Unit	Type	Description
Czl	Lateritic duricrust	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite
Czs	Sand - residual	Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand
Jsya	Sandstone, siltstone, shale, conglomerate, coal	Variegated sandstone, feldspathic sandstone, siltstone, shale, conglomerate, coal
Qd	Sand - aeolian, sand - residual	Dunes, sandplain with dunes and swales; may include numerous interdune claypans; residual and aeolian sand with minor silt and clay; aeolian red quartz sand, clay and silt, in places gypsiferous; yellow hummocky sand

Table 3-4 Soil units of the Development Envelope

Unit	Description
Wd9	Broad valleys and undulating interfluvial areas with some discontinuous breakaways and occasional mesas; lateritic materials mantle the area: chief soils are sandy acidic yellow mottled soils, (Dy5.81) containing much ironstone gravel in the A horizons, and (Dy5.84), both forming a complex pattern with each other and with lateritic sandy gravels (KS-Uc2.12). Associated are leached sands (Uc2.21) underlain by lateritic gravels and mottled clays that occur at a progressively greater depth down slope
Ca27	Sandy plains with occasional pockets of sand dunes, a few small swamps, and stream courses: chief soils are leached sands (Uc2.21), often with a sandy clay substrate

	between 3 and 6 ft in depth. Associated are (Dy5.61) and gravelly (Dy5.81) soils with (Uc1.22) soils on the dunes

3.3.3 Land Systems

Land systems traversed by the Pipeline corridor are outlined in Table 3-5.

Table 3-5 Land systems traversed by the Proposal

Land system	Land system description
Mount Adams System (224Ma)	Gently undulating sandplain with low gravel ridges and occasional laterite breakaways.
Correy System (221Cy)	Broad sandy alluvial fan of the lower Arrowsmith River. Pale deep sands predominate, with grey shallow sandy duplexes, moderately deep sandy gravels and yellow deep sands less common. Banksia woodlands and heathlands.

3.4 Flora and vegetation

Vegetation condition within the Development Envelope is excellent. Minor disturbances include minimal presence of weeds and feral fauna (rabbit diggings, scats) (ELA 2020a). The majority of the Development Envelope was impacted by a fire in April 2019. On ground surveys revealed that the fire has altered the structural elements of vegetation communities present within the Development Envelope; although, a strong post-fire recovery was observed, with the majority of flora species expected to occur being present. Flora species with more rapid post-fire recovery strategies were naturally more dominant than those which take longer to re-establish (ELA 2020a).

3.4.1 Vegetation associations

The pre-European vegetation of the Development Envelope was defined and mapped by Beard (1976) and within the broader region by Beard (1990) in the Irwin Botanical District as coastal scrub heath on sandplains, with *Acacia* and *Allocasuarina* thickets further inland, and hard-setting loams with *Acacia* scrub and scattered *Eucalyptus loxophleba*.

Three vegetation associations occur within the Development Envelope, as outlined in Table 3-6.

Table 3-6 Beard (1976) vegetation associations of the Development Envelope

Vegetation association	Description	% coverage of 213 ha Development Envelope
49	Shrublands; mixed heath	6%
378	Shrublands; scrub-heath with scattered *Banksia* spp., *Eucalyptus todtiana* and *Xylomelum angustifolium* on deep sandy flats in the Geraldton sandplains bioregion	22%
379	Shrublands; scrub-heath on lateritic sandplain in the central Geraldton sandplains bioregion	72%

3.4.2 Vegetation communities

Six vegetation communities were mapped within the Development Envelope during on-ground surveys (ELA 2020a). An overview of these communities is provided in Table 3-7 and depicted in Figure 3-1.

Table 3-7 Vegetation communities recorded within the Development Envelope

Vegetation community	Vegetation description
AcEbHh	*Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland.
EtAhHh	*Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland.
BpDdHh	*Banksia prionotes* mid open woodland over *Daviesia divaricata*, *Conospermum boreale*, *Allocasuarina humilis* mid open shrubland over *Hibbertia hypericoides* low open shrubland and *Ecdeiocolea monostachya*, *Mesomelaena pseudostygia* low open sedgeland.
AcAhGp	*Allocasuarina campestris* tall sparse shrubland over *Allocasuarina humilis*, *Hakea auriculata*, *Petrophile shuttleworthiana* mid open shrubland over *Gastrolobium plicatum* low open shrubland and *Ecdeiocolea monostachya*, *Schoenus armeria* low open sedgeland.

AcDdMl	*Allocasuarina campestris* tall isolated shrubs over *Daviesia divaricata*, *Conospermum boreale*, *Beaufortia elegans* mid open shrubland over *Melaleuca leuropoma*, *Hibbertia hypericoides* low open shrub over *Ecdeiocolea monostachya* low open sedgeland.
EtBaHh	*Eucalyptus todtiana* mid open woodland over *Banksia attenuata*, *Calothamnus blepharospermus*, *Eremaea beaufortioides* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland.

3.4.3 Threatened Ecological Communities and Priority Ecological Communities

No TEC or PEC were identified during on-ground surveys conducted by ELA in September 2020 (ELA 2020a). There are two TECs listed at State level that occur 10 km to the east of the Development Envelope (DBCA 2020):

- Mound Springs (Three Springs area) (Endangered (EN))
- Ferricrete floristic community (Rocky Springs Type) (Vulnerable (VU)).

3.4.4 Flora

A total of 166 taxa (165 native and one introduced) from 90 genera and 37 families were recorded within the Development Envelope (ELA 2020a).

Figure 6-2: Vegetation communities mapped within the Development Envelope (Page 1 of 3)

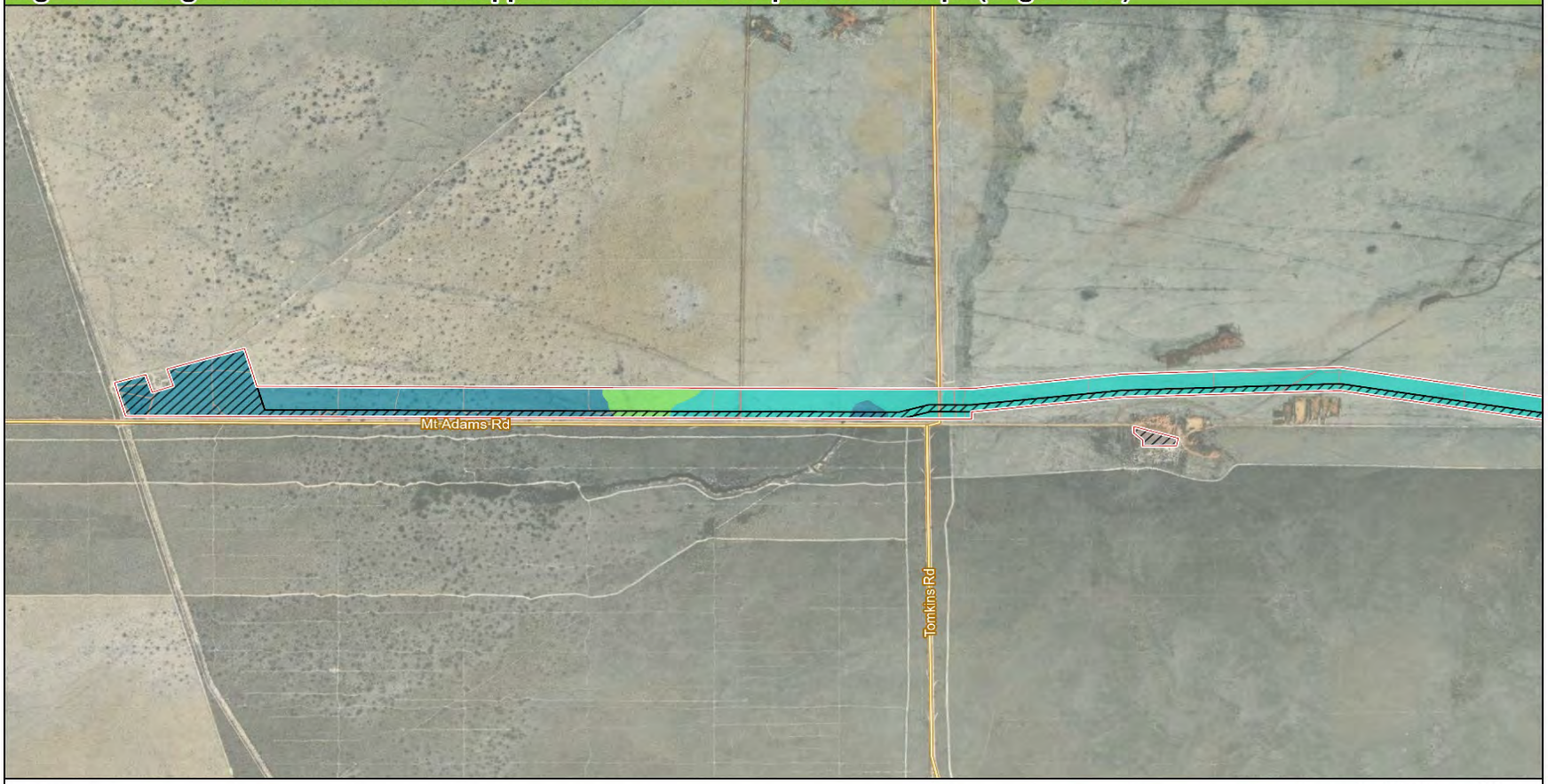

Figure 6-2: Vegetation communities mapped within the Development Envelope (Page 2 of 3)

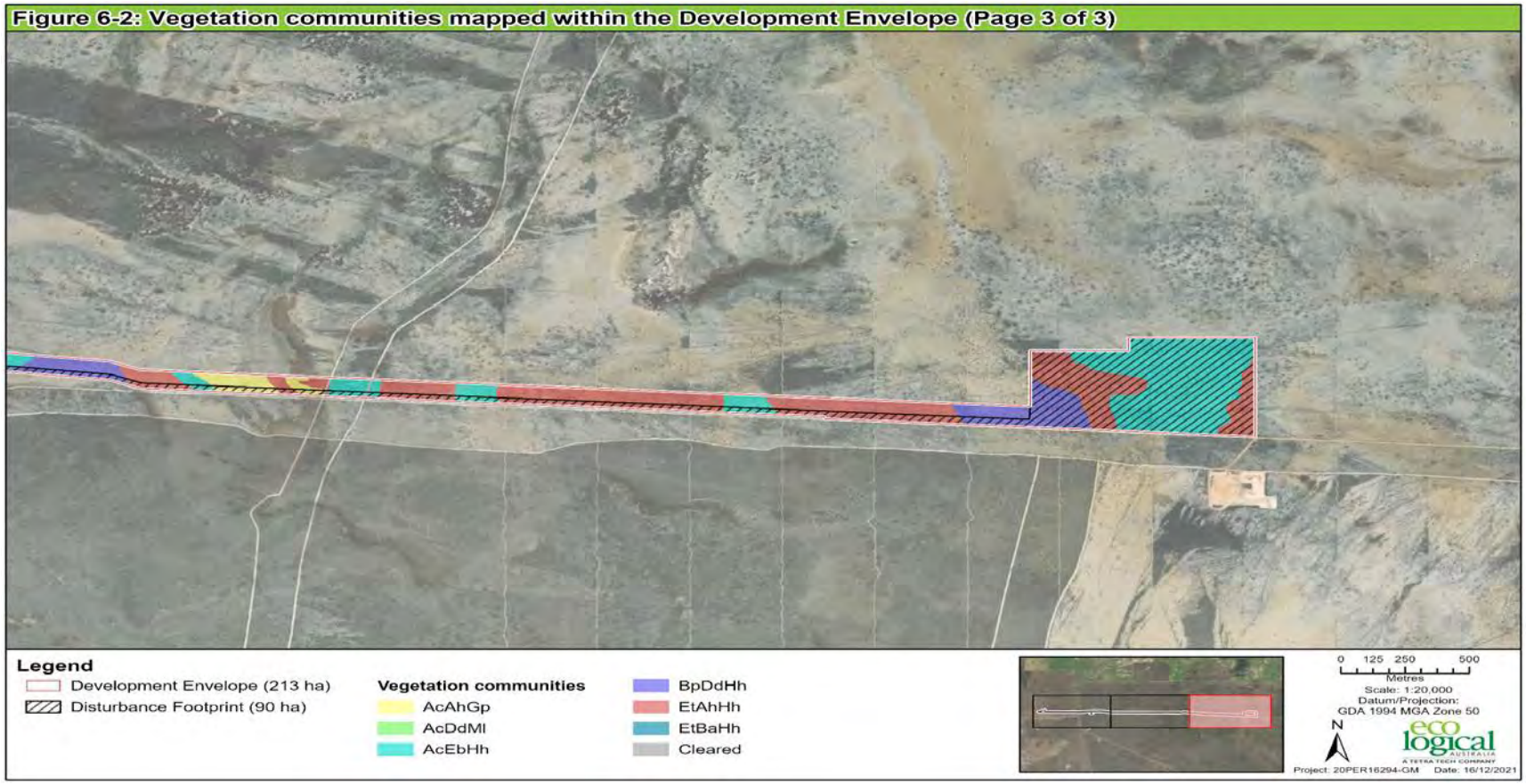

Figure 3-1 Vegetation communities within the Development Envelope

3.4.5 Conservation significant flora

One Threatened flora species, *Paracaleana dixonii* (Endangered under the EPBC Act and Vulnerable under the BC Act) was previously recorded within the Development Envelope from a database search (2011 record); however, this species was not recorded in the recent targeted flora survey (ELA 2020a). An additional survey was conducted in December 2021, which located one individual within the pipeline route. This individual will be managed for avoidance through the construction and operations phases by delineation, barriers, signage and awareness for all personnel.

Eight flora species listed as Priority by DBCA were recorded within the Development Envelope from the 2020 field survey, including:

- *Micromyrtus rogeri* (P1)
- *Lasiopetalum ogilvieanum* (P1)
- *Guichenotia alba* (P3)
- *Mesomelaena stygia* subsp. *deflexa* (P3)
- *Stylidium drummondianum* (P3)
- *Banksia scabrella* (P4)
- *Eucalyptus macrocarpa* subsp. *elachantha* (P4)
- *Stawellia dimorphantha* (P4).

The location and details of conservation significant flora recorded in the Development Envelope are provided in ELA 2020a.

3.4.6 Weeds

One introduced (weed) flora species is present at a low density in the Development Envelope within the AcEbHh, EtAhHh and EtBaHh vegetation communities. It is likely this weed is being spread via the movement of cattle and other introduced fauna species (ELA 2020a).

3.5 Terrestrial fauna

Three fauna habitats were mapped within the Development Envelope, covering a total of 199.6 ha (98.47% of the Development Envelope). The remaining 3.1 ha (1.53% of the Development Envelope) was described as Cleared. Habitat types include:

- **Fauna habitat 1:** *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on sandy plains (69.3 ha; 34.19% of the Development Envelope)
- **Fauna habitat 2**: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sandy plains (89.5 ha; 44.15% of the Development Envelope)
- **Fauna habitat 3**: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises (40.8 ha; 20.13% of the Development Envelope).

Further details and mapping of these habitats is provided in Figure 3-2.

A total of 46 fauna species were identified from the desktop assessment as possibly occurring within the Development Envelope. Of the 46 species, 35 fauna species (31 native and four

introduced) were recorded within the Development Envelope during recent surveys (ELA 2020a). This included 28 bird species, five mammal species and two reptile species.

3.5.1 Conservation significant fauna

The Proposal is in the non-breeding range of the Carnaby's Cockatoo (*Calyptorhynchus latirostris*); however, the Development Envelope potentially provides low quality foraging habitat due to the presence of *Banksia* spp. and *Hakea* spp. (DSEWPaC 2012; DotEE 2017). The recent fire has decreased the likelihood of the species utilising the Development Envelope in the immediate future (ELA 2020a). No direct or indirect observations of the species have been recorded in the Development Envelope.

3.5.2 Introduced fauna

Evidence of four introduced fauna species (mainly scats and tracks) has been recorded within the Proposal area including Cattle (*Bos taurus*), Domestic Dog (*Canis lupus familiaris*), Goat (*Capra hircus*) and European Rabbit (*Oryctolagus cuniculus*) (ELA 2020a).

3.5.3 Conservation areas

Two reserves, Yardanogo Nature Reserve (R36203) and Beekeepers Nature Reserve (R24496), are located approximately 4 km and 15 km to the southwest of the Development Envelope respectively. These will not be impacted by the proposed works.

Figure 7-1: Fauna habitat recorded within the Development Envelope (Page 1 of 3)

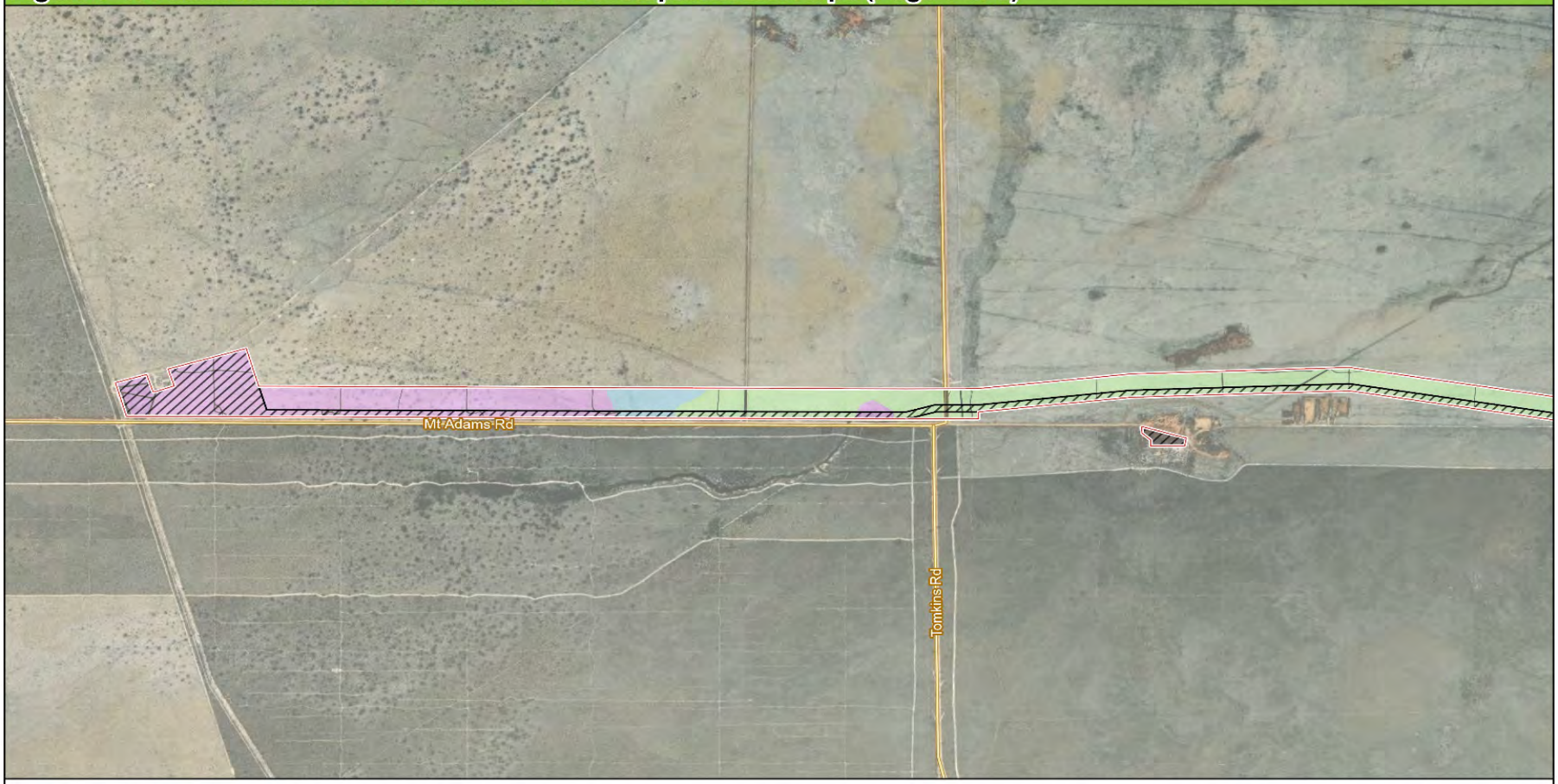

Figure 7-1: Fauna habitat recorded within the Development Envelope (Page 2 of 3)

Figure 3-2 Potential fauna habitat within the Development Envelope

3.6 Hydrology and hydrogeology

3.6.1 Hydrology

The Development Envelope does not contain any significant permanent surface water features; however, it is encompassed by two regional drainage systems, the Irwin and Lockier Rivers 22 km to the north and the Arrowsmith River 15 km to the south (ELA 2020b). Numerous small watercourses dissect the surrounding area, draining either westwards from the Arrowsmith Region onto the Swan Coastal Plain, or north or south towards the two river systems (RPS 2011). The nearest watercourse is Sand Plain Creek, located approximately 6 km north of the Development Envelope.

3.6.2 Hydrogeology

The Development Envelope is located within the Twin Hills Groundwater subarea where two major regional groundwater resources exist; the Yarragadee Formation (the largest aquifer in the Perth Basin) and the underlying Lesueur Sandstone (ELA 2020b). The Cattamarra Coal Measures and the Eneabba Formation host smaller, localised aquifers.

Yarragadee Formation

The Yarragadee Formation is present at surface within the Development Envelope and unconfined in its upper parts; becoming increasingly confined at depth due to the layered nature of the formation. The upper water table in the Yarragadee Formation is more than 100 m below ground level and given the layered nature, little direct rainfall recharge is expected to reach the regional water table. RPS (2011) reported recharge rates for the Yarragadee Formation (based on a rainfall infiltration study of the Parmelia Formation, 20 km northeast of the Development Envelope) to be in the region of 4% to 11% of annual rainfall (RPS 2011). Minor recharge from stream flow infiltration in the upper reaches of the Irwin River is also expected.

The water quality in the Yarragadee Aquifer is fresh to brackish, with salinity in the aquifer ranging between 500 to 1,000 mg/L and increasing with depth (RPS 2011).

Cadda Formation

The Cadda Formation underlies the Yarragadee Formation at around 1,700 mAHD. It hosts minor permeable horizons but is generally of very low permeability and acts as a regional aquiclude, separating the Yarragadee Formation above from the Cattamarra Coal Measures below.

Lesueur Sandstone

The Lesueur Sandstone within the Development Envelope is beyond economic exploitation and is also likely to contain hypersaline groundwater. The Lesueur

Sandstone subcrops to the south of the Proposal area from Leeman to Wedge Island and is overlain by Cainozoic sediments (RPS 2011).

Cattamarra Coal Measures and the Eneabba Formation

The Cattamarra Coal Measures and the Eneabba Formation both contain groundwater but are understood to be internally confined by coal seams and thick mudstone sequences respectively. The Eneabba Formation is likely to be hypersaline and isolated from the upper Cattamarra Coal Measures.

3.6.3 Regional groundwater levels and groundwater flow

A generalised overview of the dominant groundwater flow patterns for the upper Yarragadee indicate flow in a general westerly direction beneath the Development Envelope. The water table is mostly flat above the 80 m contour but drops off significantly to the west towards the Swan Coastal Plain.

According to RPS (2011), while the limited data available precludes the identification of local influence of structural control on groundwater flow in the Development Envelope, detailed studies elsewhere in the region have shown a close correlation between the regional water table configuration and the major regional faults. This suggests that the major faults may inhibit groundwater flow and compartmentalise the main aquifers with water levels 'stepping down' to the west (RPS 2011).

3.7 Heritage

3.7.1 Aboriginal Heritage

No Aboriginal Heritage Sites were detected in the Development Envelope through a search of the Registrar of Aboriginal Sites on NationalMap (Department of Planning, Land and Heritage (DPLH) 2021a). The closest site is the Irwin River approximately 10 km to the north of the Development Envelope, registered as a Historical, Mythological, Camp Natural Feature and Water Source by DPLH.

AGIO has identified and consulted with the Traditional Owner group with management control over the development envelope area. This changed during the planning process from Yamatji Marlpa Aboriginal Corporation (YMAC) to Bundi Yamatji Aboriginal Corporation (BYAC).

In December 2020, in consultation with YMAC and BYAC a heritage and ethnographic survey was conducted on the development envelope (Extent Heritage, 2021). The survey concluded that no Registered Sites or Other Heritage Places are within the project area. No archaeological or ethnographic sites were identified or reported within the project area.

The development envelope is part of the Yamatji Nation Native Title Claim (WAD345/2019) area. The Yamatji Nation was granted Native Tile on 7 February 2020. The survey was conducted with the full involvement and participation of endorsed representatives of Southern

Yamatji. BYAC have approved of the project proposal through a Board endorsement in August 2021.

3.7.2 European and State Heritage

No registered European heritage values were detected in the Development Envelope through a search of the WA Heritage Council Database – inherit (DPLH 2021b). The closest sites of European Heritage; Shady Grove Homestead (place number 12315) and Willow Green (place number 18091) are both located approximately 15 km northeast and north respectively from the Development Envelope.

3.7.3 GeoHeritage

No registered GeoHeritage sites were detected within the Development Envelope through a search of the DMIRS GeoView database (DMIRS 2021). The closest site of GeoHeritage is Enokurra Hill (GeoHeritage site 41) located approximately 33 km east of the Development Envelope.

4. Activity Description

AGIO proposes to construct and operate of a gas processing plant and pipeline near Dongara, Western Australia collectively referred to as the West Erregulla Gas Project (WER). The project includes the processing of gas from upstream wells (third party) and transport of the gas to the Dampier to Bunbury Natural Gas Pipeline (DBNGP). The Proposed Scope of Work includes:

- A West Erregulla gas processing facility (WEF), with a nominal design flow capacity of 87 terajoules per day (TJ/d);
- A 16.5 km interconnecting buried gas pipeline between the WEF and the DBNGP tie-in point (WEP);
- A West Erregulla Custody Transfer metering facility (WEM) located at the Main Line Valve Compound MLV93 on the DBNGP approximately 400km North of Perth;
- Supporting infrastructure proposed to include but not limited to power generation, flare system, water treatment package, water evaporation pond, back-up diesel system, and communications within the WEF; and
- Onsite office and 4 bed self-contained accommodation unit.

An outline of the project is included in Figure 4-1.

Table 4-1 Proposed Disturbance Footprint

Item	*Proposed Disturbance*	*Proposed Rehabilitation*
Gas processing plant: ▪ gas plant ▪ evaporation pond ▪ evaporation pond piping ▪ potential construction camp ▪ connecting track to wellheads ▪ accommodation block	42 ha	5 ha
Gas Pipeline – 16.5 km ▪ 6 m restricted rehabilitation over pipeline (no trees) ▪ 3 m permanent access track ▪ 21 m temporary disturbance for construction only	43 ha (30 m wide right of way)	38.7 ha including restricted rehabilitation area 30.1 ha full rehabilitation area
Custody Transfer Meter Station at DBNGP MLV93 (WEM)	1 ha	0.5 ha

Access tracks *(construction only)*	1 ha	1 ha
Ancillary works *(pond, access, permanent access tracks)*	3 ha	0
TOTAL	**90 ha**	45.2 ha (including restricted area) 36.6 ha full rehabilitation

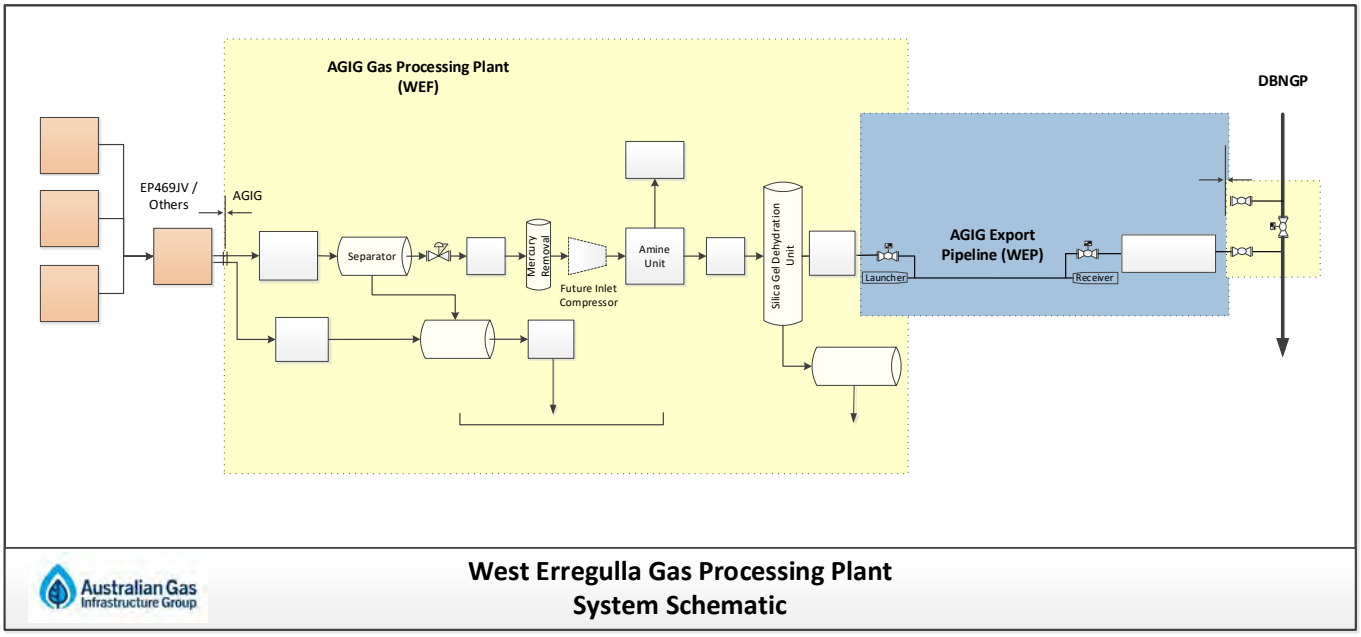

Figure 4-1 Overview of the WER

4.1 Pipeline

This section provides an overview of the pipeline route construction and operational process.

The pipeline is a high pressure 16" (DN400) Class 600, 10.2 MPa pipeline approximately 16.5 km in length. The pipeline shall include pig launcher and receiver facilities to enable future internal (in-line) inspections to occur.

Activities completed as part of construction of the pipeline are detailed below in Table 4-2

Table 4-2: Pipeline construction activity descriptions

Activity	Description
Detailed Survey	Engineering, environmental and cultural heritage surveys are used both in route selection and to determine if any special construction techniques or mitigation measures are

Activity	Description
	required. Once the preferred pipeline route has been determined, the centreline is surveyed and engineering aspects are finalised. Markers (pegs) are placed to identify the pipeline route and corridor.
Fencing	Where required and in consultation with landholders, fences are severed and construction gates installed to allow access for both property boundary and internal fences.
Clear and Grade	Graders and bulldozers are used to clear the area to provide for construction activities. This clearing will be within the permitted area as per the Authorisation to Clear Vegetation (or an alternative equivalent process) and will include pipelaying area (corridor) and the location of the permanent facility. The cleared area may include excavations through sand dunes and watercourse beds and banks to establish a construction corridor. For safety reasons, dependent on soil type (eg heavy sand), an additional area may need to be cleared in limited areas to allow for trench and stockpile stability. Topsoil will typically be graded to a depth of 100 to 150 mm for a blade-width over the trench line, or the entire working side or the full construction corridor, depending on factors such as the soil type, terrain, construction requirements and weather conditions. Topsoil will be stockpiled separately. Overburden related to dune and river crossings will be stockpiled adjacent to the excavation, in areas with no, or limited vegetation cover, where practicable. Fauna controls will be implemented as outlined in this plan.
Trenching	After the route is cleared, a trench (generally 1.5-2 m deep) is dug for the pipeline by either a trenching machine or an excavator in accordance with pre-defined depths of burial. The required depths are determined by the AS2885.1 risk assessment process and recorded on construction alignment sheets. Trench spoil is stockpiled on the right-of way, usually on the non-working side. Trench spoil is stockpiled separately to topsoil. The trench will be monitored daily for fauna entrapment and refuges (hessian bags or similar) placed in the trench to provide protection for fauna that temporarily occupy the trench. The trenches will be ramped at regular intervals to allow larger fauna to escape. The period that any part of a trench will be left open will be minimised. The maximum amount of time a trench will remain open is 21 days which may be extended with an approved risk assessment review. Trenches will be stopped and started at regular intervals with “plugs” between these sections to allow for unimpeded movement of livestock and fauna. Where possible, trenching will be delayed until completion of the welding and joint coating as part of ensuring that the trench will be open for the minimum amount of time.
Hand Digging	In areas that are within 1(m) to any known buried service, machine excavation is not allowed. Hand digging shall be used to positively identify the service (s)
Stringing	Steel pipe is trucked to the construction site and sections, each approximately 18 metres long, are laid end-to-end next to the trench. The sections are placed on sandbags and raised on blocks of wood (timber skids) to protect the pipe from corrosion and coating damage.
Bending	Where required, pipe sections are bent to match changes in either elevation or direction of the route.
Welding	Pipe sections are welded together.
Non-destructive weld testing	The pipe welds are inspected using x-ray or ultrasonic equipment as per AS 2885.2.
Joint coating	The area around the weld is grit blasted and then coated with a protective coating to prevent corrosion.

Activity	Description
Padding	Where required, padding machines are used to sift the excavated subsoil to remove coarse materials to prevent damage to the pipe coating. The remaining fine material is used to pad beneath and on top of the buried pipe. In some instances (e.g. rocky soils), imported sand or foam pillows are used for padding.
Lowering-in	Side booms (bulldozers with cranes) or excavators are used to lower the welded pipe into the trench.
Backfilling	Trench spoil is returned to the trench and material compacted to minimise the likelihood of subsidence of material over the pipe.
Watercourse Crossings	The pipeline alignment may cross watercourses of varying size, some of which are ephemeral. The ephemeral streams are expected to be dry during construction and crossings will be constructed using standard open cut (trenching) construction. Erosion and sediment control measures will be implemented to ensure there are no significant impacts at these crossings. Perennial river crossings may require construction by horizontal directional drilling, to be used under the riverbed to minimise disturbance. Permits will be obtained from the DoW where crossings involve any interference to bed or banks.
Install temporary infrastructure	Temporary infrastructure may include, but is not limited to, rubbish bins, ablutions, site office and lay down area.
Set up small mechanical workshop/work area	A small area away from the facility pad is cleared to allow for use as a workshop for welding, non-destructive testing, hydrostatic testing and sandblasting. The workshop may be located next to the site sea containers with tarpaulins extended to offer shade.
Install facility foundations, cables and conduits (electrical and fibre optic) and electrical earthing	Excavate for meter station foundations and cable trenches: Foundations are compacted and tested for compaction. Smaller pre-cast foundations are installed, however larger foundations may be site poured. In this case formwork, reinforcing and a concrete truck is used. Electrical cables are typically installed in conduits to avoid the requirement for termite treatment and are backfilled. However, if direct cable burial cannot be avoided termite treatment is used before backfilling.
Install facility, filtration and pressure reduction valves if required	The facility skid, filter and pressure reduction valves are installed onto the foundations. Pipe supports and filter are levelled and grouted.
Install remote terminal unit (RTU), communications mast, instrumentation and control equipment	RTU, communications mast (if required), instruments and control equipment are installed.
Complete electrical installation	Termination of electrical wiring in the control hut or box.
Pressure testing	Pipeline integrity is verified using hydrostatic testing in accordance with AS 2885.5. During hydrostatic testing the pipeline is capped with test manifolds, filled with water and pressurised up to a minimum of 125% of design maximum operating pressure for a minimum of two hours. A minimum 24-hour duration leak test then follows. Providing it

Activity	Description
	meets DWER water quality guidelines and has landholder approval, hydrotest water is discharged to the surrounding environment. Hydro-test water will be sourced from a variety of sources, including public water supply system standpipes, dams, local groundwater or streamflows, subject to licensing from the DWER. In general, it is expected that no chemicals will be added as the pipeline is internally coated. However, in some locations chemicals may need to be added if there is danger of aggressive water affecting the integrity of the internal coating. In these cases and where necessary, the water will be treated to neutralise alkaline elements to an appropriate standard before discharge to the environment. This discharge is a once-off discharge during commissioning of the pipeline and will be undertaken to the requirements of DWER. Should chemicals be required, details of these chemicals will be included in Bridging Documents submitted to DMIRS for approval.
Restoration and Rehabilitation	The corridor is re-contoured to match surrounding landform, and erosion controls constructed where necessary. Separately stockpiled topsoil is then respread evenly across the corridor and any stockpiled vegetation placed across the easement, to assist in soil retention, provision of seed stock and fauna shelter. Reseeding or revegetation of the corridor, using appropriate species (i.e. crops/pasture or indigenous native species of the right provenance), will be undertaken to restore vegetation cover.
Signage	Information signs on the presence of the buried pipeline are erected in line of sight along the corridor as per AS 2885.1.
Fencing	Fencing is installed around the additional area.
Commissioning	The piping is vented with compressed air to check for leaks, natural gas is then used to ensure cleanliness and to gas up the system. A vent pipe with an outlet >2.2m above ground level is used to release the compressed air and any overpressure of gas. The station pipe work is pressurised to line pressure, pressure reduction valves set (if installed) and electrical equipment energised and tested. Following successful commissioning first gas is allowed to flow through the system.
Site clean up and rehabilitation	Removal of site office, ablutions, accommodation and surplus materials. Any areas outside that are not to remain permanently will be rehabilitated. Areas which may remain include the access track and skid. Where necessary ground is re-contoured and topsoil re-spread.

Pipeline operations including regular and frequent maintenance as outlined in the Asset Management Plan, Safety Case and Environment Plan approved by DMIRS. Activities such as vegetation maintenance, pigging, minor upgrades, electrical and mechanical maintenance and cathodic protection surveys will be undertaken as set out in the above plans. These activities and their controls are included in Section 6 of this plan.

4.2 Processing Plant

The plant construction will include the following key processes:

- Survey and mark out
- Clear, level, cut and fill as required (bulk earthworks)
- Civil and foundation works
- Evaporation pond and infiltration pond layout and construction
- Mechanical package assembly
- Structural and piping assembly

- Electrical installations
- Final civil and structural construction works
- Pre-commissioning
- Commissioning

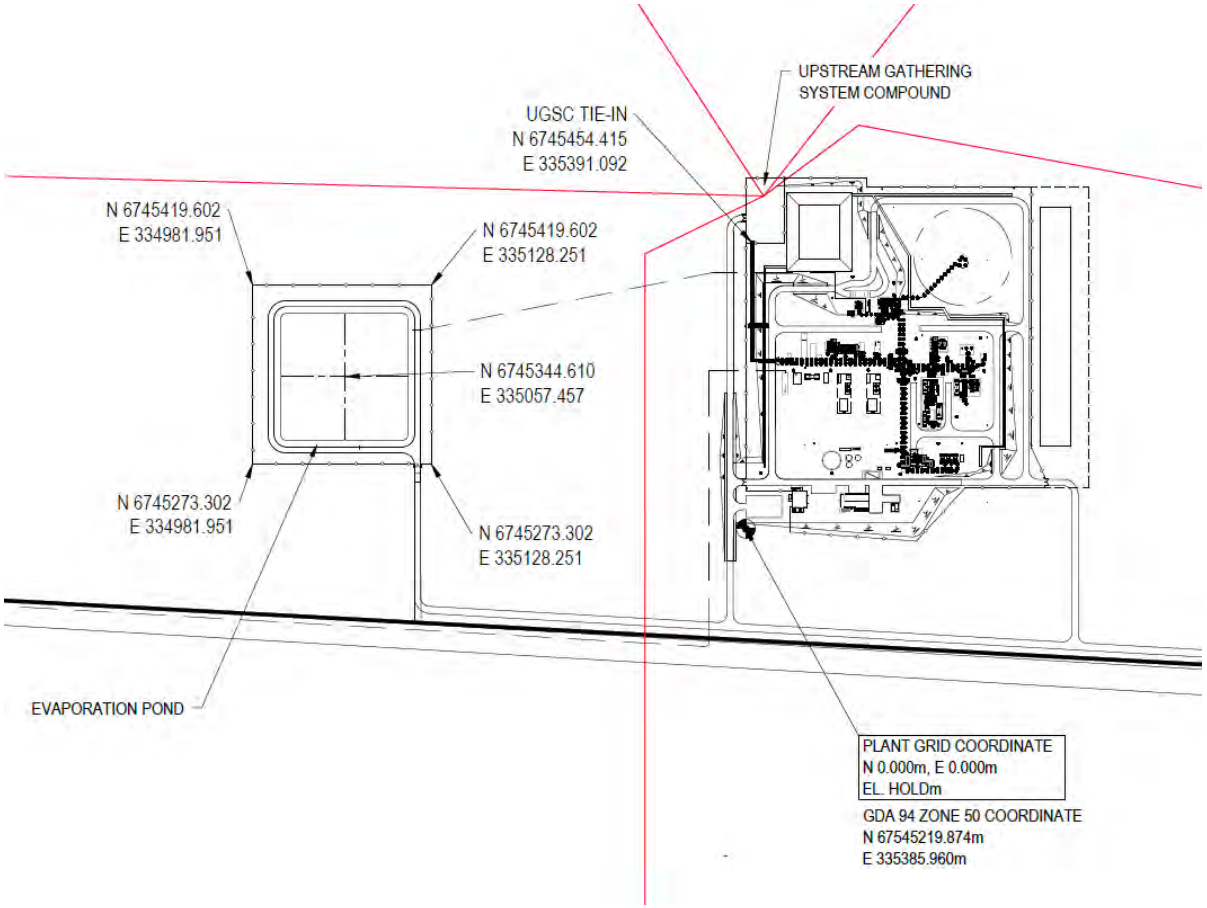

Figure 4-2 Proposed Gas Plant Layout (design subject to change)

Processing plant construction and operation description are detailed below in the following subsections. Section 6 outlines the hazards and controls for both construction and operations.

4.2.1 Station Flare and vents

A station flare unit will be installed to burn off any hydrocarbons remaining in the gas after removal from the amine package and other captured releases. Volumes of gas being flared shall be monitored as required under the Greenhouse Gas Management Plan (GHGMP). The location of the flare is outlined in Figure 4-2.

- All blowdowns within the WEF will be directed to the flare.
- Blowdown times to be designed to comply with API RP 521 requirements.
- The flare has been designed with a 50m exclusion zone, and the height minimised as far as practicable to minimise light pollution
- Process PSVs will be directed to the flare.
- Fire case PSVs will discharge to atmosphere, but not expected to be utilised within the life of the facility.

Pressure relief vents exist through the Custody Transfer Meter Station (WEM) to meet safety requirements. Vent systems at the meter station have been designed to the following requirements:

- Noise attenuators have been installed on the vents to ensure compliance with *Environmental Protection (Noise) Regulations 1997*.
- Vent height designed to safely disperse vented gas with safe gas concentration at ground level.
- Vent height minimised to reduce light impacts to surrounding area.
- Station vents located such that there are no high sources of ignition within 10m of the vent.
- Vents separated from the nearest working area based on safe heat radiation level under full flow conditions, should the vented gas be ignited.

4.2.2 Power Generation

Three Gas Engine Alternators (GEAs) (required duty being approximately 1800 kVa) will be installed and a backup Diesel Engine Alternator (DEA) of 1600 kVa to ensure power supply to the plant. The GEAs will be fed from a fuel gas skid using natural gas with a minor amount of diesel stored on site for the DEA and for vehicle refuelling.

An Uninterrupted Power Supply (UPS) system shall provide both 24 VDC and 230 VAC 50 Hz essential power for a full rating of 30 minutes or 48 hours (critical services only). The UPS system shall be through a battery bank set up.

4.2.3 Gas Processing:

The Gas Processing system will include the following:

- Inlet gas metering
- Separator (to Gas breakout tank)

- Inlet Cooler
- Mercury Removal Unit
- Amine Package (AGRU)
- Silica Gel Package (Dehydration)
- Thermal Oxidiser Gas Heater
- H_2S Guard Bed package
- Aftercoolers
- Condensate stabilization
- Hot Oil Package

4.2.4 Communication System

The communications network provides Supervisory, Control and Data Acquisition (SCADA) for the plant and links to the DBNGP communication network. It provides all telephony, Mobile Voice Radio, Corporate Ethernet and Control Local Area Network (LAN) connections between the site facilities and to the DBNGP Gas Control centre.

4.2.5 Maintenance Facilities, Storage and Logistics

Facilities on site shall include suitable sheds, storage and tanks to ensure containment of materials, equipment and waste. Where required, this will include the storage of dangerous goods in compliance with the Australian Dangerous Goods Code.

A vehicle washdown facility, workshop, lighting, fire-fighting and detection capability and other plant requirements will be installed to assist in operations of the plant. All facilities shall be air-conditioned and include adequate parking facilities.

4.2.6 Oily water system

The Oily water system is designed to capture any potential leaks, spills or washdown liquids that may contain contaminants (focused in on hydrocarbons) to ensure these do not interact with soil and are held within containment. This includes bunds, drainage and oily water separator units. Hydrocarbon wastes will be treated and then disposed of as oil and water will be discharged to the site evaporation pond.

4.2.7 Accommodation / Office

A site office will be constructed onsite as part of the overall site management and control room.

There will be construction accommodation onsite which will be temporary during the construction, commissioning and initial operations period.

Permanent accommodation is motel style, air-conditioned, capable of accommodating between 4 to 12 people, and equipped with cooking, washing, sleeping and recreational facilities. Additional accommodation may be included for specific work activities such as shutdowns or where there is an operational need identified. This would all be within the approved plant footprint and no additional clearing would be required.

4.2.8 Water Management

Water management for the site includes:

- Raw water provision to site (local bore/s);
- Reverse Osmosis (RO) Unit;
- Open drains tank;
- Waste water management from accommodation and ablution facilities;
- Evaporation Pond (see 4.2.9);and
- Surface Water Infiltration Pond.

Raw water supply for the plant is through the use of a local bore and regulated standpipes. Potable water will be via a reverse osmosis (RO) unit onsite. During construction, raw and potable water may be transported in from local water supply agents.

Water use for the operations of the plant is calculated at 16 kL per day. This equates to 5,840 kL per annum. The current bore proposed for use has a licensed limit of 20,000 kL per annum.

The RO unit will supply water via potable, demineralised and de-ionised water with an associated tank for each stage of purification. Each tank will include associated pumps (generally two pumps for a duty/standby configuration) and distribution lines with. Waste water from the RO unit (approx. 33%)

Water is drawn from the bore by electrical submersible pumps to the raw water storage tank. Alternatively water can be sourced from nearby regulated stand pipes in line with commercial limits as set out by Water Corporation. The raw water is treated by a reverse osmosis unit and the product fed into the potable water tank. Microbiological growth in the stored potable water is controlled by the installation of UV Sterilising Units that circulate water to ensure that bacteria levels are maintained within acceptable standards. The potable water passes through an activated carbon filter unit to usage.

Both raw and potable water are circulated around the station according to the specific requirements via a water treatment skid located in the Water Treatment building.

Waste water from the reverse osmosis (RO) units is pumped directly into the lined evaporation pond. Based on a 70% efficiency of the RO units, this equates to approximately 1,752 kL per annum.

Waste water from the accommodation and control room facilities will be directed to a leach drain where it mixes with septic waste water from the accommodation and control room facilities.

Where demineralised water facilities are provided, a proportion of potable water is pumped into another reverse osmosis unit to provide demineralised water that is then stored within a fibreglass tank. This water is pumped through to the GEA Radiator Water Treatment Tank, to standpipes that service the GEA Head Tanks.

Surface water (rainfall) is designed to be captured and channelled through the plant to the infiltration pond to allow for controlled infiltration back into the local water system. The infiltration pond is designed to a 1 in 100 year rainfall event for the region. Bunds that collect water will have a controlled, locked, manual release (drain valve) to ensure potentially contaminated water is prevented from entering the infiltration pond system.

Construction water will be used for dust suppression, temporary offices and crib rooms, hydrotesting and general construction activities (wash down etc.). The predicted total volume of the work in 18,500 kL. Depending on timing and use of the proposed bore, regulated sources nearby (standpipes) will be used for either the majority of works or the residual need. No new groundwater bores are proposed and therefore no groundwater modelling was undertaken.

4.2.9 Evaporation Pond

A 170 m x 170 m evaporation pond shall be constructed to manage produced water and inflows from processing. The pond shall be double lined to prevent any potential contamination from entering the local soil or groundwater. Design factors have been included to ensure pond provides a high level of containment of all process water.

The Evaporation Pond has been designed with the following controls:

- 2 mm HDPE Primary Liner;
- HDPE Drainage mat;
- 2 mm HDPE Secondary Liner;
- 500 mm freeboard design above maximum predicted water level;
- Worst case scenario using 3 year maximum year precipitation (surge storage);
- RO, waste production water (plus 20% design factor) and demineralised water consumption in aftercoolers accounted for, plus rainwater collection;
- Pond depth includes a 1 in 100 year event plus unseasonal weather; and
- Leak monitoring – HDPE monitoring pipe with capped end and 6 mm drain holes over a 1 m length.

4.3 Meter Station Construction

The following outlines the construction methodology for the Meter Station.

Activity	Description
Survey and peg out site	Engineering and, if necessary, environmental and cultural heritage surveys are used to select the site and to determine if any special construction techniques or mitigation measures are required. Once the preferred site has been determined, the station boundary, hot tap location, custody transfer point and engineering aspects are finalised. Marker points are placed to identify the project area.
Clear and grade	Minor clear and grade operations may be required for the meter station to ensure a clear area for extension of the existing compound. Graders and/or bulldozers are used to clear an area for new facilities, access, site facilities area and a lay down area. The clearing is targeted within the DBNGP corridor; however some area may also be cleared outside the corridor. Topsoil is stripped for the width and length of the meter station pad. The pad is then in-filled with imported, free draining soil and compacted and filled to the design level.
Install temporary infrastructure	Temporary infrastructure may include, but is not limited to, rubbish bins, ablutions, site office and lay down area.
Set up small mechanical workshop/work area	A small area away from the meter station pad is cleared to allow for use as a workshop for welding, non-destructive testing, hydrostatic testing and sandblasting. The workshop may be located next to the site sea containers with tarpaulins extended to offer shade.

Activity	Description
Install meter station foundations, cables and conduits (electrical and fibre optic) and electrical earthing	Excavate for meter station foundations and cable trenches: Foundations are compacted and tested for compaction. Smaller pre-cast foundations are installed, however larger foundations may be site poured. In this case formwork, reinforcing and a concrete truck is used. Electrical cables are typically installed in conduits to avoid the requirement for termite treatment and are backfilled. However, if direct cable burial cannot be avoided termite treatment is used before backfilling.
Install meter skid, filtration and pressure reduction valves if required	The meter skid, filter and pressure reduction valves are installed onto the foundations. Pipe supports and filter are levelled and grouted.
Install remote terminal unit (RTU), communications mast, instrumentation and control equipment	RTU, communications mast (if required), instruments and control equipment are installed.
Complete electrical installation	Termination of electrical wiring in the control hut or box.
Install dewatering (if required)	Excavation dewatering may be required in areas of shallow groundwater. To minimise the cone of depression, multiple dewatering spears will be inserted around the excavation.
Excavation for tie-in line	A trench (minimum 1.5 m deep) is dug for the tie-in line in accordance with DBP Excavation Procedure and Permit to Work System. Trench spoil is stockpiled within the corridor usually on the non-working side.
Complete fitted welds	The tie-in and site field welds are completed in-situ or in the temporary workshop. During welding a humpy or tent is used to cover the weld and welder.
Non-destructive weld testing	The pipe welds are inspected using Magnetic Particle Inspection (MPI), X-ray, gamma or ultrasonic equipment.
Hydrostatic testing	Pipework integrity is verified using hydrostatic testing in accordance with ASME B31.3 Code – Process Piping. During hydrostatic testing the pipework is capped or blind flanged, filled with water and pressurised up to 150% of design maximum operating pressure for a minimum of two hours. A minimum 24 hour duration leak test then follows. In general it is expected that no chemicals will be added to the test water as the pipeline is internally coated. However, in some locations chemicals may need to be added if there is danger of aggressive water affecting the integrity of the internal coating. In these cases and where necessary, the water will be treated to neutralise alkaline elements to an appropriate standard before discharge. Should chemicals be required, details of these chemicals will be included in Bridging Documents submitted to DMP for approval. Where possible pipe spools are moved away from the meter station pad for hydrostatic testing.
Touch up paint/wrapping	Minor paint chips etc. are touched up with a paintbrush. Larger areas to be painted are spray painted with careful consideration to the wind direction and intensity, proper masking of nearby pipe and equipment and storage of paint. All below ground field joints are wrapped in denso tape. All below ground pipe is jeep tested to ensure paint integrity. Jeep testing involves placing an electrical charge on the steel pipe then using a steel brush on the pipe coating. If a jeep noise is heard then it is an indicator of electrical continuity between the brush and the steel pipe and indicates a paint defect (i.e. crack). Any below ground paint defects are wrapped.

Activity	Description
Backfill	Imported clean sand is used around and 200 mm below any below ground piping. Common fill is used for the remaining fill. Common fill will be certified weed and disease free as well as non-acid sulphate soil.
Remove dewatering (if installed)	Turn off pump and remove dewatering spears. Pump settling pond dry and remove plastic liner. Ensure that any settled material remains in the liner and is disposed of at an approved location.
Fencing	Fencing is installed around meter station and blue metal is placed on ground in meter station compound.
Commission meter station	The station piping is vented with natural gas to ensure cleanliness. A vent pipe with an outlet 2.2m above ground level is used. Estimated volumes of natural gas to be vented to the atmosphere will be included in project specific Bridging Documents submitted to DMP for approval. The station pipe work is pressurised to line pressure, pressure reduction valves set (if installed) and electrical equipment energised and tested. Following successful commissioning first gas to the client can be delivered.
Site clean up and rehabilitation	Removal of site office, ablutions, workshop and surplus materials. Any areas outside that are not to remain permanently will be rehabilitated. Areas which may remain include the access track and meter skid. Where necessary ground is re-contoured and topsoil re-spread.

4.4 Operations

The gas processing plant and pipeline will operate under DMIRS regulatory requirements as a Major Hazard Facility (MHF) and Petroleum Pipeline. This includes requirements for environmental and safety requirements to be met throughout operations.

Activities during operations are set out in an Asset Management Plan (AMP) which details the inspection, maintenance and activities required to ensure the safe, efficient and environmentally sound operations. The AMP includes set frequency and timings to minimise risk of failure as well ensuring efficient operating status. Communications maintenance, remote operability, leak detection and testing of emergency processes are all included in the AMP.

The AMP includes all requirements as set out in the relevant Safety Report (MHF) or Safety Case (Pipeline) and the linked Environment Plan. An Operations Environment Plan shall be developed for DMIRS approval for the ongoing management of the pipeline which will also be included the AMP.

In particular operations shall include the following:

- Annual HSE Audit against criteria including the environment plan
- 6 monthly facility HSE inspection
- Daily inspections including bunds and evaporation pond
- Emissions monitoring and measurement
- GHG MP efficiency and feasibility of new technology reviews

- Maintenance and shutdown tasks as per AMP including calibration works, filters, pressure monitoring, electrical and mechanical maintenance
- Communication and SCADA data sharing, maintenance and upgrades
- Water management through Reverse Osmosis system

Activities outlined in section 4.1 and 4.2 may also be applicable to operations (i.e. Evaporation pond, water management and accommodation).

4.4.1 Vegetation Maintenance

As required under AS2885.3, the WER pipelines will undergo regular vegetation management to ensure Line of Sight (LOS) between pipeline signs and access to pipeline corridors is maintained. This process is undertaken in accordance with statutory clearing approvals and managed internally under an internal permit process, referred to as an Authorisation to Clear Vegetation (ACV). The ACV process conducts a pre-clearing review of the specific area to be cleared, reviews environmental aspects in the area (i.e. DRF, ESAs, TEC's) and a review of the clearing process to be used. The ACV establishes any specific controls (i.e. hand clearing only) in areas of particular value and provides information on these aspects to the field team. The ACV also enables the tracking of clearing volumes (area), dates completed and location to assist in the reporting process. Section 6 outlines the use of the ACV as a control for environmental impacts identified.

4.4.2 Pigging

The pipeline has been designed to enable the internal clearing of the pipeline. Facilities are included with installations for the launching and receival of in line inspection tools and cleaning via pigging. Pigging is conducted in line with the approved Asset Management Plan and conducted on average every five years depending on cathodic protection results.

5. Environmental Risk Identification and Assessment

5.1 Key assumptions and uncertainty

A number of factors that represent risk to the success of this CEMP are described below. The objectives, management targets and actions are summarised in Section 5 have been designed to try to minimise these risks wherever possible.

AGIG are ultimately responsible for successful construction, operation and rehabilitation of the Proposal to meet the specific completion criteria outlined in this CEMP and the corresponding Rehabilitation Management Plan (RMP); however, there are actions that will be implemented by third parties where relevant (e.g. the Construction Contractor will implement the majority of actions based on a standard pipeline reinstatement and rehabilitation approach). Issues associated specifically with heritage values will be addressed in consultation with the Traditional Owners.

5.2 Risk assessment process

AGIG ensures the effective management of risk across its business through implementation of their Risk Management Policy. The AGIG Risk Management Policy makes a commitment to ensure that:

- Systems are in place to identify (as fair as reasonably practicable) risks faced by the business
- The impact of identified risks is understood
- Risk treatment owners are nominated to manage the identified risks
- Assurance is provided on the effectiveness of the risk management system and risk controls.

In order to identify understand and manage all environmental sources of risk and consequent impacts associated with the construction of the Proposal, a comprehensive Environmental Risk Assessment (ERA) was undertaken as part of the development of this plan to identify the potential impacts with a greater environmental risk and where assessment and management controls should be focused (Appendix D). The ERA included a multidisciplinary team of in-house personnel following a structured process to:

- Outline key construction activities
- Identify, analyse and evaluate associated hazards and corresponding environmental impacts
- Where necessary, establish suitable controls
- Systematically assess the residual associated environmental risk.

The risk assessment was undertaken using a systematic risk-based approach based on international best practice standards, including:

- AS/NZS ISO 31000:2018: Risk management - Principles and Guidelines (Standard)

- HB 158:2010: Delivering assurance based on ISO 31000:2009 Risk management – Principles and Guidelines (Handbook)
- HB 203:2012: Managing environment-related risk (Handbook)
- HB 436:2004: Risk Management Guidelines Companion to AS/NZS 4360:2004 (Handbook).

This approach is summarised in Figure 4-1.

The risk assessments were conducted collaboratively between the consultant (ELA) and AGIG to identify the objectives, scope and risk criteria for the Proposal. The risk assessment for the biophysical factors and socio-economic factors required different specialist expertise and were conducted separately. The ERA methodology employs a structured workshop which completes the below key steps:

a. Definition of the study objectives and area to be studied.
b. Identification of activities involved in operation and maintenance of the assets.
c. Brainstorming of the hazards and their causes.
d. Assessment of the risk associated with the identified hazards including:
    i Determination of worst-case credible consequences
    ii Identification of the existing safeguards (management control and mitigation systems and procedures)
    iii Determination of the likelihood of the consequence occurring
    iv Categorization of the risk utilizing the AGIG Operational Qualitative Risk Analysis Matrix (Appendix C).
e. Development of control measures (where deemed appropriate) to address the risks deemed unacceptable or not ALARP. Consideration of not just the proposed risk control action but also the accountability, resource requirements, timing, performance measures, monitoring and reporting requirements.
f. Evaluation of the residual risk as per the methodology outlined in Step 4.
g. Documentation of all findings within the Project Environmental Aspects and Impacts Risk Register.

ALARP and Acceptability is managed through the risk workshop process. AGIG implements a process based on risk with all risks intermediate and above assessed during the risk workshop for ALARP.

Risks that are low and negligible residual impact are not assessed for ALARP. This is due to these risks being of low consequence or highly unlikely to occur and are generally well known to the industry and part of everyday activities. Controls for these are common and form part of normal work practices.

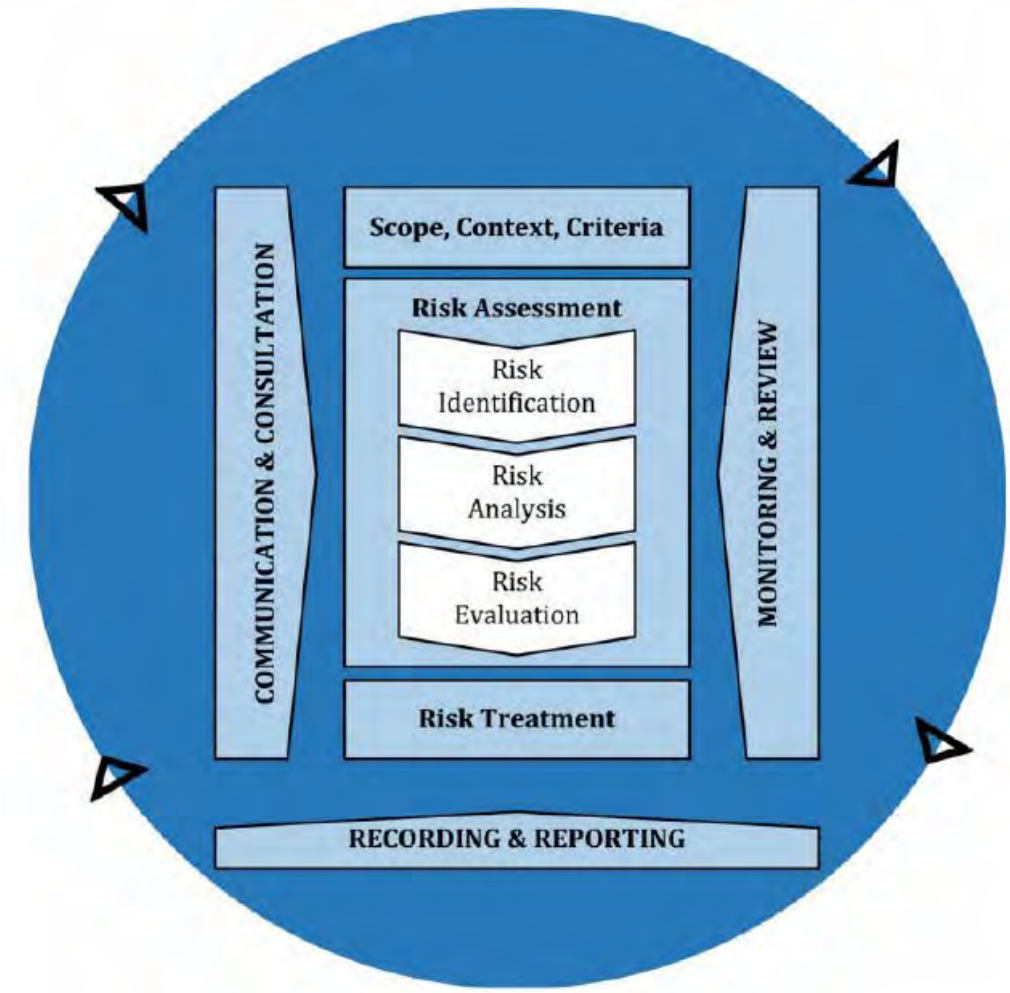

Figure 5-5-1 AS/NZS ISO 31000:2018 Risk Management Process

The scope of the risk assessment included all activities directly related to the construction and operation of the Proposal. Environmental aspects relevant to the Proposal and considered in the risk assessment were:

- Vegetation clearing
- Excavation
- Water use/groundwater extraction
- Energy/electricity use
- Physical presence of infrastructure
- Vehicle movements
- Fire ignition
- Liquid (including septic) and solid waste disposal
- Spills and leaks
- Atmospheric emissions (excluding dust)
- Dust emissions

- Light emissions
- Noise and vibration emissions.

The risk ratings were determined for each combination of aspect and factor, using the definitions of consequence and likelihood and applying the risk matrix (Appendix C).

Inherent risk ratings were determined with the assumption that minimum standards would be met without the implementation of additional management controls or risk assessment. Minimum standards would include compliance with legislative and corporate requirements or with operating practices commonly used for construction, operation and decommissioning of gas pipelines in WA. Knowledge of the likely occurrence of flora and fauna species (particularly threatened species and ecological communities) was addressed in the initial (pre-mitigation) risk assessment.

Management controls relevant to each inherent risk were identified, applying the management response criteria (Figure 4-1) and particularly focusing on those inherent risks rated as 'intermediate' and above. Standard controls employed by the proponent in their pipeline operations were applied initially to determine initial residual risk ratings. These ratings were further informed by impact analysis and specific Proposal controls developed within the CEMP. The ratings were revised iteratively to reduce the residual risks to as low as reasonably possible.

The full environmental risk assessment for the Proposal is outlined in Appendix D.

ALARP and Acceptability assessments were conducted for each of the environmental risks identified. These assessments were carried out by a group of multidisciplinary professionals with relevant industry experience calling upon their knowledge and awareness of internal and external scenarios where similar risks have been successfully controlled; and internal and external incidents where similar risks have failed to be adequately controlled. Comparison was made against documented industry standards when identifying the minimum standard to be achieved at all times. Specifically, the APGA Code of Environmental Practice was used for this purpose. Importantly, all assessments undertaken had regard for the inherent environmental risk of the subject area, acknowledging that ALARP would not always equate to acceptable.

6. Implementation Strategy – Construction and Operations

Each hazard and associated impact identified during the ERA has been attributed to at least one of the below environmental interactions (refer Appendix D):

- Soils and Sediment
- Flora
- Weeds and Pathogens
- Bushfire
- Fauna
- Cultural Heritage and Stakeholders
- Air Emissions / Dust / Noise
- Surface and Ground Water
- Hazardous Materials Storage and Handling and Spill Response
- Waste

Within each interaction sub group, each group of impacts and risks has been addressed with an objective to:

- Define the environmental performance objectives that will be required to be achieved in order to ensure environmental protection
- Define the environmental performance standards that relate to the quality of the performance
- Define the measurement criteria for determining whether the objectives and standards have been met for the activity

This section further establishes an implementation strategy such that the established objectives and standards may be met over the life of the WER.

To monitor the effectiveness of the set standards, targeted monitoring commitments have been specified where relevant. This details a measurement criteria against each standard to measure the implementation and effectiveness in achieving the objective against specific environmental interaction.

Rehabilitation for the WER is covered under a separate Rehabilitation Management Plan.

6.1 Soil and Sediments

Table 6-1 Soil and sediment; environmental objectives, standards, management controls, measurement criteria and monitoring

Soil and sediment							
Activities	Vehicle usage, pipeline maintenance, access track maintenance, clear and grade, trenching and excavation.						
Hazard	Poor stockpiling of topsoil, vehicle and earthmoving equipment movements, mixing of topsoil and subsoil and environmental conditions.						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard/ Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Loss or negative impacts to topsoil	High	Minimise change to soil profile from excavation activities	Any works impacting the topsoil or soil profile shall abide by the Native Vegetation Clearing Procedure (E-PRO-002) [or an equivalent procedure] which shall ensure at a minimum the: • Rehabilitation and reinstatement of non-operational areas • Segregation of topsoil and subsoil • Topsoil stockpiles to not exceed 2 m in height • Reinstatement of soil profile following excavation • Ripping of compacted subsoil before reinstating topsoil • Authorisation to Clear Vegetation (ACV) or an equivalent process is implemented • Dust suppression to control soil loss.	Low	Project Manager (Construction) Executive General Manager Transmission Operations (Operations)	HSE System Audit Facility HSE Inspection	All corrective actions identified in the HSE System Audit or Facility HSE Inspection in relation to erosion are closed out within the due date.
Erosion and sedimentation	High	Prevent occurrence of soil erosion	If erosion is identified associated with AGIO activities, erosion repairs shall be undertaken and if warranted, erosion and sediment control structures shall be constructed. The Procedure for Management of Erosion Risk Areas (E-PRO-003) shall be implemented including: • Sticking to existing tracks • Rehabilitation of non-operational areas • Erosion controls implemented on stockpiles (where required) or discharge points.	Low		Event Report Review Facility HSE Inspection	All corrective actions for erosion inconsistent with surrounding areas area closed out within the due date.
Exposure of potential ASS	Intermediate	Prevent acidification of potential ASS	Conduct ASS investigations where required and implement appropriate management measures, in consultation with relevant agencies.	Negligible		HSE System Audit	No non-compliances identified against objective.
ALARP and Acceptability							
ALARP	Risk of soil loss and erosion is minimal during operations as excavation of soil and vegetation maintenance activities are well controlled and have minimal impacts. For example, pipeline dig ups are minimal in size (<20 m) and vegetation maintenance does not impact root stocks and adds mulch back to affected areas. Reinstatement and rehabilitation works assist is ensuring drainage lines and erosion are assessed and controls implemented to prevent ongoing impacts. The controls in place for management of soils removed during excavation are suitable to manage the minimal impacts. Additional controls are implemented for any identified areas of erosion or potential ASS and inspections processes are in place to identify these.						
Acceptability	The risk for operations from soil loss and erosion is low. Erosion is more likely from an external source (regional flooding) and is managed through ongoing surveillance activities and consultation with landholders. AGIG accepts these risks as low and negligible as the controls are well known, industry wide accepted practices and pose little offsite risk. Development of potential ASS management measures, in line with the DWER guidelines will assist with managing discrete local impacts at the time of the activity and is aimed at minimising duration of works to reduce the potential for impact.						

Soil and sediment				
Systems and Procedures				
Risk Assessment Processes Native Vegetation Clearing Procedure (E-PRO-002) Management of Erosion Risk Areas Procedure (E-PRO-003) Driving Procedure (S-PRO-024) Work Order System (operations) INX InControl (Event Management System) HSE Audit and Evaluation Procedure (S-PRO-054) Corrective Action Register (CAR)				
Monitoring	**Details**	**Responsibility**	**Records**	**Timing**
HSE System Audit	A HSE Audit will be undertaken against the Native Vegetation Clearing Procedure (E-PRO-002) and evidence of ASS to assess implementation and effectiveness.	HSE Manager	HSE Audit Report	Once during the Proposal and annually during operations
Event Report Review	Incident or event information reviewed in relation to erosion or soil quality. Trend Analysis is conducted to ensure ongoing identified of trends.	HSE Manager	INX – Event Reports Trend Analysis	Opportunistic Annual – Trend Analysis
Facility HSE Inspection	Facility HSE inspections include a checklist approach to identify any areas of concern or potential environmental hazards; in this case specific to erosion or potential for erosion.	Person In Charge	Facility HSE Inspection Report	6 monthly (includes plant and meter station)

6.2 Flora including weed and pathogens

Table 6-2 Flora and vegetation; environmental objectives, standards, management controls, measurement criteria and monitoring

Flora and vegetation							
Activities	Vegetation and line of sight clearing, trenching and excavation, vehicle/machinery usage, maintenance activities, increased fire risk from machinery and vehicle movement, spills of hydrocarbons, hazardous materials or liquids and solid waste.						
Hazard	Clearing activities, unapproved disturbance to declared rare flora or conservation significant species, excessive clearing, vehicle and earthworks machinery movements, increased presence of weeds, contamination from waste or spills, import of contaminated fill and poor weed control program. Bushfire impacts to flora and vegetation are outlined in Table 5-3.						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard / Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Direct loss of conservation significant flora and vegetation Degradation of vegetation conditions	High	Minimise and manage the disturbance to remnant native vegetation	All clearing is managed through an internal authorisation process which facilitates preclearing checks by a competent person to: • ACV is implemented to obtain any regulatory approvals prior to clearing • Delineation of approved area prior to clear and grade (pegging) • Review the proposed location and method of clearing and conduct impact assessment • Obtain any approvals required to ensure compliance to all relevant laws • Establish any conditions necessary in order to minimise impact (including at a minimum the segregation and stockpiling of soil to enable reinstatement) • Vehicle movements to be limited to established tracks. The single individual *Paracaleana dixonii* shall be identified prior to any ground disturbance. The individual shall then be delineated through rope barriers, signage and the location marked. This information will be provided in the site project induction and to all ground disturbance works. The ACV shall include all controls and conditions to avoid disturbance to this individual. A Pre-clearance inspection shall also be completed ahead of clear and grade activities (ground disturbance) to identify any additional individuals in the disturbance footprint.	Low	Project Manager (Construction) Executive General Manager Transmission Operations (Operations)	Project Environmental Inspections	No clearing conducted outside the internal authorisation process.
						HSE System Audit	100% compliance to regulatory approval conditions
			Areas of vegetation disturbance not required for future operational use shall be rehabilitated in accordance with the RMP.		Project Manager (Construction) Executive General Manager Transmission Operations (Operations)	Project Environmental Inspections	Project Environmental Inspections verify 100% compliance with rehabilitation requirements.
						Vegetation Clearing Review	All vegetation clearing conducted in compliance with internal authorisation process.

Flora and vegetation							
			Maintain a GIS Environmental Database to present up to date publicly available information regarding the location of conservation significant and environmentally sensitive areas.		GIS Manager	GIS Review	GIS database is up to date and contains all relevant Proposal environmental information
Introduction of new weeds Spreading of existing weeds or pathogens Impact on native vegetation through use of herbicides for weed management	High	Minimise the potential for new weeds to be introduced from external sources. Minimise the risk of spreading existing weeds or pathogens.	Targeted weed management including: • Vehicles to remain on existing tracks • Targeted control of infestations • Identification and management of Weeds of National Significance (WONS) • Keeping records of new or previously unreported weed areas. Clean on Entry (CoE) Procedure including: • The delineation and demarcation of locations of infestation, high sensitivity to weeds or pathogens (i.e. COE areas) • The preferential scheduling of work for drier periods • The clean down of vehicles, including frequent visual inspections prior to entering or exiting COE areas (as per GIS database) • All fill is certified weed and seed free prior to use. A Dieback survey shall be completed prior to any ground disturbance and if located all areas shall be flagged and hygiene stations installed at each egress point.	Low	Project Manager (Construction) Executive General Manager Transmission Operations (Operations)	Project Environmental Inspections Facility HSE Inspection Dieback Survey results	Project Environmental Inspections or Facility HSE Inspections verify 100% compliance with weed and seed requirements including implementation of dieback survey controls.
Demonstration of ALARP and Acceptability							
ALARP	Vegetation maintenance activities are reduced as much as possible in terms of frequency and area impacted to minimise impacts to native flora. By minimising this clearing and having an internal and external approval process the impacts are reduced to ALARP. These activities are undertaken to meet recognized standards for safety and pipeline operation and are required under the pipeline Safety Case. Vehicle movements are minimised where possible but are required to ensure safe and effective management of the pipeline. Rehabilitation and reinstatement of non-operational areas assists in re-establishing areas required for projects or previous activities. Maintenance of tracks, fire break etc. are required to ensure safe access and controls for operations. Additionally, the review process through HSE System Audits and the Vegetation Clearing Register assist in monitoring and reviewing impacts from the above activities. The above controls have reduced this risk to an ALARP level.						
Acceptability	By minimising vegetation maintenance activities and requirements for internal approval for clearing works, AGIG has reduced the risk to an acceptable level. By utilising established tracks and maintaining vegetation this meets regulatory requirements for pipeline safety while reducing the ongoing risk to flora. By implementing the above controls this reduces the potential impacts to an acceptable level.						
Systems and Procedures							
Risk Assessment Processes Native Vegetation Clearing Procedure (E-PRO-002) Procedure for Maintenance of the DBP Environmental GIS Database (E-PRO-001) INX InControl (Event management system) GIS and aerial surveillance Land Management System (LMS) Driving Procedure (S-PRO-024) Ministerial Statement – Regulatory Approval Driving Procedure (S-PRO-024) Clean on Entry Procedure (E-PRO-014)							
Monitoring	**Details**			**Responsibility**		**Records**	**Timing**

Flora and vegetation				
Project Environmental Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including clearing permit rehabilitation and weed and pathogen controls installed and implemented.	Project Manager	Project Environmental Inspection Checklist Weed Hygiene Certificates Wash down logs GIS mapping of dieback locations if identified.	Weekly during construction activities
Vegetation Clearing Review	Review of all vegetation clearing to ensure compliance to regulatory approval conditions.	HSE Manager	Vegetation Clearing Register Completed clearing records (survey records)	At end of clear and grade and end of Proposal Annual during operations
HSE System Audit	A HSE Audit will include: • The Native Vegetation Clearing Procedure (E-PRO-002) or equivalent Proposal procedure to assess implementation and effectiveness.	HSE Manager	HSE Audit Report	Once during the Proposal, annual audit during operations
GIS Review	Review GIS data for relevancy and ensure data is up to date	GIS Manager	GIS databases	Biannually (every two years)
Facility HSE Inspection	Facility HSE inspections include a checklist approach to identify any areas of concern or potential environmental hazards; in this case specific to flora and clearing processes.	Person In Charge	Facility HSE Inspection Report	6 monthly (includes plant and meter station)

6.3 Bushfire

Table 6-3 Bushfire; environmental objectives, standards, management controls, measurement criteria and monitoring

Bushfire							
Activities	Vehicle usage, line of sight clearing, pipeline maintenance, maintenance of supporting infrastructure including hot works, construction operations.						
Hazard	Ignition from vehicles, hot works (grinding, welding, etc.) or other activities (smoking etc.)						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard/ Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Direct loss or fragmentation of native vegetation and/or fauna habitat from increased fire frequency	High	No pipeline operation caused bushfire To prevent bushfires as a result of construction or operational activities	Abide by all Bushfire Regulations including total fire ban requirements (conduct daily checks on fire danger rating for daily prestart) All activities are conducted in accordance with relevant fire restrictions (local, state), notifications and permitting procedures. This includes: • Designated smoking areas • All plant and equipment comply to fire safety standards • Fire breaks are in place and maintained • High gas risk areas are demarcated and signed • Inductions include fire risks (hot works and smoking) • Selected personnel are trained in responding to fires • Appropriate, maintained firefighting equipment is available at all times; • All prohibited items are kept away from hazardous areas. Permit to Work and Hot Works Certificate including gas testing for hazardous areas as per the Hot Works Procedure	Low	Project Manager Executive General Manager Transmission Operations (Operations)	HSE System Audit Project Environmental Inspections Facility HSE Inspections	HSE Audit verifies all conditions for firefighting equipment, notifications and total fire ban monitoring are implemented. Project Inspections or Facility HSE Inspections verify firefighting equipment in place and 90% tagged in date.

Bushfire				
Demonstration of ALARP and Acceptability				
ALARP	While utilizing industry standard practices and implementing requirements from the recent Bushfire Regulations amendments this risk has been reduced to an ALARP level. This includes ensuring daily understanding of the fire risk, ensuring first response equipment is available and the training of selected personnel. Where possible works are taking place offsite (in workshops, laydown yards) to reduce the amount of welding or ignition sources near gas risk areas. The Permit to Work System includes requirements for Hot Work Certificates to manage this activity including vehicle movement in hazardous areas. Additional legislative requirements including fire mitigation requirements such as fire breaks. With these controls this risk has been reduced to ALARP.			
Acceptability	The risk of starting a bushfire is limited due to the above controls and the fact that hot work risks are well known to the industry and controls are general practices implemented for all projects. Internal approvals through the Permit to Work System and training of personnel helps to minimise the risk. Major operational sites are equipped with fire-fighting capability to minimise this risk and the likelihood of occurrence has been reduced to an acceptable level.			
Systems and Procedures				
Risk Assessment Processes Driving Procedure (S-PRO-024) *Bushfire Act 1954* Hot Work Procedure (S-PRO-032) HSE Audit and Evaluation Procedure (S-PRO-054) Risk Assessment processes INX InControl (Event Management System)				
Monitoring	**Details**	**Responsibility**	**Records**	**Timing**
Project Environmental Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including firefighting equipment.	Project Manager	Project Environmental Inspection Checklist	Weekly during activities
HSE Audit	Review of all Bushfire Act conditions and specifically work on total fire ban days.	HSE Manager	HSE Audit Report Notification Correspondence Pre-start minutes	Once during the Proposal, annually during operations
Facility HSE Inspection	Facility HSE inspections include a checklist approach to identify any areas of concern or potential environmental hazards; in this case specific to bushfire risk and controls.	Person In Charge	Facility HSE Inspection Report	6 monthly (includes plant and meter station)

6.4 Fauna

Table 6-4 Terrestrial fauna environmental objectives, standards, management controls, measurement criteria and monitoring

Fauna							
Activities	Habitat and line of sight clearing, waste disposal and storage, vehicle use, construction of pipeline, maintenance activities, excavation, clear and grade, trenching, lowering in						
Hazard	Trench or excavation fauna entrapment, vehicle and earthworks machinery movements, attraction of fauna to temporary facilities, gates left open (livestock)						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard/ Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Direct loss or fragmentation to fauna habitat Direct injury or mortality of individuals as a result of entrapment or interaction with vehicles/machinery Indirect impact from introduction or spread of feral predators Indirect impact to fauna habitat from fire ignition Indirect impact to fauna and their habitat from dust, light noise and vibration.	Intermediate	To minimise temporary or permanent reduction in fauna habitat. To minimise direct impacts to fauna including injury and mortality to fauna from entrapment in excavation works, collision with vehicles or machinery. To minimise changes to pest predator abundance within and adjacent to the Development Envelope.	All personnel shall abide by the requirements of the Fauna Interaction Procedure (E-PRO-004) or equivalent procedure including: • Planned interactions in consultation with trained and licensed personnel • All fauna handling to be conducted by a licensed fauna handler • Fauna interaction controls (minimise handling, release ASAP to safe location, report all handling events) • Speed limits (80km/h unsealed roads) • Reduce speeds / minimise travel in dawn and dusk periods • Vehicles to remain on existing tracks • Inspection of habitat trees prior to felling • Recording of all fauna interactions including location data and date • Capturing all fauna interactions (injury, relocation or fatality) data.	Low	Project Manager - Construction Contractor Project Manager (AGIO) Executive General Manager Transmission Operations (Operations)	Fauna Licence Review	No non-compliances to the Fauna Licence
						Event Report Review	All fauna injuries or fatalities are captured as an event and reported InControl
			AGIG shall implement the Native Vegetation Clearing Procedure (E-PRO-002) or equivalent procedure in relation to: • Authorisation to Clear Vegetation (ACV) or an equivalent process is implemented • Delineation of approved area prior to clear and grade (pegging) • The identification of potential conservation significant fauna species • Pre-clearance inspection to identify fauna present in order to avoid impact • Undertaken in stages (to allow for progressive movement of fauna outside of disturbance area) • Conducting clearing in a manner that does not trap fauna.		Project Manager Executive General Manager Transmission Operations (Operations) Executive General Manager Transmission Asset Management (Operations)	HSE System Audit	All activities to be conducted to confirm compliance to procedural controls and environmental approval conditions (e.g. clearing limits of the NVCP).
			Any open trench (outside of a fenced facility) shall require at a minimum the: • Twice daily completion of trench inspections within 3 hours of sunrise and within 4 hours of sunset • Installation of fauna egress from excavations or trenches (i.e. exit ramps every 500m of trench at a minimum and each excavation) • Inspection of pipework for fauna prior to welding, including use of caps for pipe sections • Installation of fauna shelters every 100m if trench is >500m in length • Fauna ramps to be placed at both ends of trenches (intervals not to exceed 1 km)			Project Environmental Inspections Facility HSE Inspection	Project Environmental Inspections verify completion of daily fauna trench clearance reports Facility HSE Inspections include potential impacts of fauna, evidence of fauna in compounds and fauna controls are implemented. Any corrective actions are closed out by due dates.

Fauna							
			• Completion of a fauna inspection within 30mins prior to lowering in/backfill operations commencing.				
Attraction of pest predators			• Site hygiene (waste management and food hygiene) measures will be implemented during construction and operation so as not to attract pest predators • The plant facility including the evaporation pond and infiltration pond will be fenced so as not to attract pest predators to sources of permanent water. • Where there is a measurable increase in observations of pest predators within the Development Footprint, pest predator control will be undertaken within and adjacent to the Development Envelope in co-operation with regional control programs.		Project Manager, Construction Contractor	Project Environmental Inspections Opportunistic observations	Site hygiene measures adhered to, including all waste non accessible to pest predators.

ALARP and Acceptability	
ALARP	Due to its operations over time, AGIG has a proven record of minimal impacts to species through operations. The management of vegetation maintenance activities including the minimisation of clearing and frequency of activity reduces the potential impacts to fauna. Fauna interaction controls, including the training of selected personnel, reduces impacts during any relocation and the fencing of compounds and reduction or management of items that would attract fauna (waste management, water management and pest control) keeps interactions to a minimum. Fauna controls are well known to the industry and controls over trenching and excavations are well implemented during enhancement projects. This minimises the impact to ALARP.
Acceptability	Fauna impacts, especially to conservation fauna are limited during operations and the buried nature of the pipeline. The main risk is through vehicle use and controls are in place to ensure this is minimised wherever possible. Controls during trenching or excavation also reduce the potential for impact to fauna. This is an acceptable risk based on the above controls.
Systems and Procedures	
Risk Assessment Processes Driving Procedure (S-PRO-024) HSE Audit and Evaluation Procedure (S-PRO-054) Native Vegetation Clearing Procedure (E-PRO-002) Fauna Interaction Procedure (E-PRO-004) INX InControl (Event Management System) INX InTuition (Training System)	

Monitoring	**Details**	**Responsibility**	**Records**	**Timing**
Project Environmental Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including fauna inspections and access and egress controls and waste management	Project Manager	Project Environmental Inspection Checklist Fauna Interaction records/data	Weekly during construction activities
Event Report Review	Incident or event information reviewed in relation to fauna interactions. Trend Analysis is conducted to ensure ongoing identification of trends.	HSE Manager	INX Event Reports	Opportunistic
Fauna Licence Review	A review to document all details of fauna interactions including personnel involved, the date, location, species and release details.	HSE Manager	Fauna Licence Return INX Event Reports	At completion of the Proposal
Facility HSE Inspection	Facility HSE inspections include a checklist approach to identify any areas of concern or potential environmental hazards; in this case specific to evidence of fauna onsite and waste controls.	Person In Charge	Facility HSE Inspection Report	6 monthly (includes plant and meter station)

Fauna				
HSE System Audit	HSE System Audit reviews fauna control implementation to ensure risk to native fauna is minimised and the prevention of pest fauna is maximized.	HSE Manager	HSE Audit Report	Once during the Proposal, annually during operations

6.5 Heritage and Stakeholder Management

Table 6-5 Cultural heritage and stakeholder objectives, standards, management controls, measurement criteria and monitoring

Cultural heritage and stakeholder							
Activities	Vehicle use, maintenance of pipeline, pipeline excavation, clear and grade, trenching, access track maintenance, line of sight clearing						
Hazard	Clearing in unapproved areas, vehicle and earthmoving equipment movement, dust or vibration impacts to cultural sites						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard/ Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Impacts to known or unrecorded Aboriginal Heritage Sites	Intermediate	To avoid disturbance to Aboriginal heritage sites identified for protection near the pipeline corridor. To manage new Aboriginal heritage sites/artefacts uncovered or identified in accordance with the requirements of the *Aboriginal Heritage Act 1972.*	The induction sets out AH Act controls (includes all AGIG personnel) All clearing is managed through an internal authorisation process which facilitates preclearing checks by a competent person to: • Review the proposed location of clearing and conduct cultural impact assessment • Identify sites via the GIS system • Obtain any approvals required to ensure compliance to all relevant laws • Establish any conditions necessary in order to minimise cultural impact.	Low	Project Manager Executive General Manager Transmission Operations	Project Environmental Inspections	Any identified non compliances to the AH Act or these controls are reported as an event and any actions arising are closed out within due dates
						Event Report Review	Any identified non compliances to the AH Act or these controls are reported as an event and any actions arising are closed out within due dates
			All relevant personnel working on or near an Aboriginal site shall be made aware of their responsibilities under the *Aboriginal Heritage Act 1972.* This includes: • No clearing outside of approved areas If a previously unidentified cultural heritage site is uncovered then a 30m buffer must be established around the new site within which work must cease.			HSE System Audit	All activities to be conducted to confirm compliance to procedural controls and environmental approval conditions (e.g. AH Act, this plan).
Impacts to other land users (including farmers) including clearing outside of approved areas, use of gates etc.		Avoid impacts to landholder including livestock, access, water and weeds	Landholders are communicated with at least annually and complaints responded to within 14 days	Negligible	Land Manager	LMS Review	LMS verifies the 100% response within timeframe
ALARP and Acceptability							
ALARP	Using standard approvals, GIS information, the Registered Sites Database and consultation with Traditional Owners AGIG is well aware of the location of known sites and previous approvals (initial construction and loop line projects) ensures approved access to the corridor. During operations these potential impacts are reduced even further as personnel stick to existing tracks and avoid heritage locations at all times. Heritage agreements are in place along the pipeline route. Awareness programs for personnel (i.e. the induction) include the potential for artefacts to occur and what is required if discovered. This has reduced this risk to ALARP levels. Impacts to Landholders is managed through landholder agreements established prior to construction and ongoing consultation (at least once annually).						
Acceptability	A negligible or low risk ranking is fully acceptable to the business and through ongoing consultation and approved management of the pipeline the risk of any damage or discovery of new sites is minimised. Land user impacts are limited due to prior notification of activities, ongoing consultation and aerial surveillance techniques. By entering into Heritage Agreements, ongoing consultation with Traditional Owners and landholders and a process for managing complaints these risks are at an acceptable level.						
Systems and Procedures							
Risk Assessment Processes Native Vegetation Clearing Procedure (E-PRO-002)							

Cultural heritage and stakeholder				
HSE Audit and Evaluation Procedure (S-PRO-054) *Aboriginal Heritage Act 1972* Land Management System (LMS) INX InControl (Event Management System) INX InTuition (Training System)				
Monitoring	**Details**	**Responsibility**	**Records**	**Timing**
Project Environmental Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including CHMP conditions.	Project Manager	Project Environmental Inspection Checklist	Weekly during construction activities
Landholder Management System	Notification to landholders, stakeholders and Heritage groups/Traditional Owners and the response to any complaints	HSE Manager	INX Event Reports Land Management System	Opportunistic
HSE System Audit	A HSE approach to assess procedural controls are implemented including Cultural Heritage requirements	HSE Manager	HSE Audit Report CHMP	Once during the Proposal and annually during operations
Event Report Review	Incident or event information reviewed in relation to heritage and landholder interactions. Trend Analysis is conducted to ensure ongoing identification of trends.	HSE Manager	INX Event Reports	Opportunistic and on completion of monthly event reporting requirements to DMIRS. Also part of Annual Compliance Reporting to DMIRS and DWER.

6.6 Air, Dust and Noise Emissions

Table 6-6 Air, dust and noise emissions objectives, standards, management controls, measurement criteria and monitoring

Dust and noise emissions							
Activities	Vehicle use, venting and purging, failure of relief valves and commissioning pipeline operation and construction plant and equipment.						
Hazard	Vehicle and earthworks machinery movements, noise from construction and operational equipment, including mobile plant. All GHG and air emissions are accounted for in the GHGMP.						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard/ Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Dust – impacts offsite to stakeholders, visual amenity and coverage of flora	Intermediate	Minimise disturbance to flora, fauna or sensitive receptors (i.e. residential locations) from dust or noise emissions	Where excessive airborne dust is generated or a substantiated landholder complaint received, any combination of one or more of the following shall be implemented as required. This includes: • Reduced speed limited on unsealed roads and right of way • Minimise time between clear and grade (stripping) and backfill / reinstatement • SWMS/ JHA to identify dust risk at time of activity and apply controls (i.e. water cart/ truck) • Minimise grit blasting through other techniques (wire brush) where possible. Install enclosures and containment of overspray particles • The application of water or stabilisers via water trucks and sprayers to dampen down soil. No run-off should be generated from application. Applications shall be frequent enough to provide persistent dust suppression • Ensuring vehicles with dust emitting loads must be covered (except when loading and unloading) • The potential use of dust stabilisers, water, tarps or geo-textile materials to suppress dust generated from stockpiles.	Low	Project Manager Executive General Manager (TO)	Event Report Review LMS Facility HSE Inspection Project Environmental Inspections	All corrective actions for dust complaints are closed within the due date.
Noise impacts to residents/ neighbours/ other stakeholders	High		Project work times (no night works unless authorised through project risk assessment) Reduce pressure to as low as possible prior to venting (minimise noise) Standard design and operating procedures to minimise noise including mobile plant and blasting Noise controls are implemented as required to minimise noise impacts including notification to landholders/ stakeholders prior to commencement of potentially noisy activities Noise modelling (no impact assessed against Guidance Statement No.3 – Separation Distance Between Industrial and Sensitive Land Uses (EPA, 2005))	Low	Project Manager Executive General Manager (TAM)	LMS Event Report Review	All corrective actions for noise complaints are closed within the due date.
Greenhouse Gas (GHG) Emissions / Air Emissions	Intermediate	Minimise GHG emissions and meet requirement of the approved GHG Management Plan	Meet Greenhouse Gas Management Plan (GHGMP) emission targets Implement ongoing controls to minimise plant emissions Respond in a timely manner to all gas leaks and uncontrolled emissions Complete all regulatory reporting in relation to GHG emissions Abide by any DWER prescribed premises license conditions	Low	Project Manager Executive General Manager (TAM)	Emissions data - NGERS Annual Report DWER license returns	All GHGMP emission targets are met. All DWER prescribed premises licenses conditions are reported on annually and any actions arising from non-compliances are closed within the due date.
ALARP and Acceptability							

Dust and noise emissions				
ALARP	Controls for emissions, dust and noise are all well known, industry standard controls that act to reduce potential impacts. In addition, the remote nature of the Development Envelope and above controls minimises the creation and impact of dust and noise on sensitive receptors. By ensuring ongoing risk assessment for each task, risks such as noise and dust can be managed onsite by personnel. The design of the plant also utilises equipment to minimise noise creation or odour. Maintenance and other procedural controls ensure the risk of uncontrolled venting of gas is also minimised to ALARP while maintaining safe operational control of the pipeline.			
Acceptability	The minimal impacts that any noise during operations has on environmentally sensitive receptors is limited. With major operational sites located outside the metropolitan area the Proposal has limited impacts from noise and dust. Management of odorant to prevent leaks and utilising a closed system enables a high level of control of odorant use. Training in spill response also mitigates impacts from odorant spills. Timing of works for maintenance activities and enhancement projects (i.e. during workdays) also minimises impacts across all locations. The management of pipeline safety and prevention of leaks also reduces the chances of uncontrolled venting and these risks are at an acceptable level. Emissions modelling completed and design inputs indicate that emission levels are below industry standard levels.			
Systems and Procedures				
INX InControl (Event Management System) Noise Management Procedure (E-PRO-018)				
Monitoring	**Details**	**Responsibility**	**Records**	**Timing**
Project Environmental Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including emissions especially dust management and noise controls.	Project Manager	Project Environmental Inspection Checklist	Weekly during construction activities
Facility HSE Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including emissions especially dust management and noise controls.	PIC	Facility HSE Inspection Checklist	6 monthly
Event Report Review	Incident or event information review in relation to unplanned emissions, odorant release or dust complaints and trend analysis process to capture ongoing event trends.	HSE Manager	INX – Event Reports Trend Analysis Report	Opportunistic Annual – Trend analysis
LMS	The LMS assists in identifying local landholders/ stakeholders and captures ongoing consultation and notifications	Land Manager	LMS	Annual and opportunistic
Emissions data	All GHG or DWER conditioned emissions are monitored and measured to enable reporting as required under NGER Act or DWER license and to meet requirements of the WER GHGMP.	HSE Manager	Emissions data	Quarterly DMIRS Reporting Annual NGER reporting Annual DWER reporting (as required) under GHGMP and prescribed premises license

6.7 Surface and Groundwater

Table 6-7 Surface and groundwater objectives, standards, management controls, measurement criteria and monitoring

Surface and groundwater							
Activities	Water use, excavation, waste water disposal, pipeline and corridor maintenance, maintenance of drainage lines (access roads and tracks) and hazardous substance use. Note: Erosion and sedimentation shall be managed in accordance with Table 6-1. Hazardous Materials and Spill Response shall be managed in accordance with Table 6-8 respectively.						
Hazard	Disposal of brine from water treatment plan Stormwater management to prevent flooding or erosion Waste water disposal Produced water disposal						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard/ Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Water quality decrease (pollution)	Low	To prevent contamination of surface and groundwater	Stormwater Management Plan including diversion to infiltration pond and erosion controls Installation of erosion controls to prevent sedimentation offsite Capture of site stormwater in infiltration basin Temporary controls installed during construction Evaporation and infiltration pond controls	Negligible	Project Manager Executive General Manager TO	HSE System Audit	Any actions identified from HSE System Audit are closed out within due dates.
			Waste water disposal shall be managed as per design and threshold levels for onsite disposal of water All other waste liquids to be disposed of by a licensed waste contractor	Negligible	Construction Contractor	Project Environmental Inspections Waste Transfer Monitoring	Any actions identified from Project Environmental Inspections are closed out within due dates.
				Negligible	Executive General Manager TO	Facility HSE Inspections Waste Transfer Monitoring	Any actions identified from Facility HSE Inspections are closed out within due dates
Water quantity decrease	Low	Minimise impacts from abstraction of groundwater	Minimise water use for construction and operations Maintain water abstraction within all license / regulated volumes Water abstraction / use only from regulated sources (licensed bores or existing standpipes)	Negligible	Project Manager PIC	Water use volume register	All water use is tracked, reported and in line with license requirements.
Impacts to surface water flow patterns	Low	To ensure that natural surface water flow patterns are not detrimentally impacted	Site designed to capture all stormwater for controlled release (infiltration basin) Maintain drainage lines in a stable condition	Negligible	Project Manager Executive General Manager TAM	Project Environmental Inspections / Facility HSE Inspection	Any impacts to surface water flows are identified and any corrective actions completed within due dates
					Executive General Manager TO	Aerial surveillance	No impacts to surface water flows due to plant or pipeline operations inconsistent with surrounding lands

Surface and groundwater				
ALARP and Acceptability				
ALARP	Controls for surface and groundwater management are all well known, industry standard controls that act to reduce potential impacts. By ensuring ongoing risk assessment for each task, risks such as water quality can be managed onsite by personnel. Reinstatement and rehabilitation works further assist in ensuring drainage lines and erosion are assessed and controls implemented to prevent ongoing impact.			
Acceptability	The risk for operations to adversely impact surface and groundwater is low. AGIG accepts these risks as low and negligible as the controls are well known, industry wide accepted practices and pose little offsite risk. Development of a Stormwater Management Plan, in line with the DWER guidelines will assist with managing local impacts at the time of the activity and is aimed at minimising duration of works to reduce the potential for impact.			
Systems and Procedures				
INX InControl (Event Management System) HSE Audit and Evaluation Procedure (S-PRO-054) Management of Erosion Risk Areas Procedure (E-PRO-003) Stormwater Management Plan				
Monitoring	**Details**	**Responsibility**	**Records**	**Timing**
HSE System Audit	A HSE Audit shall be undertaken during construction against the CEMP controls to assess implementation and effectiveness especially in regards to water use efficiency and water volume against license requirements	HSE Manager	HSE Audit report	Once during construction; Annually during operations
Project Environmental Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including waste water management. A record of water use is required to ensure accurate records of water volume usage during construction. Tracking of water volumes abstracted and used	Project Manager	Project Environmental Inspection Checklist Water Volume Tracking Register	Weekly during construction activities
Facility HSE Inspection	HSE inspections using a pre-determined checklist to review environmental hazards and controls onsite including water management and water disposal.	PIC	Facility HSE Inspection Report	6 monthly
Waste Transfer Monitoring	Records of waste liquid, including hazardous wastes removed from site from waste contraction including disposal locations.	Project Manager	Quarterly Emissions Report Contractor supplied waste records/receipts	Quarterly
Water use volume register	Abstraction monitoring data reviewed quarterly to ensure adherence and compliance to license requirements	PIC / Project Manager	Water Use Register	Quarterly reporting on license (DWER – Water Online)

6.8 Hazardous Materials handling; Spills

Table 6-8 Hazardous waste, contamination and spill objectives, standards, management controls, measurement criteria and monitoring

Hazardous materials storage and handling, spill response							
Activities	Weed control, fuel and oil storage and use, painting, cleaning and maintenance, welding and hot works, repairs, construction (concreting and setting agents), storage and use, spill response neutralisers and the transmission of natural gas.						
Hazard	Hazardous chemical use including diesel, oils, herbicides and sewerage, hazardous waste storage and transport of hazardous chemicals						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard/ Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Degradation of vegetation from contamination Soil contamination Stormwater run off Loss of crop/ impacts to neighbours Bushfire	Intermediate	Prevent the contamination of soil due to accidental spills of hazardous materials Prevent contamination of proximal watercourses by stormwater runoff	Minimise amount of chemicals stored onsite All chemicals used shall be transported, stored and handled and disposed of in accordance with the requirements of the relevant legislation and industry standards and S-PRO-016 Hazardous Materials Storage and Handling Procedure. This includes: • SDS available onsite • Chemical register available onsite • Spill kits in heavy vehicles and at all storage locations • Use of drip trays during refuelling / vacuum removal from tanks • Bunding/self-containment of fixed plant and equipment (i.e. Generators) • All liquid chemical waste disposal includes bunding during storage. • Ensuring secondary containment is in place • Labelling all containers • ChemAlert subscription including risk assessment, max storage volumes and approval process • Project HSE Inspections. Frequent removal of waste product to minimise waste hydrocarbon storage time onsite (vacuum truck) Bund valves locked in closed position (default position) Onsite storage is located > 100m away from surface watercourses E-PRO-015 Waste Management Procedure sets out the controls for waste onsite and the disposal process including the: • Licensing of waste contractor • Segregation of waste streams including hydrocarbon waster and batteries • Collection of all pigging waste in sealed containers • Bunding or containment of liquid wastes. Asset Management Plan requires five-year assessment of soils adjacent to underground petroleum storage tanks	Low	Project Manager HSE Manager PIC Executive General Manager TO	Project Environmental Inspections Facility HSE Inspections	Verify the implementation of hazardous substances controls with any non-conformances actioned within one week.
						HSE System Audit	All corrective actions relating to hazardous substances are closed out within the due date
		Minimise the residual impacts to soil associated with accidental spills	Appropriate spill response equipment, including containment and recovery equipment, shall be available on site and in vehicles undertaking work where there is the potential for fuel or chemical spillage			Project Environmental Inspections	Suitable spill response equipment is in place with any non-conformances actioned within one week.

						Facility HSE Inspections	
			Any spills shall be contained as soon as possible and clean up actioned as soon as feasible			Event Report Review Corrective Action Register	Verifies the completions of actions associated with any spills and 100% close out of actions by the due date.
			Personnel shall be aware of and abide by requirements of the Oil Spill Response Procedure (E-PRO-016) that sets out: • Response to spills, the 3C approach – control, contain, cleanup • Escalation requirements for emergency level spills • Alarms on waste oil storage units (above ground).		Executive General Manager TO PIC	Emergency Exercise Evaluation	An oil spill (or equivalent scenario) drill is completed annually with documented report on outcomes and 100% close out of actions.

Demonstration of ALARP and Acceptability	
ALARP	The ongoing management, including an approval process for chemicals, allows AGIG to minimise onsite storage and ensure handling and transport of chemicals is well understood and controlled. By reducing amounts onsite, providing mitigation measures and training as well as frequent reviews of controls the risk of a large spill to a sensitive receptor is low. The risk of fire is also minimised due to pipeline integrity (leak checks) in place for hot works, gas monitoring and ensuring ignition sources are controlled. This reduces this risk to ALARP.
Acceptability	The risk of spills, fire and contamination are minimised, and controls are well established, industry-based controls to ensure risks of spills are minimised or eliminated onsite. Ongoing monitoring (tanks) and inspections of bunding minimises the risk associated with onsite storage. These controls ensure this risk is at an acceptable level.

Systems and Procedures

Risk Assessment Processes

Hazardous Materials Handling and Storage Procedure (S-PRO-016)

Oil Spill Contingency Plan (as per the Emergency Response Plan (E-PRO-016))

INX InControl (Event Management System)

HSE Audit and Evaluation Procedure (S-PRO-054)

ChemAlert (MSDS Register System) / or equivalent

Waste Management Procedure (E-PRO-015)

Monitoring	**Details**	**Responsibility**	**Records**	**Timing**
Project Environmental Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including storage of hazardous goods, spill kits and MSDS.	Project Manager	Project Environmental Inspection Checklist	Weekly during activities
Event Report Review	Incident or event information reviewed in relation to spills including annual trend analysis information for historical trending of events.	HSE Manager	INX Event Reports Trend Analysis Report	Opportunistic
HSE System Audit	System Audit conducted to confirm compliance to the Hazardous Materials Handling and Storage procedure.	HSE Manager	HSE System Audit Report Dangerous goods training records Dangerous goods licenses (transport)	Once every three years
Corrective Action Register	Register that includes hazards, audit and inspection actions and tracks close out	Construction Contractor	Corrective Action Register	Updated weekly at a minimum
Facility HSE Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including handling and storage of hazardous materials	PIC	Facility HSE Inspection Checklist	6 monthly

Emergency Exercise Evaluation	Completion of annual spill drill (or equivalent process) to ensure awareness and knowledge of spill response requirements and escalation.	Executive General Manager TO Project Manager	Emergency Exercise Evaluation Report	Annual (or as per project specifications)

6.9 Waste

Table 6-9 Waste objectives, standards, management controls, measurement criteria and monitoring

Waste							
Activities	Domestic waste from crib rooms and offices, hazardous waste (contaminated material and containers), sewage, general pipeline construction and demolition waste, pigging wastes and excess materials						
Hazard	Production of waste from activities, production of food/ personal wastes, littering, minimal segregation and recycling opportunities onsite, storage of liquid wastes. All Hazardous Wastes are accounted for in Table 5-8.						
Measurement of Environmental Performance							
Potential Environmental Impact	**Inherent Risk**	**Management Objective**	**Standard/ Management Action**	**Residual Risk**	**Responsibility**	**Monitoring**	**Measurement criteria**
Attraction of feral fauna Odour (including associated public complaints) Excess waste	Low	Prevent contamination, harm to fauna or environmental harm due to inappropriate storage or disposal of waste	All personnel shall abide by the Waste Management Procedure (E-PRO- 015). This includes requirements for: • Segregation of waste streams as far as possible • Covering over skip bins (except scrap metal) to prevent fauna attraction • Minimisation of wastes where possible (reduce, reuse) • Ensuring the labelling of receptacles • Frequent waste contractor removal of wastes to prevent build up • Additional waste storage available in case of severe weather Aerial Surveillance and road patrols identify third party waste in the pipeline corridor. Management of any discharge of water to land.	Negligible	Project Manager Executive General Manager TO PIC	HSE System Audit	Compliance to the Waste Management Procedure shall be verified through a HSE Audit or Inspections with close out of actions 100% by due date.
						Project Environmental Inspections Facility HSE Inspections	
			All waste shall be captured and stored and then disposed of in a licensed contractor to a licensed waste facility.			Waste Transfer monitoring	All waste records are captured and reported quarterly
			Sewerage shall be stored in a portable tank where sludge is retained for collection and offset disposal by a licensed contractor. Operational sewage shall be managed through leach drain and septic system.			Project Environmental Inspections Facility HSE Inspections	Project Environmental Inspections verify the capture, treatment and containment of all sewerage waste
Demonstration of ALARP and Acceptability							
ALARP	Waste management for operations is a broad, industry known risk with controls implemented through all previous activities and well embedded process to ensure risks associated with waste are managed and minimised. Segregation and ongoing programs to reduce, reuse and recycle waste are in place to minimise any potential impacts. Incineration of waste is only approved at a single location where controls are implemented to minimise impacts to sensitive receptors. Awareness, frequent inspections and increasing opportunities for recycling reduce this risk to ALARP.						
Acceptability	Waste facilities across the Development Envelope are sited to minimise impacts and ensure that where possible segregation of waste streams occurs. Controls to prevent leaks, windblown litter and fauna attraction ensure impacts are minimised to an acceptable level. Management of third-party impacts remains an ongoing issue and frequent inspections, awareness presentations and landholder consultation ensure ongoing waste management along the pipeline corridor						
Systems and Procedures							
Risk Assessment Processes Waste Management Procedure (E-PRO-015) HSE Audit and Evaluation Procedure							
Monitoring	**Details**			**Responsibility**		**Records**	**Timing**
Project Environmental Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including waste management.			Project Manager		Project Environmental Inspection Checklist	Weekly during activities

Waste				
HSE System Audit	A HSE Checklist approach to assess procedural controls are implemented including waste receptacles being lidded and labelled, segregation, bunding for hazardous liquid wastes and adequacy of disposal.	HSE Manager	Evaluation Reports	Opportunistic
Facility HSE Inspections	Inspections against a pre-determined checklist to review environmental management of key risk areas including waste management	PIC	Facility HSE Inspection Checklist	6 monthly
Waste Transfer monitoring	Reporting of waste amounts including type and volume	Project Manager Construction Contractor HSE Manager	Quarterly Emissions Report Contractor supplied waste records/ receipts	Quarterly

7. Environmental Management System

This section describes the documented systems and processes of the EMS used for the safe construction and operation of the Proposal. AGIG will implement the EMS to conform with the overarching DBNGP construction and operations managed by DBP. The EMS ensures that hazards are identified and assessed to eliminate or minimise the risk to the environment to a level that is ALARP throughout construction of the Proposal.

7.1 Induction and Training

All staff and contractors shall be required to undertake an environmental awareness induction prior to commencement of works on the WER. The environmental awareness induction is targeted to educate staff and contractors regarding AGIG's environmental objectives and their individual responsibilities for environmental management. The environmental awareness induction covers off on the following key topics:

- Soil and Sedimentation
- Flora and Vegetation
- Weeds
- Fauna
- Bushfire
- Hazardous Chemical and Spill Response
- Cultural Heritage and Communities
- Waste
- Emissions; and lastly
- Water

The DBP induction additionally ensures that all personnel are capable of implementing the JHA process to identify and manage risks.

All visitors or short term workers to a location receive a site-specific induction appropriate in length and content for the type of work being undertaken.

Employees will be trained and provided with appropriate resources to ensure compliance with environmental laws, codes and standards and company policies. These additional specific training needs are addressed on an as needs basis. DBP will maintain a record of training for all personnel.

7.2 Job Hazard Analysis and Take 5

AGIO enable site based risk assessment via the use of either one of two tools: Take 5 (a mini risk assessment) or JHA (a detailed risk assessment). The appropriate tool to use will vary dependent upon the number of job steps and hazards requiring assessment and control.

Both the Take 5 and JHA tools require Personnel to:

- Communicate as a work party;
- Discuss the task to ensure a common understanding;
- Identify hazards with potential for an adverse impact;
- Establish and implement controls to mitigate risk of harm;
- Evaluate residual risk and agree as a work party that it is acceptable;

- Consider the risk assessment regularly throughout the delivery of the task, especially after breaks; and
- Revise the risk assessment whenever a new job step or hazard is identified.

The JHA and Take 5 Procedure (S-PRO-004) sets out the protocol for the completion of a JHA or Take 5. All personnel conducting work at any WER site must be inducted regarding these key risk management tools.

On completion of the job, the JHA is to be sent to the DBNGP Planning department for filing within a work order tracking system, so it can be referred to in the future when the job, or a similar type of job, occurs again.

7.3 Incident Management

It is a mandatory requirement for any and all personnel working for or on behalf of DBP to respond to all hazards and events that have affected or have the potential to adversely affect the environment.

Examples of such events include: odour emissions, accidental gas releases (e.g. leaks), fuel spillage, excessive noise incidents, chemical spills or a complaint from a neighbour.

The first line of response is to take immediate actions to minimise risks to persons, plant, equipment and the environment. These actions may include:

- stop work,
- assess site and make the area safe,
- notify other parties that may be affected by the Hazard / Event

Following this, incidents must then be classified and reported on in accordance with the Risk Classification Matrix contained within the HSE Event Reporting and Investigation (S-PRO-014). The level of analysis required will vary dependent upon the level of risk associated with the event.

At a minimum reporting will require documentation of all details, notification of key stakeholders in accordance with the event classification and determination of corrective actions with due dates and accountabilities.

Event reporting is conducted and recorded via InControl a tailored software system purchased from INX Cube Consulting. InControl facilitates the communication of events, tracking of corrective actions and the analysis of trends. All significant events may be subject to a TAPROOT investigation, led by a suitably qualified Lead Investigator, as mandated by the HSE Event Reporting and Investigation Procedure (S-PRO-014).

Actions arising from incident reports and TAPROOT investigations shall be monitored (via InControl) to ensure their adequate and timely implementation.

The findings of all incident investigations shall be communicated to the business where appropriate to increase awareness and prevent recurrence.

DBP shall annually conduct a targeted review (Trend Analysis) of all events to identify recent and historical trends. Preventative actions shall be instigated where necessary based upon the outcomes of this annual review

7.3.1 External Reporting

The requirements for external reporting of incidents is summarised in Table 7-1. DBP shall ensure that all relevant parties are informed of any significant incident verbally within 2 hrs (or as early as possible) and then in writing within 3 days.

A Significant Environmental Incident is an event which:

- may but does not necessarily result in any permanent damage to the environment but requires the use of additional personnel or contractors external to the site and additional remediation equipment; or
- the regulatory authority deems as notifiable; or
- is likely to result in wide spread public complaints and anger.

External notifications of significant incidents shall be carried out by the designated responsible person in accordance with the Event Reporting and Investigation Procedure (S-PRO-014).

The DMIRS may be contacted via the petroleum environment email address petroleum.environment@dmirs.wa.gov.au.

Additionally, where an incident impacts on a reserve set aside for conservation purposes or a national park, or may have significant or material environmental impact the appropriate regional office of the Department of Water and Environmental Regulation is to be informed.

If an incident occurs contrary to conditions set out in any of the Ministerial Statements DWER shall also be notified.

Contact details for all agencies, including regional offices, that may need to be contacted in the event of an emergency, are specified within the DBNGP Emergency Response Plan.

Table 7-1 DBNGP External Incident Reporting/ Notification Requirements

Requirement	Reference	Agency	Timeframe
Where an incident causes or threatens to cause serious[2] or material[3] environmental harm.	*EP Act*	DWER	As soon as practicable

2 **Serious Environmental Harm**: environmental harm that:

(a) is irreversible, of a high impact or on a wide scale

(b)is significant or in an area of high conservation value or special significance
(c) results in actual or potential loss, property damage or damage costs of an amount, or amounts in aggregate, exceeding 5 times the threshold amount (i.e. $100,000).
[Environmental Protection Act 1986, s 3A(1)]

3 **Material Environmental Harm**: environmental harm that:

(a) is neither trivial nor negligible; or
(b) results in actual or potential loss, property damage or damage costs of an amount, or amounts in aggregate, exceeding the threshold amount ($20,000);
[Environmental Protection Act 1986, s 3A(1)]

Recordable Incidents: Any incident arising from the activity that breaches a performance objective or standard identified in the EP (and is not a reportable incident) shall be reported monthly, on or prior to the 15th day of each month.	*PP Act and PPE Regs* *PGER Act and PGERE Regs*	DMIRS	Monthly, on or prior to the 15th day of each month. A Nil report shall be provided where no events occur.
Reportable Incidents: *Consequence based:* Where an unplanned event is identified to have caused (or have potential to cause) an adverse environmental impact where that impact has a consequence rating of 'moderate or more serious than moderate' (NOTE: With reference to the ERA this includes risks with a consequence level of severe, major or catastrophic, refer Appendix D).	*PP Act and PPE Regs* *PGER Act and PGERE Regs*	DMIRS	As soon as practicable but not later than 2 hours after the operator becomes aware of the reportable incident. A written report shall be submitted within 3 days after the first occurrence of the reportable incident
Reportable Incidents: *Additional Reporting Requirements:* – Spills of hydrocarbons or hazardous materials in excess of 80 L to the sea or inland waters; Spills of hydrocarbons or hazardous materials in excess of 500L in other areas; – Spills of hydrocarbons or hazardous materials that affect a ground surface area greater than 100m2; – An unplanned gaseous release to atmosphere 500m3 or more; – Death or injury to individual(s) from a Listed Species during an activity; – Unplanned impact caused to a matter of national environmental significance (NES) during an activity (as per the EPBC Act).	*PP Act and PPE Regs* *PGER Act and PGERE Regs*	DMIRS	As soon as practicable but not later than 2 hours after the operator becomes aware of the reportable incident. A written report shall be submitted within 3 days after the first occurrence of the reportable incident
Known contaminated sites	*Contaminated Sites Act 2003*	DWER	Within 21 days of first knowing the site is contaminated
Suspected contaminated sites	*Contaminated Sites Act 2003*	DWER	As soon as is reasonably practicable

Recordable incidents shall be reported on a monthly basis and the following details shall be provided:

- Type of incident
- All material facts
- Actions taken to avoid and mitigate impacts of the incident
- Corrective actions applied

Reportable incidents shall be addressed through documentation and submission of the following details:

- Facility name
- Pipeline title
- Location of incident

- Name of operator
- Names and contact details of witnesses
- Name and contact details of report submitter
- Description of the incident
- Work activity undertaken at time of incident
- Quantity and composition of spilled/vented material
- Duration of spill/vent
- Extent of impact
- Immediate actions taken
- Arrangements for internal investigation
- Corrective actions applied

7.4 Emergency Preparedness and Response

The WER shall feed into the DEP Emergency Response Process. DBP has three tiers of emergency and crisis response: Incident, Emergency and Crisis (refer Figure 7-1).

The WER Emergency Response Plan (ERP) provides for an Emergency Management Team (EMT) and an Incident Management Team (IMT) who are responsible for managing emergencies and minor incidents.

The contractor's local area emergency response plan specifies the assignment of particular responsibility and provisions for project related emergency response requirements and interfaces with the DBP ERP.

The Crisis Management Plan (CMP) establishes the Crisis Management Team (CMT) which is responsible for managing Crisis events, being those that are likely to be associated with personnel, public safety, supply, pipeline license or DBP reputation issues.

In the event that an emergency deteriorates and can no longer be managed effectively by the Emergency Management Team the CMT would be activated.

7.4.1 Emergency Response Plan

The emergency response processes (including storage of emergency response equipment) have been designed to effectively respond to all foreseeable emergency events as identified in various risk assessments (e.g. FSA, HAZOPs, HAZIDs and JHA's) and from DBNGP experience.

The Emergency Response Plan (ERP) is in place to manage events and emergencies so as to limit the consequences of such events so as to:

- Minimise or eliminate any danger or risk to individuals;
- Minimise or eliminate any risk to the business; and
- Ensure that the WER is returned efficiently to a safe condition with minimum impact to supply of gas and the environment.

The WER ERP consists of:

- All Hazards Plan (framework) which specifies the arrangements for:
  - incident escalation;
  - incident and emergency management structures;
  - roles and responsibilities of IMT and EMT and their interface;
  - IMT and EMT interface with Crisis Management Team;
  - display of emergency information including incident/emergency management logs;
  - changeover of responsibilities; and
  - emergency operations centre locations.
- Emergency Procedures, Contingency Plans and Work Instructions
- Emergency Equipment Management Plan
- Contacts Directory
- Notification and reporting requirements

The Spill Response Procedure (E-PRO-016) acts as the Oil Spill Contingency for the WER and is aligned with the Emergency Response Plan.

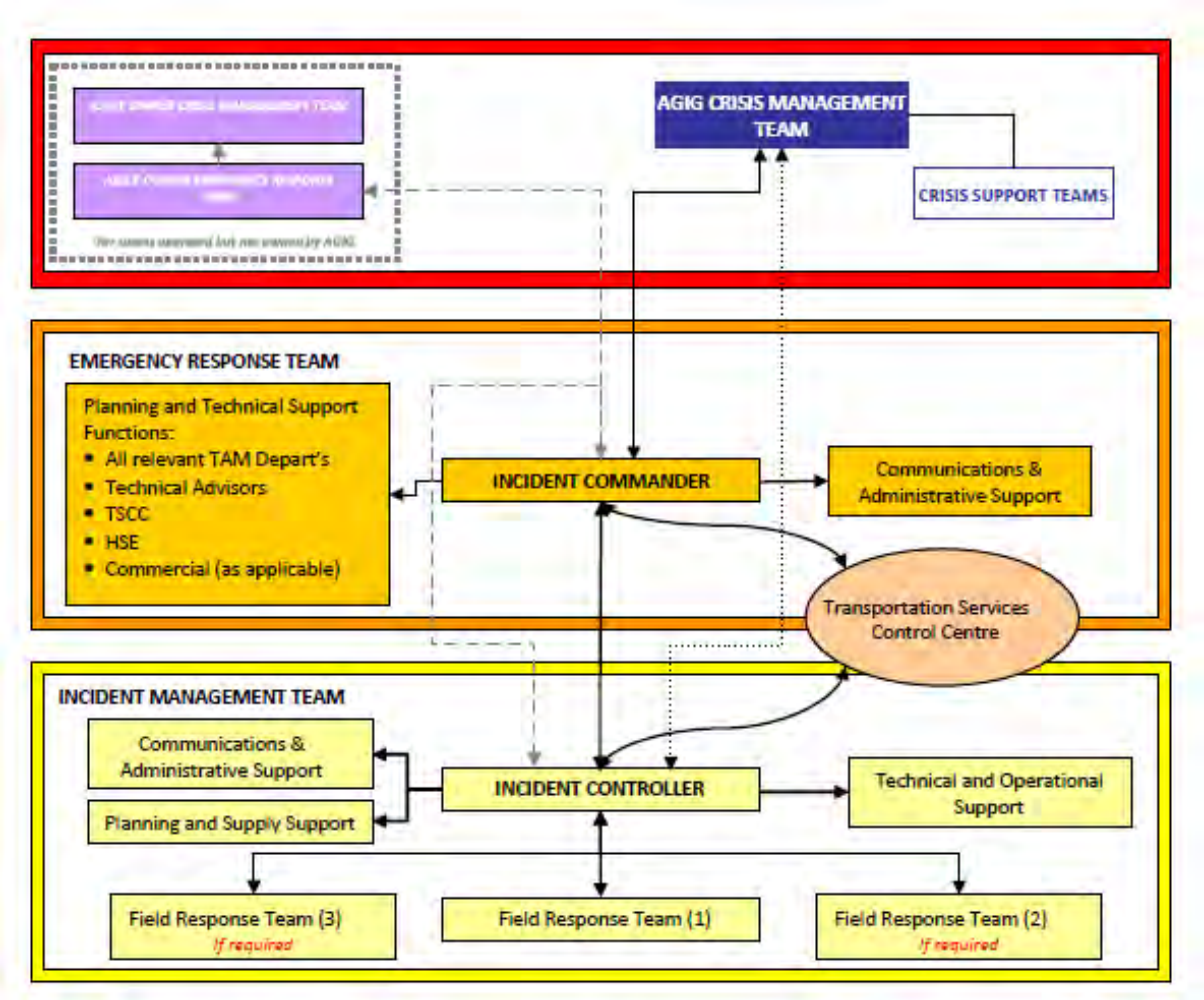

Figure 7-1 Emergency & Crisis Teams – Structures

The DBP ERP operates on risk based incident escalation and notification structures as shown in Table 7-2. These structures describe the escalation of an event to an emergency, which triggers the activation of the DBP ERP (see Figure 7-2). Depending on the severity of an emergency, the Crisis Management Plan may also be activated.

Table 7-2 Levels of Emergencies and Categories

Incident	Emergency	Crisis
Injury		
▪ Minor injury only	▪ Severe injury	▪ Fatality or fatalities ▪ Multiple injuries
Operational Impacts		
▪ No interruption or curtailment of supply ▪ Minor damage to equipment	▪ Short term interruption or curtailment within contractual limits ▪ Moderate damage to equipment, may require repair or replacement	▪ Extensive interruptions or curtailment ▪ Declaration of Force Majeure ▪ Declaration of Gas Supply System Emergency ▪ Major damage to equipment
Environmental Impacts		
▪ Short term impact without lasting effects	▪ Serious impact with medium to long term effects	▪ Major offsite impact; long term severe or permanent effects; rectification required
Community / Government / Reputation / Social / Cultural / Heritage		
▪ Public concern restricted to local complaints ▪ Minor infringement of cultural heritage – repairable	▪ Attention from Media ▪ Ongoing social issues or concerns from local community ▪ Permanent damage to items of cultural or heritage value	▪ Serious social issues with State political ramifications ▪ Significant damage or infringement of cultural heritage with widespread public outcry

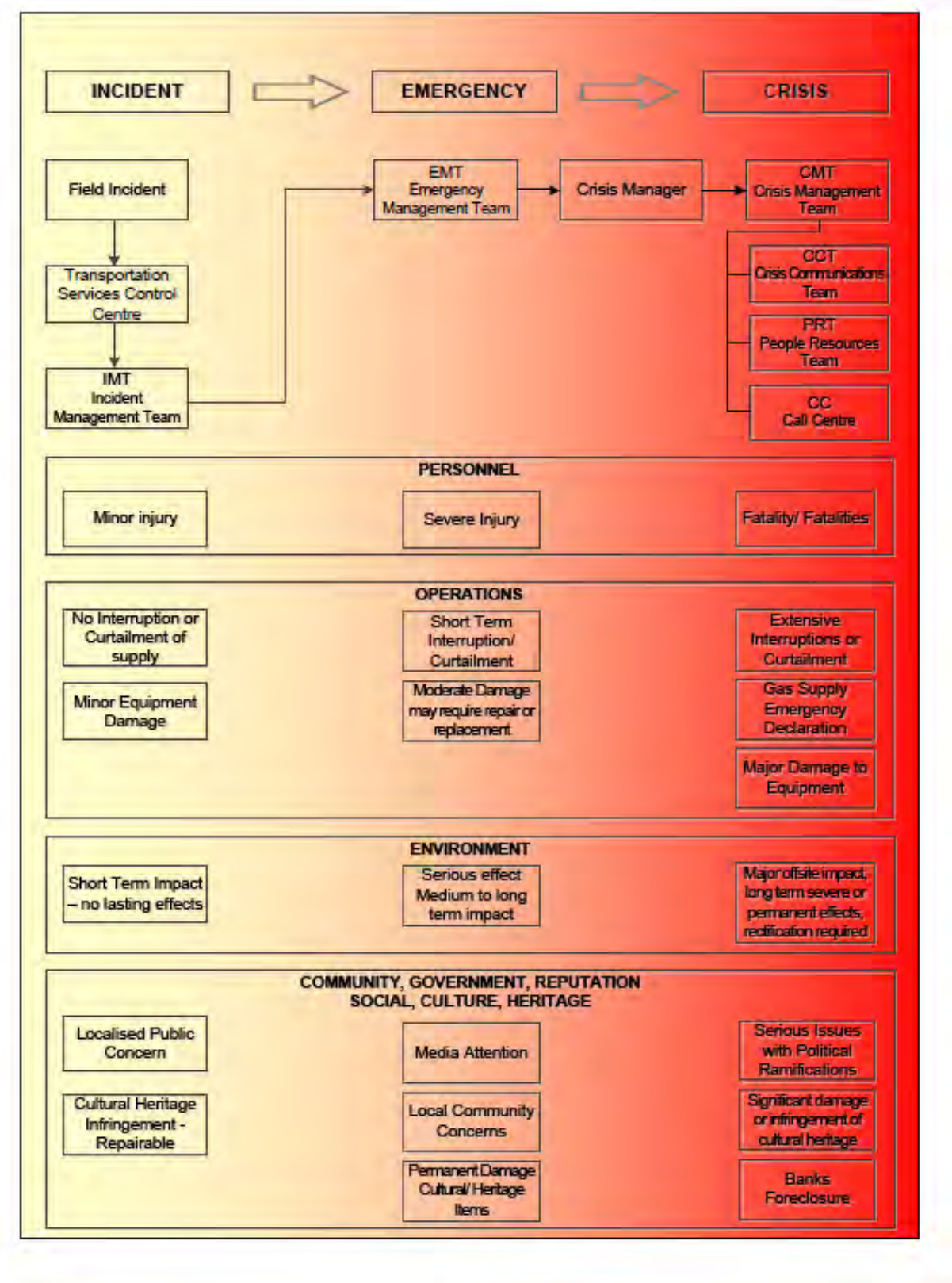

Figure 7-2 Emergency & Crisis Management Teams – Flowchart

7.4.2 Emergency Training

All field personnel are trained and competent in Senior First Aid/Remote Area First Aid, Fire Fighting and 4WD Driving. The performance of the tasks associated with Emergency Procedures for the pipeline and associated facilities are an extension of normal work practices and as such the personnel are trained on a regular basis to perform those tasks. Selected personnel also conduct competency based training in the completion of emergency response through regular emergency exercises.

Emergency exercises are conducted annually to assess the emergency response capabilities of the various teams by providing exercises at levels up to and including crisis. The level of escalation may vary from one exercise to another. All exercises include at least activation of the IMT and EMT.

The key roles in the response and recovery processes are the Incident Commander (GM Transmission Asset Management or delegate) and Incident Controller (GM Transmission Operations or delegate).

7.4.3 Emergency Preparedness & Management

The WER Construction Team assesses each project activity and potential external factors or influences that may give rise to identifiable emergency conditions. Systems will then be established and assigned priority to prevent, manage or mitigate emergency events, i.e. awareness of general fire restrictions, permit to work systems requirements, adverse weather monitoring etc.

The preparation for emergency response also includes an assessment of the probability of the type of emergency events identified through the hazard identification process.

Project emergency planning and procedures will reference:

- communications/alarm systems;
- emergency equipment;
- emergency reporting and support contact information;
- frequency of emergency response drills/exercises.
- muster points;
- provisions to account for personnel on site;
- response to specific emergency situations; and
- specific responsibilities.

7.4.4 Crisis Management Plan

DBP's Crisis Management Plan (CMP) details the roles and responsibilities of the Crisis Management Team (CMT). Events that will trigger the activation of the CMT are likely to be associated with personnel, public safety, supply, license or reputation issues.

The function of the CMT is to manage a crisis at a strategic level. Once activated, the CMT will receive input from all groups involved in the crisis. The operational crisis or the event is monitored and assessed for the impact on DBP's statutory and legal obligations, shipper contracts and its corporate reputation.

7.5 Monitoring

In accordance with Section 33 of the Regulations, WER shall conduct monitoring of the emissions and discharges defined in Table 7-3 and as outlined in the project GHG Management Plan.

The Quarterly Emissions and Discharge Report shall consolidate the results of all monitoring for submission to the DMIRS as specified in Table 7-6.

Table 7-3 Overview of monitoring of emissions

Equipment / Activity	Emission	Monitoring	Reporting
Venting	Fugitive gas emission	DBP's Supervisory Control and Data Acquisition (SCADA) system continually monitors for valve movements and pressure changes to identify periods of gas venting.	Where identified, a predetermined model is utilised to quantify the gas released. Results are recorded within DBP's Customer Reporting System (CRS) and reported quarterly to DMIRS.
Amine Gas Removal Unit and Oxidiser – Flare Unit	Gas removal from reservoir gas	Gas emissions measured through flare system and AGRU monitoring.	Emissions of CO_2 equivalents shall be calculated using measured gas consumption data in accordance with the NGER Measurement Determination 2008 and reported quarterly.
GEA	Gas combustion	Gas consumption by compressor turbines shall be continually metered at the source and recorded within DBPs Customer Reporting System (CRS).	Emissions of CO_2 equivalents shall be calculated using measured gas consumption data in accordance with the NGER Measurement Determination 2008 and reported quarterly.
DEA	Diesel combustion	DEA run time shall be metered where possible and for less frequently used units recorded directly.	DEA diesel consumption shall be estimated based on system specifications and measured run time. Emissions of CO_2 equivalents shall be calculated using estimated diesel consumption data in accordance with the NGER Measurement Determination 2008 and reported quarterly.
Pipeline maintenance and Testing	Purged Nitrogen	Acknowledging the inert and ubiquitous nature of this gas, monitoring is not proposed.	NA
Vehicles	Diesel combustion	Diesel purchases shall be monitored using DBPs Financial accounts system.	Direct purchasing values shall be used to calculate emissions of CO_2 equivalents in accordance with the NGER Measurement Determination 2008 and reported quarterly.
Forklifts	Gas combustion	Bottled gas purchases shall be monitored using DBPs Financial accounts system.	Direct purchasing values shall be used to calculate emissions of CO_2 equivalents in accordance with the NGER Measurement Determination 2008 and reported quarterly.
Potable Water Treatment	Reverse Osmosis waste water discharge	Acknowledging the low operating capacity of this plant no monitoring of effluent is conducted.	The volume of RO waste water discharge shall be estimated based on equipment specifications and reported quarterly.

Equipment / Activity	Emission	Monitoring	Reporting
Waste water disposal - Construction	Dewatering and hydrotest water discharge	Volume of dewatering amounts and hydrotest water that is discharged to the environment.	Volumes of water discharged measured through pumping rates (dewatering) and volumes of water used in hydrotest. NOTE water that is not suitable for discharge and is collected by a licensed waste contractor is captured as per below.
Waste Disposal	Waste – All types	Monitoring and recording of the type and volume of all waste collected for disposal shall be undertaken.	The total volume for each waste stream collected from site shall be reported quarterly.

7.6 Inspections and Audits

7.6.1 Project HSE Inspections

Project HSE Inspections shall occur weekly during construction and assist assessing compliance to the CEMP and regulatory approvals. Planning, controlling and monitoring construction activities are considered essential in ensuring those activities are effectively and efficiently performed. Project HSE Inspections are performed at least weekly and include the following environmental aspects:

- Evidence of any spills or leaks;
- Security, lighting and signage of the facility;
- Appropriateness of chemical storage (volume, storage type, availability of SDS);
- Evidence of subsidence, erosion;
- Impacts to flora and fauna are as per project approvals;
- Waste management; and
- Weed and vegetation control.

All issues identified must be recorded, investigated and action implemented to prevent the issue recurring.

7.6.2 HSE Audits and Field Evaluations

The HSE Audit and Evaluation Procedure (S-PRO-054) sets out the process for conducting internal HSE audits. Ultimately, the objective of this process is to provide a framework that ensures the implementation and effectiveness of DBP's HSE management system.

There are two levels of assessment used to verify the implementation and effectiveness of DBP's HSE management system, these are:

i. System Audit: An in depth and targeted assessment against specific criteria, established to assess compliance against a strategic audit objective.

ii. Field Audit: A high level and systematic assessment against generic criteria, tailored to evaluate ongoing compliance against key system indicators.

7.6.2.1 System Audits

The Lead Auditor shall review the relevant Obligation Sources (i.e. procedures, management plans, statutory approvals etc.) and identify all obligations relevant to the scope. To assist in the development of audit criteria for audits against the WER Safety Case and CEMP, the HSE Manager shall ensure the maintenance of the HSE Audit Template (S-TMP-054.1). This shall include obligations detailed within the documents themselves and also the subsidiary procedures that support them.

An audit schedule is developed annually and DBP completes a range of audits per year on AGIG assets. WER shall undergo at least an annual HSE System Audit.

Additionally, HSE System Audits shall also be conducted against specific activities, such as a clearing or waterway crossings, to ensure regulatory and procedural controls are being implemented. The frequency of these is set out in Section 6.

7.6.2.2 Field Audits

The HSE Manager shall ensure that a minimum of one field audit is conducted each calendar year on activities at WER. Where relevant, the HSE Manager may identify focus areas to be targeted, these may include for example:

- High risk work programs;
- Work involving environmental compliance requirements;

- Work activities relevant to a procedure that is under review (i.e. for consultation purposes);
- Work activities impacted by a recent procedural update; or
- Workgroups or work activities observed to encounter increased incident rates

The HSE Manager must monitor the frequency and scope of field audits completed and where there is concern that insufficient coverage is achieved, take steps to schedule targeted field audits to address this. Results of both internal (as above) and external audits (by the Regulator) shall be included in the Annual Environmental Report (Table 7-6).

7.7 Review and Improvement

DBP conducts an annual comprehensive business strategy planning process which guides the overall business operation for the following year. Key performance indicators for the business and individuals are determined from these reviews. The achievement of compliance with environmental management obligations shall be considered in each business plan, enabling the identification of issues to upper management and the allocation of resources where necessary to implement improvements.

Additional ongoing review commitments are presented in Table 7-5.

Table 7-4 Details of system elements requiring periodic review

Subject	Detail	Timeframe	Responsibility
CEMP / Operations Environment Plan	The review shall: ▪ assess the appropriateness of the EP to the operations of facilities based on audit information; and ▪ determine if any changes to the EP are required as a result of operational, legislative or organisational changes. All revisions shall be submitted to DMIRS for approval.	Minimum of every five years or earlier if in response to a material change to the activities and/or the use of equipment or in response to actions arising from any audit taken.	HSE Manager
Environmental Policy	Review to identify and implement continuous improvement opportunities.	Every two years	HSE Manager/ Executive Management Team
Legislation and other requirements	Review to identify amendments to existing and addition of new legislation which is relevant to the environmental management of pipeline activities.	Annual and opportunistic	HSE Manager
GIS Environmental data	Review to update publically available spatial information relating to environmentally sensitive areas within the DBNGP corridor.	Every two years	GIS Manager and HSE Manager
OSCP	Review the OSCP for relevance and appropriateness to risk from hydrocarbon management	Every 2.5 years (see OSCP for more details)	HSE Manager

7.7.1 Trend Analysis

As per Section 7.3, DBP undertakes a targeted annual review to ensure a process to identify trends, key factors and areas of focus for upcoming awareness programs and evaluations. This allows DBP to assess the potential risk from both events as well as audit and evaluation findings to target areas of concern or ongoing opportunities for improvement.

7.8 Reporting

To demonstrate and maintain compliance against legislative requirements, routine external reporting to key regulatory agencies shall be conducted. Routine external reporting requirements for the DBNGP are summarised in Table 7-6.

Table 7-5 Overview of external regulatory reporting requirements

Report	Details	Agency	Period	Due Date	Responsibility
Recordable Incident Report	Details the cause, impacts and corrective actions associated with any incident arising from the activity that breaches a performance objective or standard identified in the EP	DMIRS	Each calendar month	Not later than 15 days after the reporting period. A Nil report shall be supplied if no incidents occurred.	Senior HSE Advisor
Emissions and Discharge Report	Details all emissions and discharges to any land, air, marine, seabed, sub-seabed, groundwater, sub-surface or inland waters environment that occur in the course of the activity	DMIRS	Each three calendar months (Jan – Mar; Apr – June; Jul – Sept; Oct – Dec)	Not later than 15 days after the reporting period	Senior HSE Advisor
Emissions	Details GHG Emissions	DWER	Annual (TBC)	As outlined in the GHGMP	Senior HSE Advisor
Annual Environmental Report (AER)	Demonstrates environmental performance objectives and standards for	DMIRS	Each financial year	Not later than 3 months after the reporting period via petroleum.environment@dmirs.wa.gov.au	Senior HSE Advisor

Report	Details	Agency	Period	Due Date	Responsibility
	the activity are being met				
National Pollution Inventory (NPI)	Details emissions submitted for all meter stations and compressor sites on the DBNGP	DWER	Each financial year	Not later than 3 months after the reporting period	HSE Manager
NGERs	Details greenhouse emissions for all DBP facilities	Clean Energy Regulator (CER)	Each financial year	Not later than 3 months after the reporting period	HSE Manager
Annual Compliance Assessment Report (ACAR)	Details compliance against approvals issued under Part IV of the EP Act	DAWE	TBC	Not Specified: approximately 6 months following the reporting period	Senior HSE Advisor
Annual Compliance Report	Details compliance against approvals issued under the EPBC Act	DWER	Each financial year	Not later than 3 months after the reporting period	Senior HSE Advisor

7.9 Decommissioning and Rehabilitation

There is no current plan to decommission the WER with operational life expected to extend into the foreseeable future. The design life of the pipeline is 60 years and the plant 20 years. Prior to commencing any decommissioning activities, a Decommissioning and Final Rehabilitation Plan will be developed after a risk assessment and in consultation with stakeholders based around the following minimum criteria:

- Confirmation of future land use; dependent on multiple factors including previous land use, current land use for adjacent areas, stakeholder consultation and ensuring ecological sustainability of the land
- Removal of above ground facilities
- Removal of above ground signage and CP points
- Disturbance areas (compounds, access tracks and airstrips) shall be ripped to mitigate any soil compaction
- Development of rehabilitation criteria for disturbance areas (for an example see Table 7-7)
- Best practice (at the time) decommissioning management of the pipeline asset either through removal or if left in situ; to enable a non-polluting, safe and stable condition of the asset.

Where possible, we will conduct ongoing rehabilitation works for areas no longer required for operational use. This progressive rehabilitation allows for criteria such as perennial species diversity,

richness and foliage cover as well as the potential impact from weeds. These criteria, aligned with the above requirements would form the basis for any final decommissioning planning.

Rehabilitation immediately post construction and for the pipeline construction is covered under the project Rehabilitation Management Plan.

Table 7-6: Potential Rehabilitation Criteria for decommissioning

Criteria	Details
Native species richness	Perennial native species richness equals or exceeds 40% of that of the adjacent control area at 36 months
Native species density	Perennial native species density equals or exceeds 40% of the adjacent control area at 36 months
Native species foliage cover	Percentage foliage cover of perennial native species indigenous to each plant community is greater than or equal to 40% of the adjacent control area at 36 months
Weed foliage cover	Foliage cover of Declared and Environmental Weeds is not greater than that of the adjacent control area at 24 and 36 months (excluding extensive adjacent populations i.e. buffel grass).
Stable waterway beds and banks	Waterway beds and banks are in a stable condition as compared to the surrounding adjacent waterway features and monitored annually for three years.

Monitoring of criteria will be conducted annually with annual reviews to understand progress and trend of success. Any contamination identified during decommissioning or rehabilitation shall be remediated immediately. An Annual report shall be supplied to DMIRS in regards to progress of rehabilitation works or as agreed in the Decommissioning and Final Rehabilitation Plan.

The Decommissioning and Final Rehabilitation Plan shall require approval by DMIRS prior to decommissioning commencing.

Rehabilitation immediately post construction and for the pipeline construction is covered under Appendix E of the Environmental Review Document – Rehabilitation Management Plan.

7.10 Document Control

The HSE Manager is responsible for the maintenance of all HSE documentation to ensure that they:

- have an identifiable owner responsible for ensuring document updates as required;
- be clearly identifiable via a standard naming protocol and unique identifier;
- be subject to periodic review via a consultative process; and
- be readily available to all Personnel (as required) with obsolete versions removed and retained on
- archive for a minimum of five years.

The HSE Document Control Procedure (S-PRO-000) sets out the process for this. At the time of writing all HSE documents are managed, communicated to Staff and stored using InControl.

The TAM Document Controller, jointly with relevant document authors/owners, is responsible for implementing the Document Control and Records Management Procedure (TEB-003-0016-01) which describes the method for controlling documents and management of data relating to asset management and Project management, and all DBP Safety Cases. The policy is applicable to all

documents produced by TAM including policies, procedures, work instructions, and drawings, whether in hardcopy or electronic format, associated with management of:

- DBP assets (including DDG assets); and
- Projects executed under the Project Management Methodology (by Project Management Office) including AGIG Projects

Other relevant records, while not extensively referenced in this document, may be managed by the dedicated document control process which exists for the Maintenance and Commercial divisions as follows:

- Maintenance – Maintenance related work instructions are managed through DBNGP Work Instruction Administration Procedure (DBP-PR-ADM-004) by the Technical Writer.
- Commercial – Pipeline Operations related documented are created and managed through the Document Control Procedure (TSD-PR-GEN-OPS-UNI-002) by DBP Transportation Services Control Centre (TSCC). However document numbers are issued by the TAM Controller.

7.11 Consultation

The purpose of consultation is to:

- Obtain appropriate input into the ongoing improvement of this EP;
- Keep key stakeholders up to date with DBNGP activities;
- Ensure timely response to landholder issues; and
- Maintain dialogue with regulatory authorities, including local councils.

Key stakeholders including the Department of Planning, Land and Heritage and DMIRS, along with relevant pipeline operations personnel participated in a HAZID to identify and assess the potential environmental hazards associated with the operations and maintenance activities for the DBNGP. Furthermore, consultation with other stakeholders including the Department of Water and Environmental Regulation (DWER) undertaken as the need arises to ensure that operations on the DBNGP are managed in accordance with relevant statutory requirements.

Recent consultation with key regulators is described below:

- Consultation with DWER (OEPA) in relation to close out of rehabilitation for pipeline activities assessed under part IV of the EP Act. DWER reporting is also completed annually and on a 5 year basis for some projects.
- Ongoing discussions with DMIRS in regards to pipeline operator status, annual reporting, new projects, clearing permit and audits
- DWER (DoW) licensing for water bores along the route including renewal information.
- DBCA and DPaW in relation to fauna licensing and renewals or updates to the fauna license as well as access to conservation estates as the land manager.

Consultation and communication with relevant landholders, regulatory authorities, Aboriginal and other interest groups and the general public will be undertaken as part of the DBNGP operation activities. The schedule and key messages to be included in the consultation program is governed by the Land Management Plan. All contact with stakeholders will be recorded in the Land Management System (LMS). The Land Management department and the HSE department are responsible for the development and distribution of corporate awareness publications to communicate the details of our environmental commitments to key stakeholders. All other relevant details about land use, foreign crossings, landholder concerns and issues are to be recorded on the LMS for future reference and reporting.

The Wellesley Meter Station consultation included LandCorp (as the landholder), Albemarle Lithium Plant, Shire of Harvey, EPA (referral of project, DAWE (EPBC referral), DMIRS (pipeline license) and DWER (clearing permit). Outcomes included a no assessment / not a controlled action from EPA and

DAWE, a clearing permit application (awaiting outcome from DWER), an access arrangement from the Shire of Harvey and discussions on the construction of a road and a sub-lease with LandCorp.

Formal contact with all landholders will be determined relevant to the perceived risk, with ongoing liaison throughout the year. All contacts involve the dissemination of information about the DBNGP, discussion of any concerns and education of pipeline safety to increase awareness. This ongoing process is designed to decrease the risk of third party incidents and to encourage ownership of the activities around the pipeline.

DBP target annual consultation with all landholders. These consultations provide an opportunity for the landowner to advise DBP of any change to their contact details, land use requirements and future expectations. DBP promote awareness of risks and emergency protocols.

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Appendix A Environmental Policy

Environment Policy

AGIG's vision is to be the leading gas infrastructure business in Australia by delivering for customers, being a good employer, and sustainably cost efficient. Environmental and social responsibility is a key element of our vision.

AGIG believes that all incidents are preventable and is continually striving to achieve Zero Harm. Environmental stewardship is critical to the success and sustainability of our business.

AGIG believes that we are all individually accountable and empowered to ensure our actions are without undue adverse impact upon the environment.

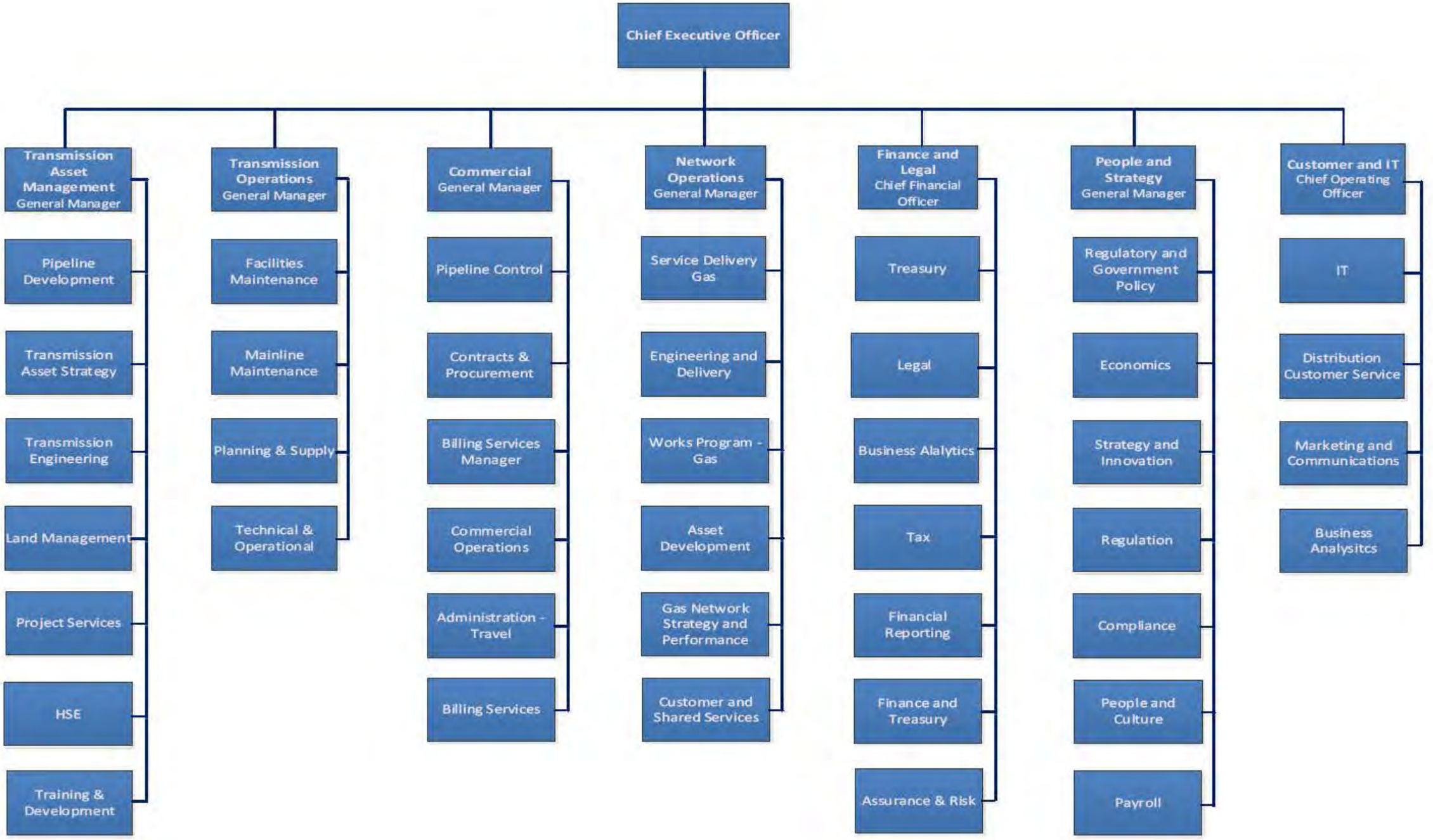
Our key objectives are to:

- Conduct environmentally responsible operations and minimise environmental impact wherever possible.
- Ensure our carbon emissions footprint is consistent with national policy and regulations.
- Create a culture and environment where every employee is personally committed to managing impacts to the environment.
- Act consistently with AGIG's values, including working in a safe and professional manner.

We will achieve this by:

- Embedding environmental considerations into business decisions and processes.
- Promoting environmental awareness and fostering a culture of respect for ecological values.
- Effectively consulting with our employees, contractors and key stakeholders on environmental matters and establishing an escalation mechanism for matters requiring management intervention.
- Driving a culture where employees and contractors take ownership and are accountable for environmental performance.
- Developing processes and systems to identify, assess and control environmental risks and to ensure the management of risk to as low as reasonably practicable.
- Establishing and maintaining pragmatic and flexible environmental management systems that are tailored to our risks, drives achievement of our vision and are regularly reviewed for currency, relevance and effectiveness.
- Allocating the appropriate resources and providing the necessary information, instruction, training and supervision to enable implementation of the environmental management systems.
- Effectively reporting, recording and investigating environmental incidents and near misses in the workplace and taking proactive measures to prevent recurrence.
- Maintaining preparedness to respond promptly to environmental incidents to mitigate the nature and scale of unintended impacts.
- Setting, monitoring and communicating meaningful performance measures to drive continuous improvement.
- Regularly auditing our operations to monitor compliance with statutory obligations and conducting accurate and transparent reporting on any findings.
- Complying with all applicable laws, regulations and standards for the protection of the environment.

Appendix B Organisational Structure


Chief Executive Officer
Transmission Asset Management General Manager
Pipeline Development
Transmission Asset Strategy
Transmission Engineering
Land Management
Project Services
HSE
Training & Development
Transmission Operations General Manager
Facilities Maintenance
Mainline Maintenance
Planning & Supply
Technical & Operational
Commercial General Manager
Pipeline Control
Contracts & Procurement
Billing Services Manager
Commercial Operations
Administration - Travel
Billing Services
Network Operations General Manager
Service Delivery Gas
Engineering and Delivery
Works Program - Gas
Asset Development
Gas Network Strategy and Performance
Customer and Shared Services
Finance and Legal Chief Financial Officer
Treasury
Legal
Business Alalytics
Tax
Financial Reporting
Finance and Treasury
Assurance & Risk
People and Strategy General Manager
Regulatory and Government Policy
Economics
Strategy and Innovation
Regulation
Compliance
People and Culture
Payroll
Customer and IT Chief Operating Officer
IT
Distribution Customer Service
Marketing and Communications
Business Analysitcs

Appendix C Risk Management Policy and Model

AGIG OPERATIONAL RISK MATRIX

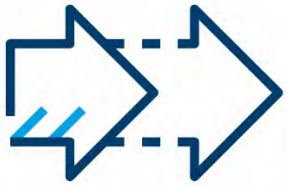
RISK MATRIX		Consequence				
		Trivial	Minor	Severe	Major	Catastrophic
Frequency	Frequent	Low	Intermediate	High	Extreme	Extreme
	Occasional	Low	Low	Intermediate	High	Extreme
	Unlikely	Negligible	Low	Intermediate	High	High
	Remote	Negligible	Negligible	Low	Intermediate	High
	Hypothetical	Negligible	Negligible	Negligible	Low	Intermediate

Consequence	Financial impact	People	Environment	Reputation/ Outage	Supply
Catastrophic	Would threaten DDG's survival Greater than $10M	Two or more fatalities	Permanent, irreparable off site impact	International media	Long term interruption of supply
Major	Would threaten the effective operation of DDG for a substantial period $5m - $10m	Less than two fatalities More than four LTIs or MTIs	Long term, off-site impact or medium term impact within ESA	National media	Prolonged interruption; long term restriction of supply
Severe	Exposes DDG to unacceptable cost consequences $2.5m - $5m	Less than four LTIs or MTIs	Medium term offsite impact or short term impact within ESA	State media Widespread complaints	Short term interruption, prolonged restriction of supply
Minor	Issues are dealt with internally $0.5m to $2.5m	Injuries requiring first aid treatment	Short term offsite effect	Local media and complaints	Short term interruption; restriction of supply with shortfall met by other sources
Trivial	No significant impact on DDG Less than $0.5m	Injuries not requiring first aid or other treatment	No offsite effect	Internal complaints and minor public nuisance	No impact; no restriction of pipeline supply

Frequency	Definition
Frequent	Event could reasonably be expected to occur eg manual handling injury, vehicle fauna strike and heat overexposure
Occasional	Event may occur from time to time eg vehicle accidents and snake bites
Unlikely	Event is not likely to occur eg diesel tank storage failure, fall from height
Remote	Event is not anticipated to occur eg vehicle collision causing pipeline rupture
Hypothetical	Event is theoretically possible but highly improbable eg. a sudden lightning strike (on an otherwise clear day) striking a communications tower when an officer is working from it causing electrocution.

Risk	Definition
Extreme	Modify the threat, the frequency, or consequence so that the risk is reduced to 'Intermediate' or lower. For an in-service pipeline the risk shall be reduced immediately.
High	Modify the threat, the frequency or consequence so that the risk is reduced to 'Intermediate' or lower. For an in-service pipeline the risk shall be reduced as soon as possible, typically within a timescale of not more than a few weeks.
Intermediate	Modify the threat, the frequency or consequence to reduce the risk rank to 'Low' or 'Negligible', if practicable (ie anything else that can reasonably be done to reduce the risk). Risk is tolerable if we have done all that can be reasonably called upon to further reduce the risk, but the risk remains largely the same. Document reasoning for the ALARP conclusion. For an in-service pipeline, the reduction to 'Low' or 'Negligible' or demonstration of ALARP shall be completed as soon as possible and typically within a timescale of not more than a few months.
Low	Determine the management plan for the threat to prevent occurrence and to monitor changes that could affect the classification.
Negligible	Review at the next review interval. Manage by routine procedures – reassess at next review.

GRAVITY *e.g. WAH, falls, dropped objects, suspended loads, unstable structures*	**TEMPERATURE** *e.g. open flame and ignition sources, hot or cold surfaces, extreme weather*	**CHEMICAL** *e.g. toxins, corrosives, combustibles, unsafe atmospheres, asbestos and dust*
MOTION *e.g. manual handling, awkward/ sustained postures, repetitive actions, vehicle movements and mobile plant*	 **HAZARD FINDER**	**BIOLOGICAL** *e.g. insects, animals, bacteria, viruses, contaminated water*
MECHANICAL *e.g. rotating or vibrating stationary equipment*	**PSYCHOLOGICAL** *e.g. stress, fatigue, distraction, excessive workload*	**RADIATION** *e.g. sun exposure, welding arcs, lighting issues, X-rays*
ELECTRICAL *e.g. energised equipment, overhead and underground power lines, batteries*	**PRESSURE** *e.g. live pipework, compressed cylinders, hoses, pneumatics, hydraulics*	**SOUND** *e.g. equipment noise, high pressure release, impact noise, vibration*

 GRAVITY	 TEMPERATURE	 CHEMICAL
 MOTION	Australian Gas Infrastructure Group **HAZARD FINDER**	 BIOLOGICAL
 MECHANICAL	 PSYCHOLOGICAL	 RADIATION
 ELECTRICAL	 PRESSURE	 SOUND

Appendix D Environmental Aspects and Impacts Risk Register

ID	ACTIVITY	ASPECT		IMPACT / CONSEQUENCE	*Inherent*			Physical Safeguards	Procedural Safeguards	*Residual*		
		Hazard	Source	Environmental Effect	CONSEQUENCE	LIKELIHOOD	RISK			CONSEQUENCE	LIKELIHOOD	RISK
1	Waste Disposal: Domestic waste	Leachate; Solid Domestic Waste; Liquid Domestic Waste; CO_2	Inadequate management of domestic waste generated on site.	Odour, Pests, Aesthetics/Visual, Attracts feral animals, Hazard to livestock	3. Severe	D. Occasional	Intermediate	Covered skip bins Designated waste management area	Licenced rubbish removal	1. Trivial	C. Unlikely	Negligible
2	Waste Disposal: Sewage and Grey water to on-site septic tank or BioMax WWTP; treatment prior to disposal onsite	Sewage	Inadequate containment of sewage	Soil, groundwater and/or surface water contamination, Increase in nutrient levels entering natural water systems	2. Minor	D. Occasional	Low		Adequate containment volume, Septic pump out as required by licenced contractor. Adequately sized leach drains meeting Department of Health requirements. Onsite treatment and disposal monitoring (i.e. irrigation)	1. Trivial	C. Unlikely	Negligible
3	Waste disposal: RO by-product	Salt	Discharge of saline by product of RO to ground	Creating saline ground, vegetation death, contributing to salinity of shallow groundwater, impacting offsite groundwater users.	3. Severe	D. Occasional	Intermediate		Minimise our need to produce water on site. Import water for compressor wash. Characterise receiving environment to ensure negligible likelihood of offsite migration of impacts (if any). Localised containment of saline discharge. Appropriate disposal based on site specific risk assessment outcome.	1. Trivial	C. Unlikely	Negligible
4	Waste Oil storage (underground)	Waste Oil	Leaching of oil through storage tank walls or floor. Spill during transfer to/from tank.	Soil, groundwater and/or surface water contamination	4. Major	D. Occasional	High	Located away from surface water	Adequate storage (double skin) and / or bunding (AS1940), Spill contingency procedures, Standard handling and safety procedures, Monitoring (where warranted) of soil adjacent to UST, Monitoring of groundwater quality at relevant locations. High level alarms - monthly inspections.	2. Minor	C. Unlikely	Low
5	Fuel / Oil storage	Oil spill	Inadequate containment of failed tank	Soil, groundwater and/or surface water contamination	3. Severe	E. Frequent	High		Adequate storage (double skin) and / or bunding (AS1940), Spill contingency procedures, Standard handling and safety procedures, Monitoring (where warranted) of soil adjacent to UST, Monitoring of groundwater quality at relevant locations. High level alarms, periodic inspections, Validate waste storage is sufficient to contain entire contents of tank.	2. Minor	B. Remote	Negligible
6	Waste Oil Storage (Above ground)	Waste Oil	Inadequate bund capacity or leaching of oil through bund walls or floor	Soil, groundwater and/or surface water contamination	3. Severe	C. Unlikely	Intermediate	Double skin tanks	Spill contingency procedures, Standard handling and safety procedures, reduce the quantity & period of oil storage. High level alarms - monthly inspections. 5 yrly tank monitoring. Adequate bunding (AS1940),	2. Minor	C. Unlikely	Low
7	Waste Oil sump	Waste Oil	Failure of pump out system leading to overflow	Soil, groundwater and/or surface water contamination	2. Minor	C. Unlikely	Low	Design of sumps over large for planned quantity	Monthly inspections.	2. Minor	B. Remote	Negligible
8	Transfer by vacuum truck	Waste Oil	Spill during transfer from tank	Soil, groundwater and/or surface water contamination	2. Minor	D. Occasional	Low	Tank design	Use of drip trays, licenced removalist, spill kits	1. Trivial	C. Unlikely	Negligible

9	DEA use	NAI	See Item #5									
10	Hazardous waste disposal	Hazardous Waste including lead acid batteries, Asbestos, Oily filters, Oil soaked coalescer	Inappropriate disposal of hazardous waste	Soil, groundwater and/or surface water contamination	2. Minor	E. Frequent	Intermediate		Standard handling and safety procedures, use of licenced waste disposal contractors.	1. Trivial	C. Unlikely	Negligible
11	Weed control	Herbicide	Overspray	Damage to native vegetation, damage to agricultural crops	4. Major	C. Unlikely	High		Use of approved herbicides, Use correct application procedure and equipment. Register of land owners specific requirements in LMS. Targeted weed management	1. Trivial	C. Unlikely	Negligible
12	Weed control	Herbicide	Spillage	Soil contamination	2. Minor	C. Unlikely	Low		Use of approved herbicides and, Use correct application procedure and equipment. Register of land owners specific requirements in LMS. Review weed management processes on corridor.	1. Trivial	C. Unlikely	Negligible
13	Venting Purging (e.g. automatic valve operations pressure relief valves compressor casing compressor station start-up/shut down	Methane CO_2	Venting, Purging, (Controlled release of gases)	Increase in greenhouse gas emissions, Decrease in local air quality.	3. Severe	E. Frequent	High		Normal operational management (pressure management), minimise starts and stops.	1. Trivial	E. Frequent	Low
14	General operations and venting (pigging)	Noise	Noise	Increase in noise levels at residential locations	3. Severe	E. Frequent	High		Standard maintenance procedures (AMP), appropriate equipment	1. Trivial	E. Frequent	Low
15	Flaring of odorised gas	Smell	Smell	Residential complaints of odour.	4. Major	C. Unlikely	High		Standard operating procedures (AMP), manned operation.	2. Minor	B. Remote	Negligible
16	Failure of relief valve	Methane	Uncontrolled release, noise	Increase in greenhouse gas emissions and noise disturbance. Decrease in local air quality.	4. Major	C. Unlikely	High		Standard maintenance procedures (AMP), alarms for all significant PRV	2. Minor	C. Unlikely	Low
17	General Compressor Operation	Air pollution	Exhaust emissions	Increase in greenhouse gas emissions, Decrease in local air quality	2. Minor	E. Frequent	Intermediate		Adhere to licence conditions, standard maintenance procedures (AMP)	1. Trivial	E. Frequent	Low
18	General Compressor Operation	Air pollution	Excessive Fuel Consumption as a result of inefficient configuration/operation	Increase in greenhouse gas emissions, Decrease in local air quality	2. Minor	E. Frequent	Intermediate		Standard operating procedures (AMP), pipeline efficiency modelling.	1. Trivial	D. Occasional	Low
19	Major Maintenance (Venting)	Methane, noise	Venting major pipeline section for repairs of third party damage	Increase in greenhouse gas emissions, Decrease in local air quality	3. Severe	D. Occasional	Intermediate		Standard operating procedures (AMP), manned operation.	2. Minor	C. Unlikely	Low

20	Draining cooling systems, water bath heaters, radiators etc.	Chemically treated water	Inadequate containment of drained material	Soil, groundwater and/or surface water contamination	2. Minor	C. Unlikely	Low	Design specifications	Standard handling and disposal procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure).	1. Trivial	B. Remote	Negligible
21	Storage of Hazardous materials / Dangerous Goods e.g. chemicals hydrocarbons, aviation fuel	Oil, chemical, or aviation fuel	Spill of oil, chemical, or aviation fuel	Soil, groundwater and/or surface water contamination. Loss of vegetation / crops. Odour, Increased risk of fire.	3. Severe	D. Occasional	Intermediate	Bunding	Adequate containment and bunding (AS1940), spill contingency procedures, standard handling and safety procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure) Minimise quantities of oil and hazardous materials stored.	1. Trivial	C. Unlikely	Negligible
22	Injection and handling of Odorant e.g. Mercaptan	Odorant	Spill of odorant	Soil contamination. Loss of vegetation / crops. Detrimental effect on native fauna and livestock, odour, Public alarm and complaints	4. Major	E. Frequent	Extreme	Bunding	Adequate containment and bunding (AS1940), spill contingency procedures, standard handling and safety procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure). Trained personnel	1. Trivial	D. Occasional	Low
23	Transport and handling of Hazardous material / Dangerous Goods e.g. chemicals hydrocarbons, aviation fuel, radioactive sources	Oil, chemical, or aviation fuel	Spill of oil, chemical, or aviation fuel	Soil, groundwater and/or surface water contamination. Loss of vegetation / crops. Odour, Increased risk of fire.	2. Minor	C. Unlikely	Low	Vessel design and specifications	Adequate Transport equipment, spill contingency procedures, standard handling and safety procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure)., Use of competent contractors and staff. Licenced Dangerous Goods Transport - where required.	2. Minor	B. Remote	Negligible
24	Transport of Odourant e.g. Mercaptan	Odorant	Major spill of odorant	Odour. Soil, groundwater and/or surface water contamination.	3. Severe	C. Unlikely	Intermediate	Vessel design and specifications	Adequate Transport equipment, Licenced Dangerous Goods Transport, spill contingency procedures, standard handling and safety procedures (S-PRO-016 Hazardous Materials Handling and Storage Procedure)..	3. Severe	A. Hypothetical	Negligible
25	Airstrip maintenance	Native Vegetation	Impact from maintenance – clearing covered under #53	NCC								
26	Use of airstrip	Aircraft	Impact through taxi, take-off and landing	NCC								
27	Pigging	Waste Material from inside pipeline	Waste material is not contained, is spilled or is incorrectly disposed of	Soil, groundwater and/or surface water contamination	2. Minor	E. Frequent	Intermediate		Adequate facilities, define waste disposal method (E-PRO-015 Waste Management Procedure), standard maintenance procedures (AMP)	1. Trivial	B. Remote	Negligible
28	Filter changes	Oil and Gas Filter	Waste oil and filter is not contained, is spilled or is incorrectly disposed of.	Soil contamination	2. Minor	E. Frequent	Intermediate		Adequate facilities, define waste disposal method, standard maintenance procedures	1. Trivial	B. Remote	Negligible
29	Construction and use of water bores	Abstraction	Use of groundwater for compressor station operations	Decrease in ground water level, Decrease in ground water available to other landowners	3. Severe	E. Frequent	High		Obtain permit and adhere to conditions, identify and implement water use minimisation measures.	1. Trivial	B. Remote	Negligible
30	Failure of pipeline	Methane	Unplanned release of methane	Increase in greenhouse gas emissions, Decrease in local air quality.	3. Severe	C. Unlikely	Intermediate		Standard maintenance procedures, monitoring of pipeline, emergency response	2. Minor	A. Hypothetical	Negligible
31	Pipeline maintenance resulting in release e.g. Filter Change	Methane	Release of Methane	Increase in greenhouse gas emissions,	2. Minor	E. Frequent	Intermediate		Standard maintenance procedures (AMP)	1. Trivial	E. Frequent	Low

				Decrease in local air quality.								
32	Cathodic Protection Deep well anode drilling	Drilling - soil contamination	Soil and Ground Water table pollution	Cross contamination of water table.	3. Severe	C. Unlikely	Intermediate		Standard design procedures (Basis of Design), appropriate assessment prior to installation	1. Trivial	B. Remote	Negligible
33	Vehicle usage	Weed or pathogen infected soil	Soil build up on vehicle	Introduction or spread of dieback disease in native forests / remnant vegetation potentially reducing quality of the forest, causing species loss Introduction or spread of weed species.	3. Severe	E. Frequent	High		COE Procedure. Landholder liaison prior to visit, Use of buses instead of private vehicles for transport of large workgroups. ACV process for clearing includes weed and dieback review. Stick to existing tracks	2. Minor	D. Occasional	Low
34	Vehicle usage	Vehicle	Driving vehicle on corridor	Compaction of topsoil, Loss of vegetation cover. Formation of erosion channels, Sedimentation resulting in a decrease in water quality, Decrease in depth of cover or exposure of pipeline.	2. Minor	D. Occasional	Low		Corridor not to be used as general thoroughfare When use cannot be avoided, standard operating procedures – stick to existing track, landowner liaison if required.	1. Trivial	D. Occasional	Low
35	Vehicle usage	Vehicle	Accidental collision with native fauna or livestock	Death or injury of animal struck by vehicle	2. Minor	E. Frequent	Intermediate		Driver training, avoid driving at dusk and dawn if possible, speed limits	1. Trivial	E. Frequent	Low
36	Vehicle usage	Access /Interference	Gates left open	Escape of livestock and entry of other animal species.	2. Minor	D. Occasional	Low		Minimise stock crossing points Landholder liaison prior to visit Driver training Gates in left in position found	1. Trivial	D. Occasional	Low
37	Pipeline maintenance - Slashing and clearing	Slasher / mulching	Slashing of non-target vegetation	Damage or loss of protected flora species or habitat areas. Soil erosion, Sedimentation resulting in a decrease in water quality. Disturbance to known or unidentified aboriginal site.	3. Severe	D. Occasional	Intermediate		Environment Plan, Regular inspection and monitoring, Authorisation to Clear Vegetation (ACV), Landholder liaison. Clearing permit. Restrict/minimise activity in waterways.	3. Minor	C. Unlikely	Low
38	Pipeline excavation	Open excavation	Excavation left open overnight	Native fauna and or livestock fall into the excavation resulting in injury and death. Decrease in population of protected species.	2. Minor	D. Occasional	Low		Fence excavation in sensitive areas, Environment Plan, Identify potential sites, Continual liaison with landholders and include in all project aspects. Trench management controls	1. Trivial	D. Occasional	Low
39	Excavation	Degradation of top soil and impact flora	Machinery used for clearing and excavation	Scouring of water course bank, loss of species	3. Severe	D. Occasional	Intermediate		ACV, Top Soil and subsoil stockpiled separately. Rehabilitation of non-operational areas, Native Vegetation	2. Minor	C. Unlikely	Low

									Clearance Procedure. Stormwater Management Plan and design. Infiltration basin.			
40	Excavation for inspection	Disturbance to Unearth cultural heritage artefacts or site	Machinery used for clearing and excavation	Disturbance of and / or damage to cultural heritage site or artefacts	3. Severe	C. Unlikely	Intermediate		Cultural Heritage Site listed on GIS - standard operating procedures, staff training and awareness.	3. Severe	B. Remote	Low
41	Pipeline excavation	Potentially acid forming soils at depth Fill introduces weeds	Excavation through Acid Sulphate Soil	When exposed to air formation of sulphuric acid, Groundwater and / or surface water contamination, Damage to aquatic organisms and ecosystems, Corrosion of pipeline. Weeds	3. Severe	C. Unlikely	Intermediate		Assess potential ASS Impacts and if required investigate or develop an Acid Sulphate Soil Management Plan (ASSMP), Treatment in line with DWER guidelines Minimise exposure time to less than 18 hours where practicable. Fill certified weed and seed free	2. Minor	B. Remote	Negligible
42	Pipeline watercourse crossings	Erosion, Flora, Heritage	Clearing of riparian vegetation	Scouring of water course bank, loss of species and habitat area. Disturbance within aboriginal site of ethnographic significance.	3. Severe	C. Unlikely	Intermediate		Don't clear / trim riparian zone unless essential - consider relocation of signs. Stick to existing tracks. Route selection. Only drainage lines located on route	2. Minor	B. Remote	Negligible
43	Pipeline watercourse crossings	Vehicle	Vehicles drive through watercourse	Damage to watercourse banks and bed, Damage to riparian vegetation, introduction or spread of waterborne weeds	3. Severe	D. Occasional	Intermediate		Stick to existing tracks	2. Minor	B. Remote	Negligible
44	Pipeline watercourse crossings	Erosion	Bank re-contoured and restored post flood	Inadequate revegetation of riparian zone, Erosion of bank, Sedimentation resulting in a decrease in water quality, Decrease in depth of cover or exposure of pipeline, Loss of pipeline integrity.	3. Severe	C. Unlikely	Intermediate		Regular patrol, particularly post cyclones	2. Minor	B. Remote	Negligible
45	Pipeline operation / maintenance grit blasting/painting	Noise, Grit, Paint, Thinners	Dust and Noise emission	Disturbance of landowner.	2. Minor	D. Occasional	Low		Use of wire brush technique, Adequate equipment, Enclose operations, Conduct operations during daylight hours, Standard Operating Procedures, Landholder liaison	1. Trivial	C. Unlikely	Negligible
46	Pipeline operation / maintenance grit blasting/painting	Grit, paint or thinners	Spill or overspray of grit, paint or thinners	Soil contamination, Detrimental effect on native flora.	2. Minor	D. Occasional	Low		Standard procedures, JHA (Job Hazardous Analysis), capture of waste material (overspray) Training and competency of operators.	1. Trivial	C. Unlikely	Negligible

47	Pipeline borrow pits	Erosion	Inadequate restoration of borrow pit area, Inappropriate excavation of materials	Inadequate revegetation, cave in. Unstable ground, Soil Erosion, weeds, Changes to natural drainage. Aesthetics visual.	2. Minor	D. Occasional	Low		Erosion procedure Rehabilitation non-operational areas Stick to existing tracks Native Vegetation Procedure including stockpile management	1. Trivial	C. Unlikely	Negligible
48	Clear and grade	Impact to native vegetation and fauna	Over clearing, clearing of threatened species	Inadequate survey, inadequate pegging, lack of onsite approval process, failure to follow ground disturbance permit	3. Severe	d. Occasional	Intermediate		Native Vegetation Procedure Clearing Approvals Ground Disturbance permit (or equivalent) Survey review – pegging of clearing locations Prestart reviews with personnel on approved clearing area Operator competency	2. Minor	C. Unlikely	Low
49	Corridor Maintenance	Access /Interference	Third party access	NCC – outside of DBP control (environmentally) Safety Awareness completion – Third party approval process								
50	Waste incineration, including odorant waste	NAI										
51	Construction Planning	Pre planning	Construction	Disturbance to infrastructure, nearby residents and land use activities. Increase public risk from site of project.	4. Major	C. Unlikely	High		Engage in early consultation with land users regarding proposed works Identify and obtain all necessary approvals	2. Minor	C. Unlikely	Low
52	ESA impacts	Activities associated with Environmentally Sensitive Areas	Clearing of vegetation	Clearing of vegetation and flora in environmentally sensitive areas.	3. Severe	C. Unlikely	Intermediate		Minimise clearing footprint Avoid ESAs where possible Obtain approvals where required	2. Minor	B. Remote	Negligible

53	Clearing	Clear and Grade Vegetation maintenance	Clearing of vegetation	Impacts on vegetation and flora Disturbance to declared rare flora (DRF) Impacts on fauna Spreading of weeds to detriment of native vegetation Impacts on watercourses, wetlands, ground or surface water Spread of dieback to detriment of native vegetation Cultural Heritage disturbance Noise Dust generation	4. Major	C. Unlikely	High		Native Vegetation Clearance Procedure ACV process Minimise clearing footprint Maintain GIS database Conduct pre-clearing checks Obtain approvals as required Where possible, avoid disturbance to trees with large hollows Inspection of habitat trees prior to felling Brush down soil material prior to entry to COE areas Avoid construction near surface waters and wetlands where possible Maintain within DBNGP or gain cultural heritage approvals as required Stop work and create buffer zones if cultural material found Use and maintain proper equipment Trained and competent operators Plan to avoid noisy work during sensitive times or close to sensitive receptors Minimise earthworks in windy conditions Use water spray or other suppressants to manage dust.	3. Severe	B. Remote	Low
54	Construction	Trenching and Excavation (incl dewatering) Erosion, clearing, water diversion, fauna impacts ASS, Heritage	Trenching and excavation	Alteration to hydrological regimes (surface drainage) and sedimentation. Soil erosion Fauna impacts (death / injury by falling into excavation or by trenching) Damage to other land uses Disturbance to ASS Cultural Heritage disturbance	3. Severe	C. Unlikely	Intermediate	Pipeline design (including depth) and route	Fauna Interaction Procedure Fauna handlers prior to any clearing Daily fauna inspections of trench and excavations Trench Management Controls Soil stockpiles segregate topsoil and subsoil and vegetation stockpiled separately Soil stockpiles inspected for erosion and controls applied as required ASSMP implemented as required ACV reviews cultural heritage impacts Notification to other stakeholders / service providers Erosion Procedure Dewatering managed to minimise erosion as per DWER guidelines Dewatering volumes measured Dewatering process inspected every two hours while in operation	2. Minor	B. Remote	Negligible
55	Construction	Drilling/boring	HDD boring or drilling for anodes / foundations	Soil erosion. Sedimentation Disturbance to ASS Contamination of surface and/or ground water Noise	3. Severe	C. Unlikely	Intermediate	Pipeline design (including depth) and route	Erosion Procedure Erosion controls and monitoring of mud collection areas Approvals for any hazardous chemicals in place prior to use ASS investigation conducted if required Daily fauna inspections of mud pits Stockpiles segregated and separated as required under Native Vegetation Clearance Procedure	1. Trivial	D. Occasional	Low

56	Bushfire	Hot works and vehicle movements Smoking	Hot work, ignition source use	Potential to cause fire that will impact on flora, fauna and other land uses.	4. Major	D. Occasional	High	Spark arrestors, diesel fuel vehicles	Native Vegetation Clearance Procedure No hot works next to or on vegetation Knowledge of local fire bans and inclusion of risk in JHA Fire equipment as required Emergency Response Plan Gas testing PTW Designated smoking areas Fire response training for selected personnel Trained and competent operators	3. Severe	B. Remote	Low
57	Chemical use in testing phases (including disposal of hydrotest water)	Testing and Commissioning	Abrasives, corrosives and cleaning and paint products	Erosion Contamination of local environment	3. Severe	C. Unlikely	Intermediate	Avoid chemical use in hydrotesting where possible	Water testing Approved chemicals only to be used in hydrotesting Management for collection of waste prior to disposal NATA accredited lab for water testing Biodegradable chemicals if possible Reuse of water for other sections if possible Erosion controls in place for any onsite or offsite disposal Waste products disposed of licensed contractor Hazardous waste managed as per Hazardous Materials Storage and Handling Procedure	2. Minor	B. Remote	Negligible
58	Trench backfill Pipe installation	Lowering-in, padding and backfilling	Pipeline construction	Trapping of fauna in trench. Dust	2. Minor	E. Frequent	Intermediate		Inspections prior to backfill, trained and licensed fauna handlers Minimise open trench time Where possible do not leave open over night Capping of open pipes Inspection of pipes prior to lowering in Dust suppression	2. Minor	B. Remote	Negligible
59	Rehabilitation	Lack of clean-up and poor rehabilitation success	Post construction	Lack of vegetation can lead to erosion, Sedimentation, Visual amenity and alterations in hydrological regimes. Disturbance to existing vegetation. Dust	3. Severe	C. Unlikely	Intermediate		Maintenance of drainage lines and culverts/drains as required for projects and DBP access roads and tracks Monitoring of rehabilitation success Signage of rehabilitation areas Induction Dust suppression	2. Minor	B. Remote	Negligible
60	Hot works and vehicle use	Vehicle Use Hot works Ignition sources	Vehicle use and access to sites, hot works	Destruction to native vegetation Bushfire Fauna death / injury	3. Severe	C. Unlikely	Intermediate	Vehicle specifications	Do not drive over vegetation, stick to access tracks Maintenance of access tracks No hot works adjacent to or on vegetation Hot Works Procedure Firebreaks at facility compounds Bushfire controls	3. Severe	B. Remote	Low
61	Water use	Groundwater abstraction	Water needs for project including dust suppression and construction water	Hydrological changes Groundwater drawdown Impact to groundwater dependent ecosystems,	3. Severe	D. Occasional	Intermediate	Abstraction monitoring	Monitoring of water abstraction to license conditions GWL / SWL in place Consultation with local landholders / pastoral leases No abstraction without permit in place	2. Minor	C. Unlikely	Low

				Impact to other groundwater users.								

Appendix E ELA Survey Report 2020

West Erregulla Pipeline Flora and Fauna survey

Australian Gas Infrastructure Group

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DOCUMENT TRACKING

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Template 2.8.1

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Abbreviations

Abbreviation	Description
BAM Act	State *Biosecurity and Agriculture Management Act 2007*
BC Act	State *Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
CLUSTER	Hierarchical Clustering
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attraction
DPIRD	Department of Primary industries and Regional Development
DRF	Declared Rare Flora
ELA	Eco Logical Australia
EP Act	State *Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Areas
ha	hectare
IBRA	Interim-Biogeographic Regionalisation for Australia
km	kilometre
m	metre
mm	millimetre
NVIS	National Vegetation Information System
P	Priority
PEC	Priority Ecological Communities
PMST	Protected Matters Search Tool
PRIMER	Plymouth Routines in Multivariate Ecological Research v6
SIMPER	Similarity Percentages
T	Threatened
TEC	Threatened Ecological Communities
VU	Vulnerable
WA	Western Australia
WAH	Western Australian Herbarium
WAM	Western Australian Museums
WAOL	Western Australian Organism List
WoNS	Weed of National Significance

Executive Summary

Eco Logical Australia was engaged by Australian Gas Infrastructure Group to undertake a Detailed and Targeted flora survey and vegetation condition assessment, a Basic fauna survey, Targeted Black Cockatoo habitat assessment and Targeted Malleefowl survey of the West Erregulla Pipeline Project. The survey area, 212.2 hectares in size, is located approximately 230 kilometres north-east of Perth, and 50 kilometres south-east of Dongara, Western Australia. The initial field survey was undertaken from 7th to 10th September 2020 by Dr Jeffry Cargill (Senior Botanist), Daniel Brassington (Botanist), Briana Wingfield (Ecologist) and Jeni Morris (Ecologist). In order to capture Threatened and Priority flora known to commence flowering from October onwards, a follow up targeted survey was conducted in areas of suitable habitat identified during the first survey (8th to 9th October 2020).

A total of 170 taxa (168 native and two introduced) from 93 genera and 39 families were recorded across 26 quadrats established within the survey area (161 taxa) and from Targeted and opportunistic collections (nine taxa). Average species per quadrat was 38.04 species, ranging from a low of 19 species to a high of 57 species. The majority of taxa recorded were representative of the Proteaceae (30), Myrtaceae (23 taxa) and Fabaceae (18 taxa) families. *Banksia* and *Hakea* were the best represented genera throughout the survey area with 8 taxa recorded each.

No Threatened flora species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* or the State *Biodiversity Conservation Act 2016* were recorded from within the current survey area. One Threatened flora species, *Paracaleana dixonii* (Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and Vulnerable under the State *Biodiversity Conservation Act 2016*) was recorded within the survey area in 2011 from one location (24 plants) in a database search. Eight Priority flora species were recorded within the survey area; *Micromyrtus rogeri* (Priority 1), *Lasiopetalum ogilvieanum* (Priority 1), *Guichenotia alba* (Priority 3), *Mesomelaena stygia* subsp. *deflexa* (Priority 3), *Stylidium drummondianum* (Priority 3), *Banksia scabrella* (Priority 4), *Eucalyptus macrocarpa* subsp. *elachantha* (Priority 4), and *Stawellia dimorphantha* (Priority 4).

A total of six vegetation communities were delineated and mapped within the survey area, covering a total of 208.7 hectares (98.35% of the total area surveyed). No vegetation communities delineated within the current survey area were inferred to represent any potential conservation significant communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the State *Biodiversity Conservation Act 2016* or by the Department of Biodiversity, Conservation and Attractions. Vegetation communities recorded include:

- **AcEbHh**: *Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland.
- **EtAhHh**: *Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland.
- **BpDdHh**: *Banksia prionotes* mid open woodland over *Daviesia divaricata*, *Conospermum boreale*, *Allocasuarina humilis* mid open shrubland over *Hibbertia hypericoides* low open shrubland and *Ecdeiocolea monostachya*, *Mesomelaena pseudostygia* low open sedgeland.

- **AcAhGp**: *Allocasuarina campestris* tall sparse shrubland over *Allocasuarina humilis*, *Hakea auriculata*, *Petrophile shuttleworthiana* mid open shrubland over *Gastrolobium plicatum* low open shrubland and *Ecdeiocolea monostachya*, *Schoenus armeria* low open sedgeland.
- **AcDdMl**: *Allocasuarina campestris* tall isolated shrubs over *Daviesia divaricata*, *Conospermum boreale*, *Beaufortia elegans* mid open shrubland over *Melaleuca leuropoma*, *Hibbertia hypericoides* low open shrub over *Ecdeiocolea monostachya* low open sedgeland.
- **EtBaHh**: *Eucalyptus todtiana* mid open woodland over *Banksia attenuata*, *Calothamnus blepharospermus*, *Eremaea beaufortioides* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland.

Descriptions of vegetation communities resemble those described by a previous report (Woodman 2013) in a far larger mapped area adject to the current survey area. This report also did not infer the presence of any threatened or priority ecological communities.

Vegetation condition within the survey area was Excellent (208.7 hectares; 98.35%) or Cleared (3.5 hectares; 1.65%) based on the vegetation condition scale adapted by Keighery provided in the Environmental Protection Authority *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment*. The primary disturbance within the survey area was a recent prescribed burn, which occurred in April 2019. Post fire regeneration was very good, with majority of species that were expected to occur being recorded. It is noted however, that structural elements of defined vegetation communities may slightly change over time as plant growth and development continue. This includes *Banksia* spp. and *Hakea* spp., Carnaby's Cockatoo (*Calyptorhynchus latirostris*) foraging species, which are predicted to increase in density, quality and structural complexity over time (currently provide low quality foraging habitat).

A total of 35 fauna species were recorded in the survey area, comprising 28 bird species, five mammal species and two reptile species. Introduced fauna species recorded included Cattle (*Bos taurus*), Domestic Dog (*Canis lupus familiaris*), Goat (*Capra hircus*) and European Rabbit (*Oryctolagus cuniculus*). No Threatened or Priority fauna species listed under the Federal *Environment Protections and Biodiversity Conservation Act 1999*, the State *Biodiversity Conservation Act 2016* or by the Department of Biodiversity, Conservation and Attractions were recorded from within the survey area.

Three fauna habitats were delineated and mapped within the survey area; **Fauna habitat 1**: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on sandy plains, **Fauna habitat 2**: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sandy plains, **Fauna habitat 3**: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises. Fauna habitat 2 was the most commonly occurring fauna habitat, covering 95.2 hectares (44.86%) of the survey area.

No individuals of Carnaby's Cockatoo were recorded within the survey area. No potential or confirmed breeding or roosting trees were recorded as occurring within the survey area. Fauna habitat 2, totalling 95.2 ha (44.86% of the survey area), was assessed as providing 'Low' quality foraging habitat due to the presence of *Banksia* spp. and *Hakea* spp. (SEWPaC 2012; DotEE 2017). The recent fire has decreased the likelihood of the species utilising the survey area in the immediate future; however, *Banksia* spp. and *Hakea* spp. are predicted to increase in density quality and structural complexity over time. The remaining vegetated areas (113.6 ha, 53.53%) are considered as providing 'Negligible' quality foraging

habitat of Carnaby's Cockatoo. Cleared areas (3.4 ha, 1.6%) provide 'Nil' quality foraging habitat for black cockatoo species. No foraging evidence was observed within the survey area.

Whilst the Malleefowl (*Leipoa ocellata*) was targeted in the survey area, the habitat is not considered suitable for the species due to the lack of leaf litter and thicker vegetation. The recent fire has also decreased the likelihood of the species, as the effect of fire on Malleefowl is severe, with breeding in burnt areas usually reduced for at least 30 years (Benshemesh 2007).

For the purposes of the current flora, vegetation and fauna survey, adequate data has been collected to define and assess the presence, extent and significance of species and communities within the survey area. Based on the values identified, it is unlikely that proposed works would appreciably reduce the representativeness of individual taxa or vegetation associations within the local area or indeed across the broader landscape. It is recognised that the survey area far exceeds what would be impacted by any site works.

1. Introduction

1.1 Project background

Eco Logical Australia (ELA) was engaged by Australian Gas Infrastructure Group (AGIG) to undertake a Detailed and Targeted flora survey and vegetation condition assessment, a Basic fauna survey, Targeted Black Cockatoo habitat assessment and Targeted Malleefowl survey of the West Erregulla Pipeline Project.

A proposed pipeline and gas processing plant (the project) includes a survey area of 212.2 hectares (ha), approximately 230 kilometres (km) north-east of Perth, and 50 km south-east of Dongara, Western Australia (WA; **Figure 1**). The objectives of this survey were as follows:

- Undertake a desktop assessment to identify the potential occurrence of any Federal or State conservation listed flora, fauna or communities;
- Undertake a Detailed and Targeted flora and vegetation survey in accordance with the Environmental Protection Authority (EPA) *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016), including:
    - Identification and mapping of vegetation communities, including identification of Threatened Ecological Communities (TECs) and Priority Ecological Communities (PECs);
    - Completion of a full species inventory (including weeds), and mapping of any Federal or State listed Threatened, Priority or other significant flora; and
- Assessment and mapping of vegetation structure cover and condition.
- Undertake a Basic fauna survey in accordance with the EPA *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020), including:
    - Broad level fauna habitat mapping;
    - Targeted fauna searches and mapping of any Federal or State listed Threatened, Priority and other conservation listed fauna species present and their habitat; and
    - Opportunistic observations of fauna species.
- Undertake a Targeted Black Cockatoo habitat assessment in accordance with the *Environmental Protection and Biodiversity Conservation (EPBC) Act referral guidelines for three threatened black cockatoo species* (DSEWPaC 2012).
- Undertake a Targeted Malleefowl survey in accordance with the National Heritage Trust National *Manual for The Malleefowl Monitoring System* (National Heritage Trust 2007).
- Preparation of a standalone summary report detailing the findings of the desktop assessment and field survey; and
- Provision of data including relevant mapping at an appropriate scale and associated data files.

Figure 1: Survey area location

Legend

- Survey Footprint
- Town
- Major Road

0 5 10
Kilometers

Scale: 1:350,000 (A4)
Datum/Projection:
GDA 1994 MGA Zone 50

N

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Project: 20PER16295-GM Date: 15/10/2020

2. Methodology

2.1 Desktop review

2.1.1 Database searches and literature review

The following Commonwealth and State databases were searched for information relating to conservation listed flora, fauna and ecological communities in order to compile and summarise existing data to inform the field survey. Searches of the Commonwealth EPBC Act Protected Matters Search Tool (PMST) and the State NatureMap (DBCA 2007-2021) online databases were undertaken using a polygon presented in **Table 1**. Applied buffers below are considered suitable based on flora and fauna assemblages expected to occur within the survey area. It should be noted that the buffers for the DBCA database searches are selected by DBCA on a case-by-case basis and are therefore not always consistent with other searches undertaken in the area.

Table 1: Database searches undertaken for the survey area

Database	Reference	Buffer (km)
Search area polygon coordinates: 50J 319124 mE 6746717 mS (north-west corner); 50J 336944 mE 6746281 mS (north-east corner); 50J 336783 mE 6743316 mS (south-east corner); and 50J 319659 mE 6744175 mS (south-west corner).		
EPBC Act Protected Matters Search Tool (PMST) for Threatened species and communities listed under the EPBC Act	DAWE 2020	10
DBCA and Western Australian Museum (WAM) NatureMap online database.	DBCA 2007-2020	0
Atlas of Living Australia database	ALA 2021	0
Birdata database	Birdata 2021	0
Birdlife Australia Black Cockatoo roosting database	Birdlife 2021	12
Index of Biodiversity Surveys for Assessments (IBSA)	DWER 2021	0
Search area: survey area shapefile		
DBCA Threatened and Priority flora database searches for Declared Rare Flora (DRF) listed under the latest WA Wildlife Conservation (Rare Flora) Notice and Priority Flora.	DBCA 2020a	10
DBCA Threatened and Priority fauna database searches for Scheduled fauna listed under the EPBC Act or latest WA Wildlife Conservation (Specially Protected Fauna) Notice and Priority Fauna.	DBCA 2020b	50
DBCA Threatened and Priority Ecological Communities' database search	DBCA 2020c	15

In addition, the following documents, provided by AGIG, were also reviewed:

- Review of key potential flora, vegetation and fauna values on the proposed pipeline for Strike Energy near Dongara - Mattiske Consulting Pty Ltd (2020);
- West Erregulla targeted threatened flora survey - Ecologia Environment (2018); and
- West Erregulla Project Flora and Vegetation Assessment – Woodman Environmental Consulting (2013).

2.1.2 Likelihood of occurrence assessment

A likelihood of occurrence assessment was undertaken to identify conservation listed flora and fauna species that possibly occur within the survey area, identified from a review of key datasets and literature, as specified above. Conservation codes, categories and criteria for flora and fauna protected under the EPBC Act and the State *Biodiversity Conservation Act 2016* (BC Act) are provided in **Appendix A** (DBCA 2019a). Criteria used for this assessment are presented in **Appendix B**.

2.2 Field survey

2.2.1 Survey team and timing

The initial field survey was conducted by Dr Jeffry Cargill (Senior Botanist), Daniel Brassington (Botanist), Briana Wingfield (Ecologist) and Jeni Morris (Ecologist) from 7th to 10th September 2020. In order to capture threatened and priority flora known to commence flowering from October onwards, a follow up targeted survey was conducted in areas of suitable habitat identified during the first survey. The second survey was conducted by Dr Jeffry Cargill (Senior Botanist) and Daniel Brassington (Botanist) from 8th to 9th October 2020. The survey team's relevant qualifications, experience and licences are provided in **Table 2**. There was no rainfall recorded during the field survey (BoM 2020).

Table 2: Survey team

Name	Qualification	Relevant experience	Licences
Dr. Jeffry Cargill	BSc. Hons. PhD Environmental Sciences	Jeff has more than 12 years' experience in botanical and ecological studies throughout Western Australia including baseline vegetation studies (Reconnaissance and Detailed surveys), Targeted threatened and priority flora surveys, fauna and black cockatoo surveys, MNES surveys, environmental risk assessments and rehabilitation and vegetation monitoring programs.	Flora scientific collection licence: FB62000138 Declared Rare Flora (DRF) permit: TFL 48-1920
Daniel Brassington	BSc. Hons. Environmental Science	Daniel has over 8 years' experience in botanical surveys and environmental services throughout Western Australia. This includes baseline vegetation studies (Reconnaissance and Detailed surveys), Threatened and Priority flora surveys, rehabilitation and vegetation monitoring, targeted species surveys, weed control, seed collection and processing, nursery operations and revegetation operations. Daniel has an extensive background in both mining and consulting, particularly in remote areas.	Flora scientific collection licence: SL012503 DRF permit: TFL 15-1920
Briana Wingfield	BSc. Conservation and Wildlife Biology and Environmental Science (Hons)	Briana has seven years' experience conducting fauna surveys across Western Australia, including Basic fauna surveys and Targeted black cockatoo habitat assessments.	N/A

Name	Qualification	Relevant experience	Licences
Jeni Morris	BSc. Conservation and Wildlife Biology	Jeni has over five years' experience conducting flora, vegetation and fauna surveys across a range of Western Australian bioregions, including the Mid West, Carnarvon and Gascoyne bioregions.	Flora scientific collection licence: FB62000070 DRF permit: TFL 13-1920

2.2.2 Flora and vegetation survey

A Detailed flora and vegetation survey was conducted in accordance with the EPA *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016). The survey included:

- Mapping of vegetation types and completion of a species list; and
- Vegetation condition mapping using the scale outlined in EPA (2016), which is adapted from Keighery (1994).

Stainless steel fence droppers were used to permanently mark the north-west corner of each quadrat. Dominant vegetation communities were described, with respect to dominant species, structure and overall condition. The survey involved the use of 10 x 10 m quadrats as recommended for the Geraldton sandplain bioregion (EPA 2016). Photos were taken from the north-western corner of each quadrat. Where relevant, opportunistic sampling of species not recorded within the quadrats was undertaken to supplement the existing list of species recorded from within the survey area.

A total of 26 quadrats were established across the survey area (**Figure 2**). The following data was recorded within each quadrat:

- Vegetation structure and classes, cover of all species, dominant species list for each vegetation type (in accordance with the National Vegetation Information System (NVIS) Level V structure and floristics);
- Vegetation condition, in accordance with the scale outlined in EPA (2016) adapted from Keighery (1994);
- Full species list of both native and introduced species; and
- Relevant site data including coordinates, site photograph, soil, geology, drainage, slope etc. and any other relevant observational data.

2.2.3 Targeted searches

A targeted survey was undertaken within the survey area to identify and record and conservation significant flora or communities potentially occurring, including:

- Threatened flora or TECs listed under the EPBC Act;
- Threatened (Declared Rare) Flora listed under the latest WA Wildlife Conservation (Rare Flora) Notice under the BC Act;
- PECs endorsed by the Western Australian Minister for the Environment; or
- Priority (P) flora recognised by DBCA.

The survey methodology involved personnel walking meandering transects across the survey area, with transect spacing being determined by suitability of habitat for target species. Locations of survey transects is shown in **Figure 2**. Flora species able to be identified in the field were recorded, and voucher specimens of unfamiliar species were collected for later identification. All collections were assigned a

unique collecting number. For conservation significant identified in the field, the following was recorded:

- A colour photograph;
- GPS location;
- Population size estimate;
- Location of population boundaries;
- Associated habitat/landscape element;
- Time and date observed;
- Observer details; and
- A voucher specimen suitable for use as a reference specimen (if appropriate to do so for conservation significant flora).

Flora specimen identification was undertaken by ELA botanist Daniel Brassington, with assistance from Dr Jeffry Cargill where required. The Western Australian Herbarium (WAH) was also utilised to confirm additional specimens. Species identification utilised taxonomic literature and keys and where required specimens were confirmed using the WAH reference collection. Suitable material that meets WAH specimen lodgement requirements, such as flowering material and range extensions, will submitted along with Threatened and Priority Report forms to DBCA, as required by conditions of collection licences issued under the BC Act. Nomenclature used for the flora species within this report follows the WA Plant Census as available on FloraBase (DBCA and WAH 2020).

2.2.4 Data analysis

2.2.4.1 Flora species accumulation curve

A flora species accumulation curve was undertaken to indicate adequacy of the survey effort (Clarke and Gorley 2006). As the number of survey sites increases, and correspondingly the size of the area surveyed increases, there should be a diminishing number of new species recorded. At some point, the number of new species recorded becomes essentially asymptotic. The asymptotic value was determined using Michaelis-Menten modelling and provided an incidence-based coverage estimator of species richness. When the number of new species being recorded for survey effort expended approaches this asymptotic value, the survey effort can be considered adequate.

2.2.4.2 Vegetation communities

Plymouth Routines in Multivariate Ecological Research v6 (PRIMER) statistical analysis software was used to analyse species-by-site data and discriminate survey sites based on their species composition (Clarke and Gorley 2006). To down weight the relative contributions of quantitatively dominant species a 4th root transformation was applied to the species percentage cover dataset. Introduced species (weeds), specimens not identified to species level and singletons (species recorded at a single quadrat and not forming a dominant structural component) were excluded from the data set prior to analysis. In addition, annuals were also removed from the dataset prior to analysis due to the likelihood of substantial differences between years based on seasonality of local rainfall events. Computation of similarity matrices was based on the Bray-Curtis similarity measure. Data were analysed using a series of multivariate analysis routines including Similarity Profile (SIMPROF), Hierarchical Clustering (CLUSTER) and Similarity Percentages (SIMPER). Results were used to inform and support interpretation of aerial photography and delineation of individual plant communities.

2.2.5 Fauna survey

2.2.5.1 Basic fauna survey

The Basic fauna survey was conducted in accordance the EPA *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020). An assessment of fauna habitat in terms of its ability to support and sustain populations of fauna, along with an assessment of the likelihood of occurrence of conservation significant fauna species, was undertaken during the survey. The habitat characteristics and fauna database records used in assessing likelihood of occurrence for fauna included:

- Vegetation community, structure and condition;
- Soil and landform type;
- Extent and connectivity of bushland;
- Fauna species habitat preferences;
- Proximity of conservation significant fauna records; and
- Signs of species presence.

Opportunistic recordings of fauna species were made at all times during the field survey. These included visual sightings of active fauna such as reptiles and birds; records of bird calls; and signs of species presence such as tracks, diggings, burrows, scats and any other signs of fauna activity.

Nomenclature used for the vertebrate fauna species within this report follows the WAM Checklist of the Vertebrates of Western Australia (WAM 2020). Where common names were not stated for certain species, the following references were consulted:

- Amphibians and reptiles: Bush et al. (2010);
- Reptiles: Wilson and Swan (2013);
- Birds: Morcombe (2007); and
- Mammals: Menkhorst and Knight (2011).

2.2.5.2 Targeted Black Cockatoo habitat assessment

A black cockatoo habitat assessment was undertaken in accordance with the Department of Sustainability, Environment, Population and Communities (SEWPaC) *EPBC Act referral guidelines for three threatened black cockatoo species* (SEWPaC 2012). This involved assessing all significant tree species known to support potential suitable breeding, roosting and foraging habitat. Significant breeding trees are defined as trees of suitable species with a Diameter at Breast Height (DBH) greater than 500 millimetres (mm; > 300 mm for salmon gum and wandoo; SEWPaC 2012). Trees with a DBH greater than 500 mm (or >300 mm for Salmon Gum and Wandoo) are large enough to potentially contain hollows suitable for nesting black cockatoos or have the potential to develop suitable hollows over the next 50 years. Trees of this size may also be large enough to provide roosting habitat (i.e. trees which provide a roost or rest area for the birds). All potential breeding trees with a DBH of 500 mm or greater encountered within the Project Area were recorded.

Hollows were considered 'suitable' if the entrance was >100 mm in diameter, >300 mm deep and aligned near vertical. If it was not possible to determine if a hollow was suitable or not it was categorised as 'potentially suitable'. Hollows that did not meet any of the requirements were categorised as 'unsuitable'. Trees that met the required measurements were inspected with a camera-pole for

suitability of hollows for nesting and/or roosting and evidences of current or previous occupancy, including wear and chew marks around the entrance.

Vegetation present within the Project Area was assessed for its potential to provide foraging and roosting habitat for black cockatoos as per the SEWPaC guidelines (SEWPaC 2012), and the extent of potential suitable habitat within the Survey Area was mapped. Observations were also made of any black cockatoo foraging activity or feeding residue such as chewed Banksia, Jarrah and Marri nuts, and any black cockatoo individuals observed within the Survey Area.

The foraging value of vegetation to black cockatoos depends upon a number of factors including the foraging plant species present, the extent and density of those foraging species and the overall structure and condition of foraging species present. In addition, presence of weeds and/or disease or drought (i.e. plant deaths) was also considered as these can influence native vegetation recruitment and regrowth which may influence the viability of foraging species present in the short, medium or long term (Bamford 2020b, c). Foraging habitat quality can also be influenced by additional contextual information such as the availability, or lack of, foraging habitat nearby and presence/extent of breeding habitat.

Foraging habitat was assigned a quality rating based on three components (**Table 3**):

- Vegetation composition, condition and structure;
- Extent of weeds and/or tree deaths which has the potential to suppress regrowth or successful recruitment and therefore affect foraging habitat viability in the short, medium or long term; and
- Presence of black cockatoos.

As with vegetation condition, foraging quality is usually not uniform throughout an entire vegetation association and, as such, these variations have been accounted for within the assessment by using a habitat quality range (**Table 3**; i.e. low to moderate or moderate to high).

Table 3: Definition of black cockatoo foraging habitat quality*

Foraging habitat quality	Justification
High	• Presence of suitable foraging plant species#, including non-native food sources, for black cockatoos at a high density (i.e. foliage cover of suitable species >60%) and presence of preferred food sources at several strata; • Low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the • medium or long term) or • Lower quality foraging habitat based on vegetation characteristics, but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).
Moderate to high	• Presence of suitable foraging plant species*, including non-native food sources, for black cockatoos at a high density (i.e. foliage cover of suitable species 40-60%) and presence of preferred food sources at several strata; • Foraging species with greater than 60% projected foliage cover but foraging habitat viability reduced due to high weed invasion and/or tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease, or • Lower quality foraging habitat but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).
Moderate	• Presence of suitable foraging plant species, including non-native food sources, for black cockatoos at a low to moderate density (i.e. projected foliage cover of suitable species 20-40%); and/or

Foraging habitat quality	Justification
	• Foraging species with 40-60% projected foliage cover but foraging habitat viability reduced due to high weed invasion and/or tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease; and/or • Lower quality foraging habitat but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).
Low to moderate	• Suitable foraging species present but at a lower density (i.e. foliage cover of preferred species 10-20%); • Foraging species with 20-40% projected foliage cover but foraging habitat viability reduced due to high weed invasion and/or some tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease; and/or • Lack of preferred foraging plant species but other suitable foraging species present at a low density.
Low	• Suitable foraging species present at a low density (i.e. projected foliage cover of preferred foraging species less than 10%); and/or • Scattered foraging species or paddocks with known food sources such as melons or weeds that represent a short-term food source.
Negligible	• Presence of some scattered foraging species but with projected foliage cover of less than 2%.
Nil	• No suitable foraging species present; • Cleared areas.

*Methods for assigning quality to black cockatoo foraging habitat are based on ELAs internal scoring system and have been refined to include additional methodology developed by Bamford Consulting Ecologists (Bamford) in Bamford (2020a, 2020b).
Based on the list of suitable foraging plants collated from the following sources: Groom (2011), Johnstone et al. (2011), SEWPaC (2012), Heydenrych (2012) and Lee *et al*. (2013).

2.2.5.3 Targeted Malleefowl survey

A Targeted Malleefowl survey was conducted in accordance with the National Malleefowl Monitoring Manual (National Malleefowl Recovery Team 2020). A targeted survey for Malleefowl, including:

- Transect searches (i.e., spacing of approximately 20 m apart with four personnel) in suitable habitat for mound nests;
- Location and photograph of each nest mound, including the placement of two or three sticks in an 'X' formation in the centre of the mound to indicate mounds that have been inspected;
- Assessment of the activity status, being: active (containing eggs); recently active (showing signs of disturbance); or inactive (not showing any signs of disturbance).
- Nest mound profile, being: typical crater with raised rims (1); mound fully dug out (2); mound with litter (3); mound mounded up (no crater) (4); mound that has a sandy crater with peak in centre (5); and mound low and flat without pear or crater (6);
- Dimensions (total height and width) of each nest mound, where the nest mound has been excavated and the diameter across the rim/depth of excavation from the rim;
- Vegetation type in which each nest mound is identified;
- Any signs of physical disturbance, including whether or not the surface of the mound has recently been disturbed (scraped);
- If any eggshell is visible on the mound and how much (none, some or lots); and
- If animal prints or scats are present (including which species if possible).

2.3 Limitations

The EPA *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA 2016) and *Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020) recommends including discussion of the limitations of the survey methods used. These limitations are summarised in **Table 4**.

Table 4: Survey limitations

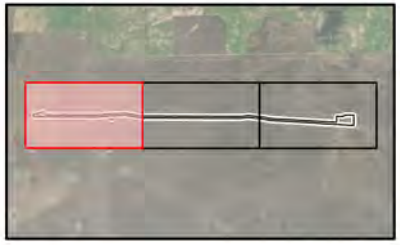
Potential survey limitation	Impact on survey
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	**Not a constraint**. Previous reports for the region were provided where applicable. Broad-scale vegetation mapping at a scale of 1:1,000,000 was available. Land system mapping at a scale of 1:2,000,000 and soil and landform mapping was also available. Available information was sufficient to provide context at varying scales and therefore were not considered a limitation.
Scope (i.e. what life forms, etc., were sampled).	**Not a constraint**. The survey requirement of a Detailed and Targeted flora and vegetation survey and a Basic and Targeted fauna survey in accordance with relevant State and Federal legislation and EPA guidance documents was adequately met.
Proportion of flora collected and identified (based on sampling, timing and intensity).	**Not a constraint**. Adequacy of sampling effort was tested via a species accumulation curve; approximately 88.93% of the flora potentially present within the survey area were recorded, which is considered to be an acceptable level of sample effort to compile a comprehensive flora inventory and subsequently accurately delineate vegetation communities present within the survey area.
Completeness and further work which might be needed (i.e. was the relevant survey area fully surveyed).	**Not a constraint**. The survey area was fully covered to meet requirements outlined in the scope of works. Quadrat locations were pre-selected using high resolution aerial photography, and confirmed in the field, to ensure all apparent vegetation communities identified were sampled, with multiple replications where possible. Site selection and replication was considered adequate to accurately analyse and discriminate sites based on species composition and subsequently delineate vegetation community boundaries.
Mapping reliability.	**Not a constraint**. Coverage of the survey area was considered to be good. High quality aerial maps were used for both the survey and subsequent vegetation mapping. Due to the nature of vegetation in the survey area, mapping boundaries of individual communities were discrete, and thus are considered accurate.
Timing, weather, season, cycle.	**Not a constraint**. The survey was undertaken in the appropriate season as specified by the EPA *Technical Guidance*: *Flora and Vegetation Surveys for Environmental Impact Assessment* (2016), with rainfall in the three months prior to the survey matching the long-term average and allowing for the presence of some annual species.
Disturbances (fire, flood, accidental human intervention, etc.).	**Potential constraint**: A fire in April 2019 resulted in disturbance of majority of the survey area and is considered a potential constraint as it has the potential to prevent flora species being detected or identified. Post fire regeneration was very good, with majority of species that were expected to occur being recorded. It is noted however, that structural elements of defined vegetation communities may slightly change over time as plant growth and development continue. Minor disturbances included minimal presence of weeds and feral fauna (rabbit diggings, scats).
Intensity (in retrospect, was the intensity adequate).	**Not a constraint**. The survey effort was adequately met. The area was searched for conservation significant species by field staff undertaking transects across the survey area spaced adequately apart. This method provides an accurate assessment of habitat characteristics and likelihood of conservation significant species. The number of

Potential survey limitation	Impact on survey
	quadrats established was sufficient to determine the vegetation communities present and to identify any vegetation of conservation significance.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	**Not a constraint**. The number of personnel conducting this field survey in the given time was adequate to undertake the required level of survey. Additional resources, including equipment available, additional support and personnel were adequate.
Access problems (i.e. ability to access survey area).	**Not a constraint**. All relevant areas within the survey area were able to be accessed and surveyed.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	**Not a constraint**. The personnel conducting this field survey were both suitably qualified to identify specimens, having previously undertaken flora and fauna surveys in the Geraldton sandplain bioregion of Western Australia.

Figure 2: Survey effort (Page 1 of 3)

Legend

- Survey Footprint
- Quadrat
- Transect



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GDA 1994 MGA Zone 50

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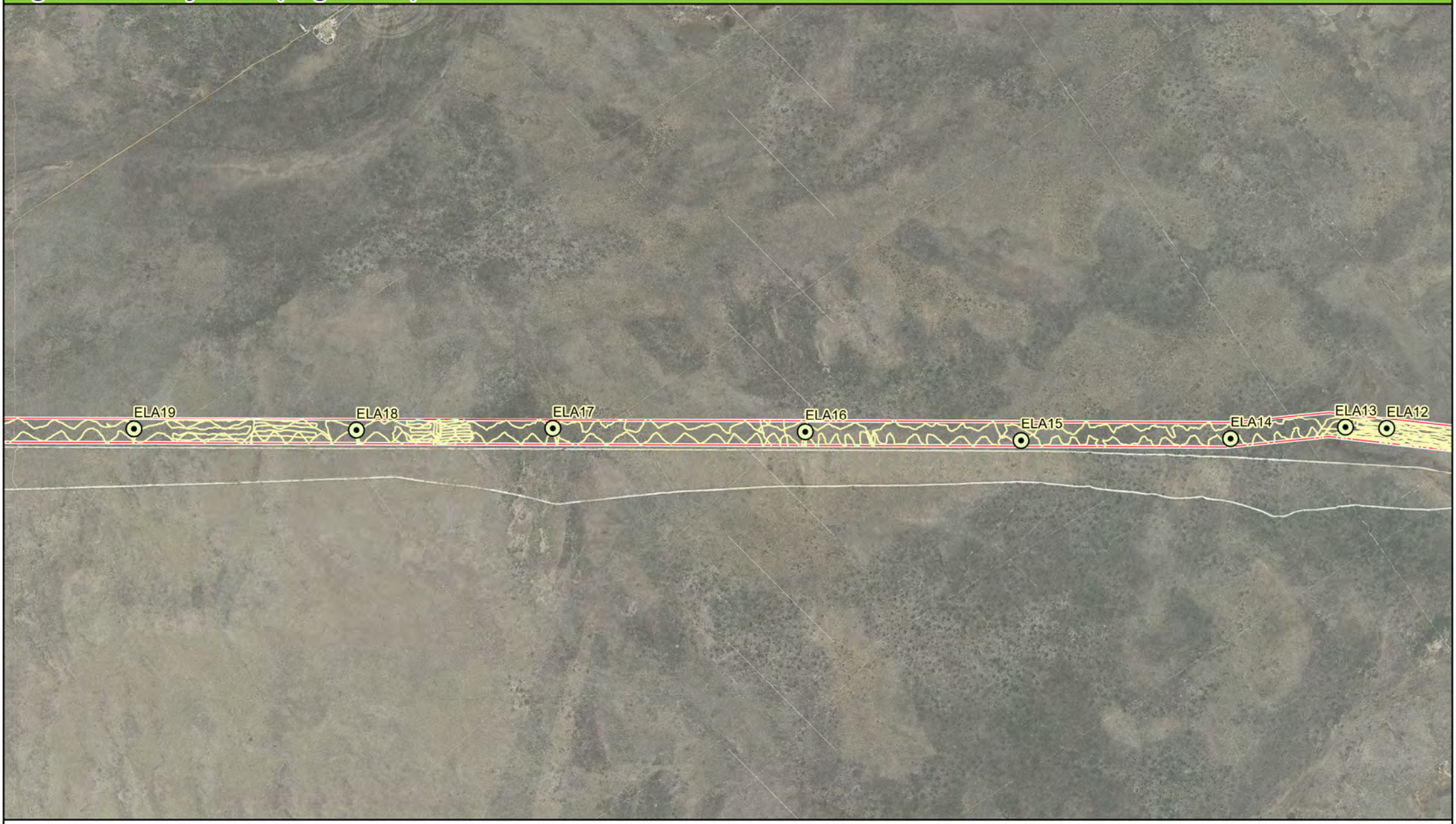
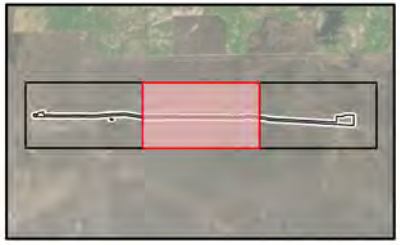
Figure 2: Survey effort (Page 2 of 3)



Legend

- Survey Footprint
- Quadrat
- Transect



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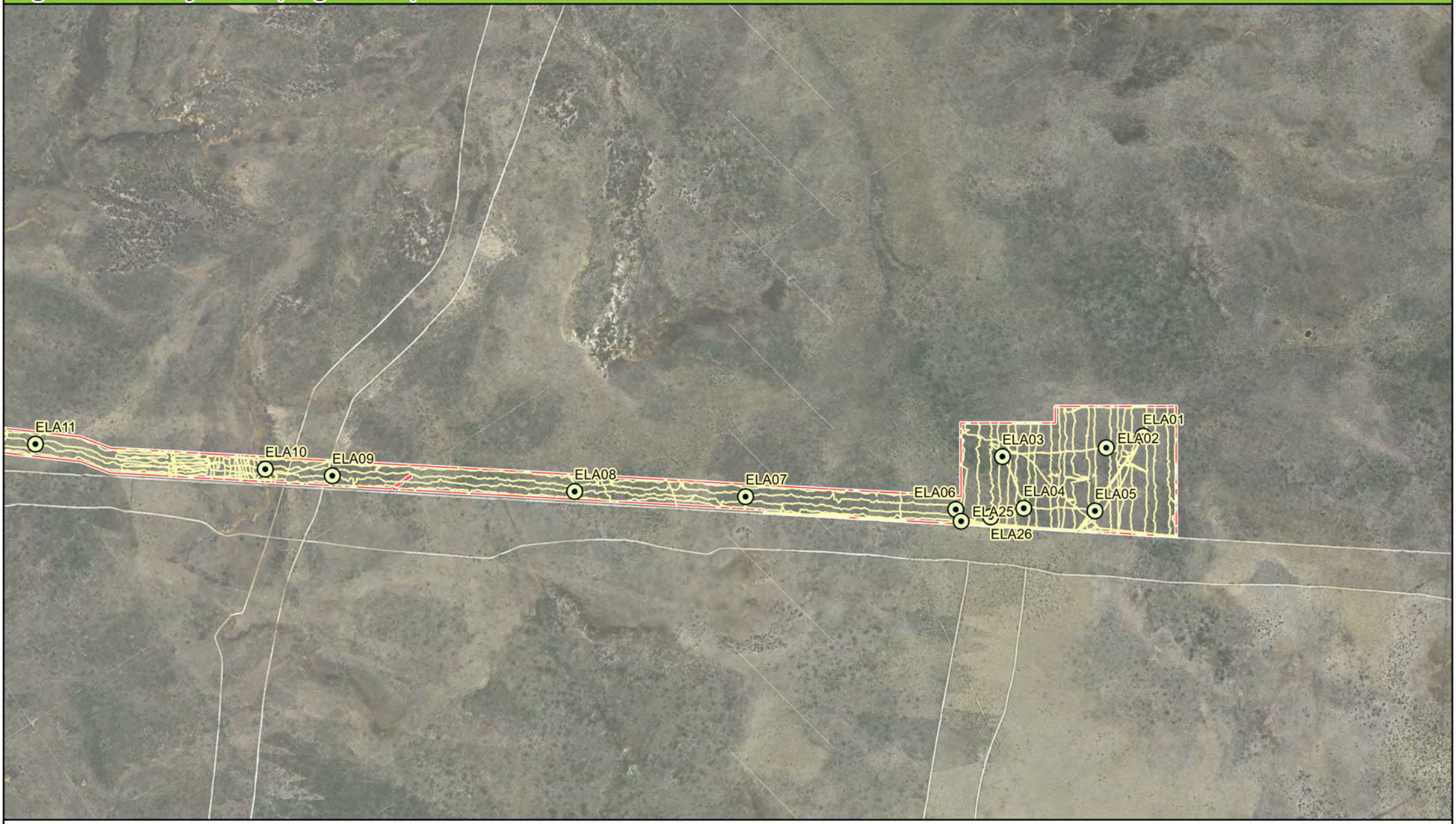
Project: 20PER16294-GM Date: 15/10/2020

Figure 2: Survey effort (Page 3 of 3)



Legend

- Survey Footprint
- Quadrat
- Transect

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Scale: 1:20,000
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3. Results

3.1 Desktop review

3.1.1 Climate

The Swan Coastal Plain experiences a warm, Mediterranean climate with hot dry summers and mild wet winters (Mitchell et al. 2002). Based on climate data from the nearby Bureau of Meteorology (BoM) Dongara weather station (station number 8044; climate data 1844 – current; located approximately 50 km north-west of the survey area), the area receives an annual average rainfall of 454.4 mm, with most rainfall occurring during the winter months of June, July and August (BoM 2020; **Table 5**).

In the 12 months preceding the field survey, the area received a total of 164.3 mm which is below the long-term average of 454.4 mm (BoM 2020). The area received 75.5 mm of rainfall in August 2020, which is above the long-term average for the same period (66.3 mm; BOM 2020). As a result, survey conditions at this time were considered to be good, with the majority of individuals being recorded in various reproductive stages (e.g. flowering, seeding), allowing for the positive identification of individual species.

Table 5: Rainfall data recorded at the Dongara weather station (8044) 12 months prior to the field survey compared to the long-term average

Month	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Total
Total monthly rainfall 2019-20 (mm)	13.2	7.2	0.0	0.0	0.0	34	5.6	6.0	22.8	-	-	75.5	164.3
Average monthly rainfall 1896 - current	35.2	18.7	8.7	4.3	5.4	10.6	13.8	22.3	68.1	108.3	91.8	66.3	454.4

Source: BoM 2020. Note: June and July 2020 rainfall data is missing from Dongara weather station

3.1.2 Geology, landforms and soils

The survey area is situated within the Northern Sandplains Region (Irwin Botanical District) as described by Beard (1976; 1990). This region is characterised by extensive lateritic sandplains, locally dissected especially near the coast, and almost entirely underlain by sedimentary rocks of a mostly siliceous nature. The sedimentary rocks form a series of plateaux, including the Dandaragan Plateau, on which the survey area is located. While dissected by rivers and eroded by sea on the west, stretches of the plateau surface is still preserved, and forms extensive monotonous sandplains, with lateritic outcrops on ridges and breakaways also common. Four broad geology soil units have been mapped across the survey area, as described in **Table 6**.

Table 6: Broad geology soil units of the survey area

Unit	Type	Description	Extent (ha) within the survey area
Czl	Lateritic duricrust	Pisolitic, nodular or vuggy ferruginous laterite; some lateritic soils; ferricrete; magnesite; ferruginous and siliceous duricrusts and reworked products, calcrete, kaolinised rock, gossan; residual ferruginous saprolite	22.6
Czs	Sand - residual	Sand or gravel plains; quartz sand sheets commonly with ferruginous pisoliths or pebbles, minor clay; local calcrete, laterite, silcrete, silt, clay, alluvium, colluvium, aeolian sand	142.9
Jsya	Sandstone, siltstone, shale, conglomerate, coal	Variegated sandstone, feldspathic sandstone, siltstone, shale, conglomerate, coal	4.5
Qd	Sand - aeolian, sand - residual	Dunes, sandplain with dunes and swales; may include numerous interdune claypans; residual and aeolian sand with minor silt and clay; aeolian red quartz sand, clay and silt, in places gypsiferous; yellow hummocky sand	42.2

Sandy soils are found throughout the survey area. Two soil units have been mapped across the survey area, as described in **Table 7**.

Table 7: Soil units of the survey area

Unit	Description	Extent (ha) within the survey area	Proportion of extent within the survey area (%)
Wd9	Broad valleys and undulating interfluvial areas with some discontinuous breakaways and occasional mesas; lateritic materials mantle the area: chief soils are sandy acidic yellow mottled soils, (Dy5.81) containing much ironstone gravel in the A horizons, and (Dy5.84), both forming a complex pattern with each other and with lateritic sandy gravels (KS-Uc2.12). Associated are leached sands (Uc2.21) underlain by lateritic gravels and mottled clays that occur at a progressively greater depth down slope	191.0	90
Ca27	Sandy plains with occasional pockets of sand dunes, a few small swamps, and stream courses: chief soils are leached sands (Uc2.21), often with a sandy clay substrate between 3 and 6 ft in depth. Associated are (Dy5.61) and gravelly (Dy5.81) soils with (Uc1.22) soils on the dunes	21.2	10

3.1.3 Interim Biogeographic Regionalisation of Australia

The Interim Biogeographic Regionalisation for Australia (IBRA7) currently classifies 89 bioregions across Australia, based on a range of biotic and abiotic factors such as climate, vegetation, fauna, geology and landform (Thackway and Cresswell 1995; DAWE 2020b). These bioregions are currently further refined into 419 sub-regions representing more localised and homogenous geomorphological units in each bioregion (DAWE 2020b). IBRA divides Western Australia into 26 biogeographic regions and 53

subregions based on dominant landscape characteristics of climate, lithology, geology, landform and vegetation (DAWE 2020b).

The survey area is situated in the Geraldton sandplain bioregion (Lesueur sandplain subregion, GS3). The Geraldton sandplain bioregion comprises mainly proteaceous shrub-heaths on extensive, undulating and lateritic sandplain (Desmond and Chant 2001). More specifically, the Lesueur sandplain subregion comprises coastal Aeolian and limestones, Jurassic siltstones and sandstones of central Perth Basin. Alluvials are associated with drainage systems and there are extensive yellow sandplains in south-eastern parts. Shrub-heaths rich in endemics occur on a mosaic of lateritic mesas, sandplains, coastal sands and limestones, and heath on lateritised sandplains along the subregions north-eastern margins (Desmond and Chant 2001).

3.1.4 Land system mapping

Soil Landscape Mapping - Systems mapping prepared by the Department of Primary Industries and Regional Development (DPIRD), provides and inventory and condition survey of lands at a 1: 250 000 scale (version April 2018; DPIRD 2020). Two land systems are present within the survey area, as outlined in **Table 8** and **Figure 3**.

Table 8: Land systems of the survey area

Land system	Land system description	Total current extent mapped in Western Australia	Extent (ha) mapped within the survey area	Proportion of total current extent (%) within the survey area
Mount Adams System (224Ma)	Gently undulating sandplain with low gravel ridges and occasional laterite breakaways.	86,963	187.2	0.1
Correy System (221Cy)	Broad sandy alluvial fan of the lower Arrowsmith River. Pale deep sands predominate, with grey shallow sandy duplexes, moderately deep sandy gravels and yellow deep sands less common. Banksia woodlands and heathlands.	27,252	25.0	0.2

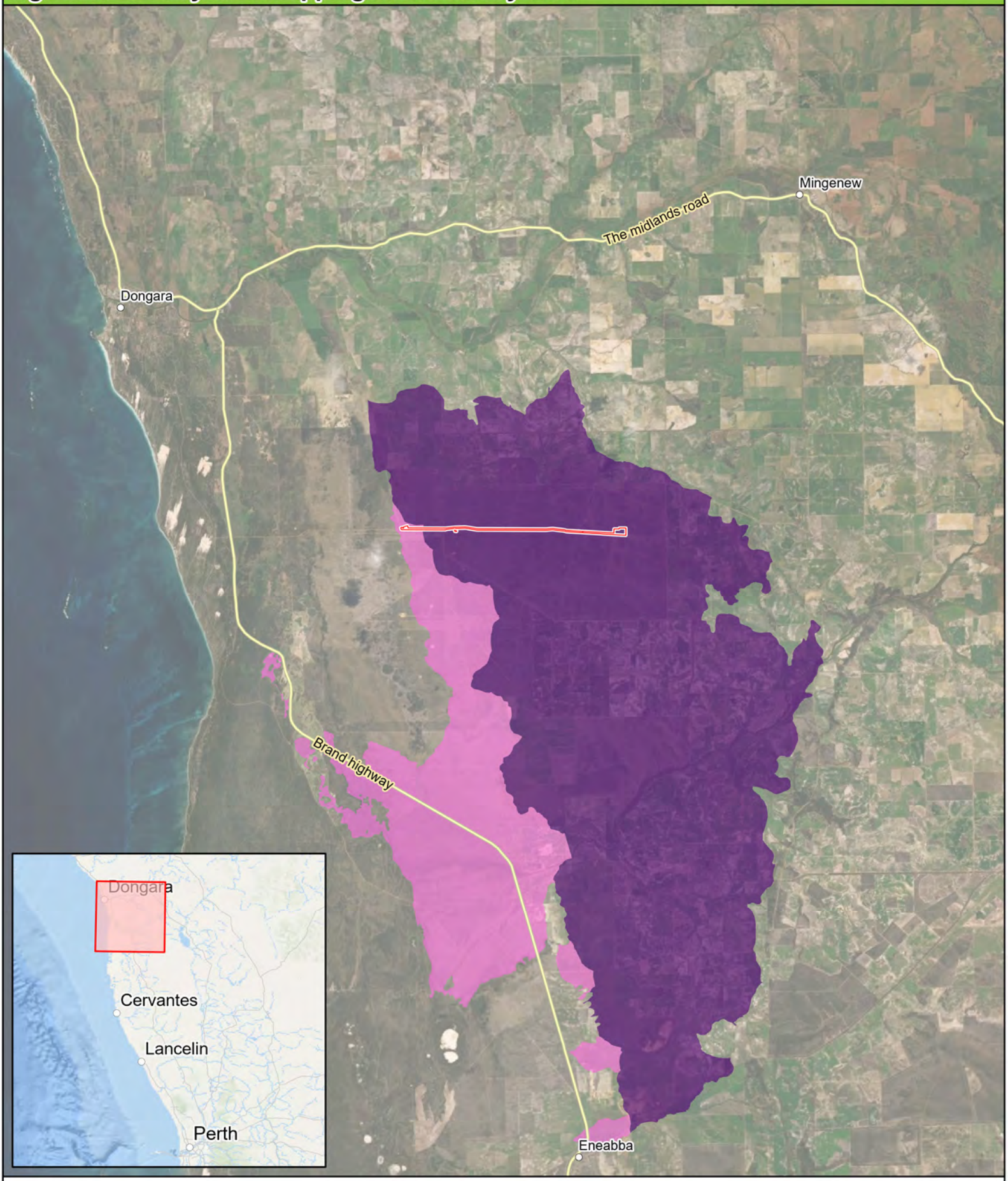
3.1.5 Broad-scale vegetation mapping

The vegetation of the survey area was defined and mapped by Beard (1976) and within the broader region by Beard (1990) in the Irwin Botanical District as coastal scrub heath on sandplains, with *Acacia* and *Allocasuarina* thickets further inland, and hard-setting loams with *Acacia* scrub and scattered *Eucalyptus loxophleba*. Three vegetation associations are present within the survey area, as outlined in **Table 9** and **Figure 4**.

Table 9: Beard (1976) vegetation associations of the survey area

Vegetation association	Description	Pre-European extent (ha) within the Lesueur sandplain subregion	Current extent (ha) within the Lesueur sandplain subregion	Proportion of pre-European extent remaining (%)	Extent (ha) mapped within the survey area	Proportion of current extent within the survey area (%)
49	Shrublands; mixed heath	33,139.33	13,618.88	41.10	12.1	0.1
378	Shrublands; scrub-heath with scattered *Banksia* spp., *Eucalyptus todtiana* and *Xylomelum angustifolium* on deep sandy flats in the Geraldton sandplains bioregion	90,922.87	60,668.26	66.72	46.2	0.1
379	Shrublands; scrub-heath on lateritic sandplain in the central Geraldton sandplains bioregion	370,029.76	111,632.48	30.17	153.9	0.1

Figure 3: Land system mapping of the survey area



Legend

Land system

- Correy System (221Cy)
- Mount Adams System (224Ma)

0 5 10
Kilometers
Scale: 1:350,000 (A4)
Datum/Projection:
GDA 1994 MGA Zone 50

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Figure 4: Broad scale vegetation mapping

Legend

- Survey Footprint
- Major Road

Beard's (1975) vegetation associations

- ERIDOON_378
- TATHRA_379
- TATHRA_49

0 5

Kilometers

Scale: 1:350,000 (A4)
Datum/Projection:
GDA 1994 MGA Zone 50

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3.1.6 Previous surveys undertaken in the vicinity of the survey area

An overview of the prior studies in the vicinity of the survey area is provided in **Table 10**.

Table 10: Overview of previous studies undertaken in proximity to the survey area

Reference	Survey type and location	Conservation significant species of communities
Review of key potential flora, vegetation and fauna values on the proposed pipeline for Strike Energy near Dongara (Mattiske 2020)	Desktop assessment of the potential flora, vegetation and fauna values present (within the current survey area)	12 threatened and 18 priority flora species have the potential to occur. 4 threatened ecological communities (TECs) and 6 Priority ecological communities (PECs) have the potential to occur. 10 threatened fauna species have the potential to occur.
West Erregulla targeted threatened flora survey (ecologia 2018)	Targeted threatened flora survey (within the current survey area)	No individuals of the targeted threatened taxa *Thelymitra stellata, Paracaleana dixonii* and *Eucalyptus crispata.* No TECs and PECs were recorded.
West Erregulla Project Flora and Vegetation Assessment (Woodman 2013)	Detailed flora and vegetation survey (within the current survey area)	**Threatened (Declared Rare Flora) flora:** *Thelymitra stellata*, *Paracaleana dixonii*, *Eucalyptus crispata. T. stellata* records were associated with vegetation types 7a, 7b, 8, 11, 13a. *P. dixonii* records were associated with vegetation types 7a, 7b, 8, 10, 11, 12, 13a. *E. crispata* records were associated with vegetation type 8 and 10. **Priority flora:** 23 confirmed taxa No TECs and PECs were recorded.

No previous studies were found within a 100 km radius of the survey area (DWER 2021).

3.1.7 Areas of conservation significance

Environmentally Sensitive Areas (ESAs) are defined in the Environmental Protection (Environmentally Sensitive Areas) Notice 2005 under section 51B of the State *Environmental Protection Act 1986* (EP Act). ESAs include areas declared as World Heritage, included on the Register of the National Estate, defined wetlands, and vegetation containing rare (Threatened) flora and TECs.

PECs are biological flora or fauna communities that are recognised to be of significance, but do not meet the criteria for a TEC. There are five categories of PECs, none of which are currently protected under legislation.

There are no TECs listed at Commonwealth level. There are two TECs listed at State level that occur 10 km to the east of the survey area (DBCA 2020c) (see Appendix A for conservation codes):

- Mound Springs (Three Springs area) (EN); and
- Ferricrete floristic community (Rocky Springs Type) (VU).

There are no PECs listed with the potential to occur within or near the survey area. No World Heritage Areas, National Heritage or Ramsar wetlands are located within or in close proximity to the survey area. The Yardanogo Nature Reserve (R36203) and Beekeepers Nature Reserve (R24496) are located to the west of the survey area.

3.1.8 Flora and fauna species of conservation significance

An initial 61 conservation listed flora species and 46 conservation listed fauna species were identified as possibly occurring within the survey area, based on the database searches (Section 2.1.1) and using criteria outlined in **Appendix B** (**Figure 5** to **Figure 7**).

Conservation significant flora species identified from database searches undertaken included 14 Threatened species and 47 Priority species. The flora likelihood of occurrence assessment is presented in **Appendix C**.

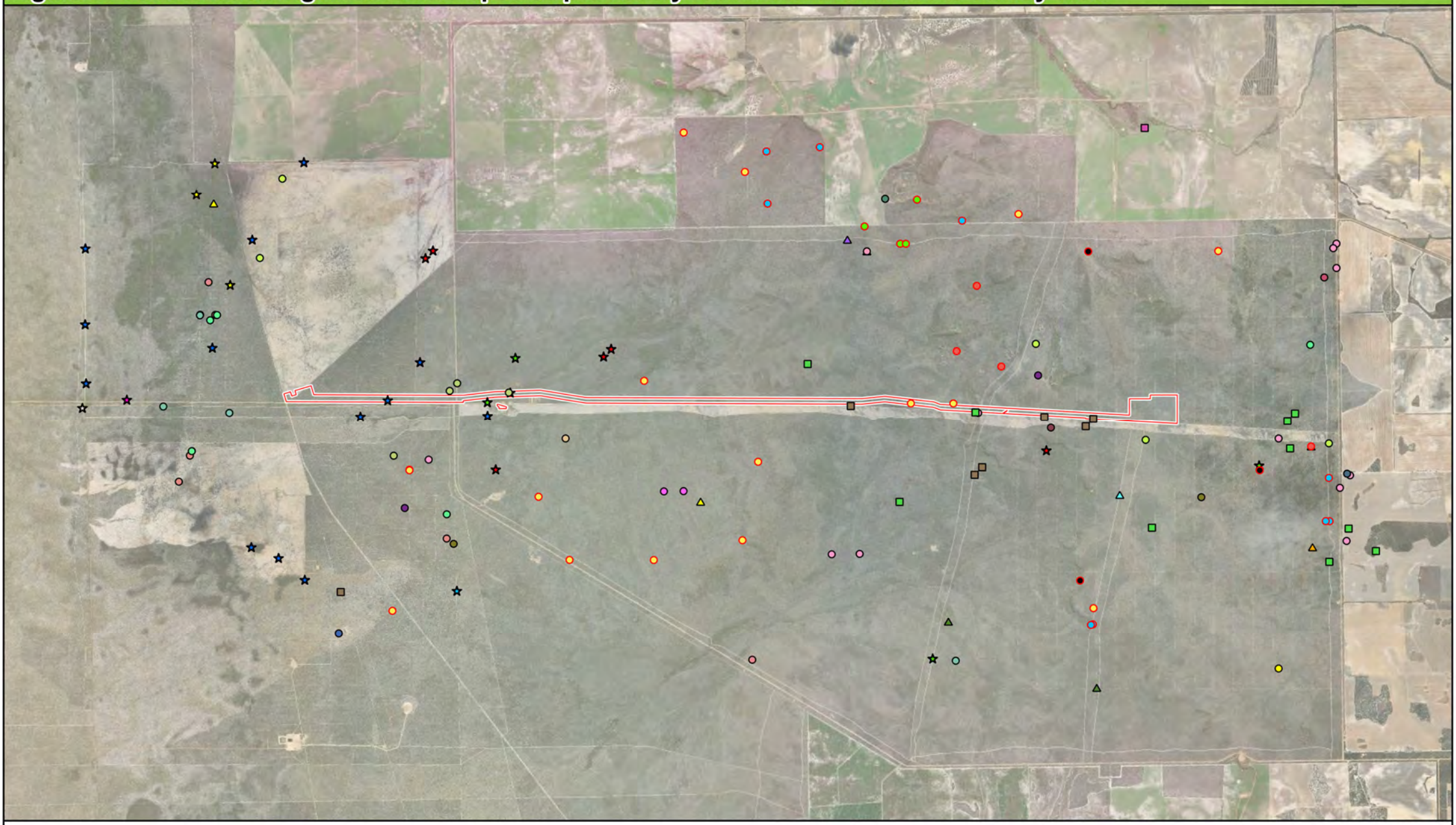
Database searches identified one Threatened flora species, *Paracaleana dixonii* (Endangered under the EPBC Act and Vulnerable under the BC Act) recorded within the survey area in 2011. This record included 24 plants recorded approximately 5 km west from the eastern end of the survey area.

Conservation significant fauna species identified from database searches undertaken included five species listed as Endangered under the EPBC Act, four species listed as Vulnerable under the EPBC Act, 23 species listed as Migratory under the EPBC Act/BC Act, one species listed as Vulnerable under the BC Act, one species listed as Migratory under the BC Act, one species listed as 'other specially protected fauna' under the BC Act, one species listed as 'species of special conservation interest (conservation dependent fauna)', two species listed as P1 by DBCA, one species listed as P2 by DBCA, four species listed as P3 by DBCA and three species listed as P4 by DBCA.

Aquatic and marine species were not considered in the likelihood of occurrence assessment as the survey area does not contain core habitat that these species solely rely on for survival. The fauna likelihood of occurrence assessment is presented in **Appendix D**.

One confirmed white-tailed Black Cockatoo record occurs within 12 km of the survey area; 10 km north (IRWMILR001; Birdlife 2021).

Figure 5: Conservation significant flora species previously found within 5km of the survey area



Legend

- Survey Footprint

Conservation significant species DBCA (2020a)

- *Daviesia speciosa* (T)
- *Eucalyptus crispata* (T)
- *Eucalyptus leprophloia* (T)
- *Paracaleana dixonii* (T)
- *Thelymitra stellata* (T)
- *Lasiopetalum ogilvieanum* (P1)
- *Malleostemon decipiens* (P1)
- *Micromyrtus rogeri* (P1)
- *Comesperma griffinii* (P2)
- *Eucalyptus abdita* (P2)
- *Schoenus badius* (P2)
- *Stylidium pseudocaespitosum* (P2)
- *Synaphea sparsiflora* (P2)
- *Acacia lanceolata* (P3)
- *Allocasuarina grevilleoides* (P3)
- *Beyeria gardneri* (P3)
- *Banksia frasari* var. *crebra* (P3)
- *Comesperma rhadinocarpum* (P3)
- *Eucalyptus macrocarpa* x *pyriformis* (P3)
- *Guichenotia alba* (P3)
- *Hemiandra* sp. Eneabba (H. Demarz 3687) (P3)
- *Hypocalymma gardneri* (P3)
- *Mesomelaena stygia* subsp. *deflexa* (P3)
- *Persoonia filiformis* (P3)
- *Persoonia rudis* (P3)
- *Stylidium drummondianum* (P3)
- *Stylidium torticarpum* (P3)
- *Synaphea oulopha* (P3)
- *Verticordia luteola* var. *luteola* (P3)
- *Banksia elegans* (P4)
- *Banksia scabrella* (P4)
- *Calytrix chrysantha* (P4)
- *Eucalyptus macrocarpa* subsp. *elachantha* (P4)
- *Schoenus griffinianus* (P4)
- *Stawellia dimorphantha* (P4)
- *Thysanotus glaucus* (P4)

0 1 2
Kilometers

Scale: 1:90,000
Datum/Projection:
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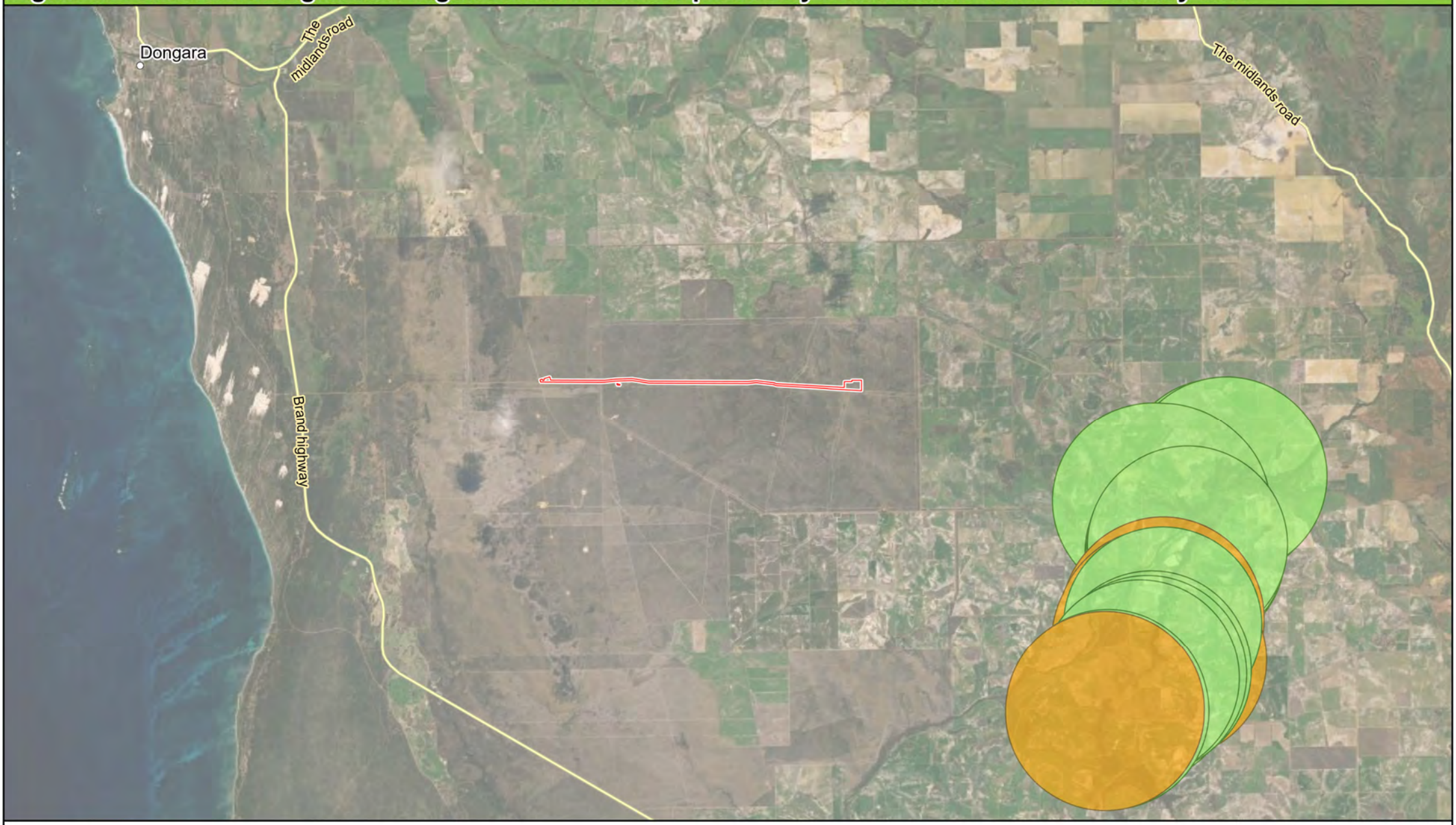
Figure 6: Conservation significant vegetation communities previously found within 20km of the survey area



Legend

Survey Footprint

Conservation significant vegetation communities (DBCA 2020b)

Assemblages of organic mound springs of the Three Springs area (EN)

Ferricrete floristic community (Rocky Springs type) (VU)

0 2.5 5 10

Kilometers

Scale: 1:250,000

Datum/Projection:
GDA 1994 MGA Zone 50

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Figure 7: Conservation significant fauna species previously found within 20km of the survey area

Legend

Survey Footprint

Conservation significant fauna species (DBCA 2020c)

- Carnaby's cockatoo (*Calyptorhynchus latirostris*, EN)
- White-tailed black cockatoo (*Calyptorhynchus* sp. 'white-tailed black cockatoo', EN)
- Malleefowl (*Leipoa ocellata*, VU)
- Black-striped snake (*Neelaps calonotos*, P3)
- Western brush wallaby (*Phasmodes jeeba*, P4)

0 2.5 5
Kilometers
Scale: 1:200,000
Datum/Projection:
GDA 1994 MGA Zone 50

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3.2 Flora and vegetation survey

3.2.1 Flora overview

A total of 170 taxa (168 native and two introduced) from 93 genera and 39 families were recorded across 26 quadrats established within the survey area (161 taxa) and from targeted and opportunistic collections (nine taxa). A flora species list is provided in **Appendix E**. Average species per quadrat was 38.04 species, ranging from a low of 19 species at ELA12 to a high of 57 species at ELA02. The majority of taxa recorded were representative of the Proteaceae (30), Myrtaceae (23 taxa) and Fabaceae (18 taxa) families. *Banksia* and *Hakea* were the best represented genera throughout the survey area with 8 taxa recorded each. A flora species matrix (per quadrat) is provided in **Appendix F**.

3.2.2 Accumulated species – site surveyed (species-area curve)

A species accumulation curve (**Figure 8**) was used to evaluate the adequacy of sampling (Clarke and Gorley 2006). Only species data recorded from defined quadrats were used, no opportunistic flora collections were included. The asymptotic value was determined using Michaelis Menten modelling. Using this analysis, the incidence-based coverage estimator of species richness was calculated to be 181.05. Based on this value, and the total of 161 species recorded within quadrats, approximately 88.9% of the flora species potentially present within the survey area were recorded. This result, in addition to opportunistic collections, indicates that the majority of flora potentially present within the survey area were recorded.

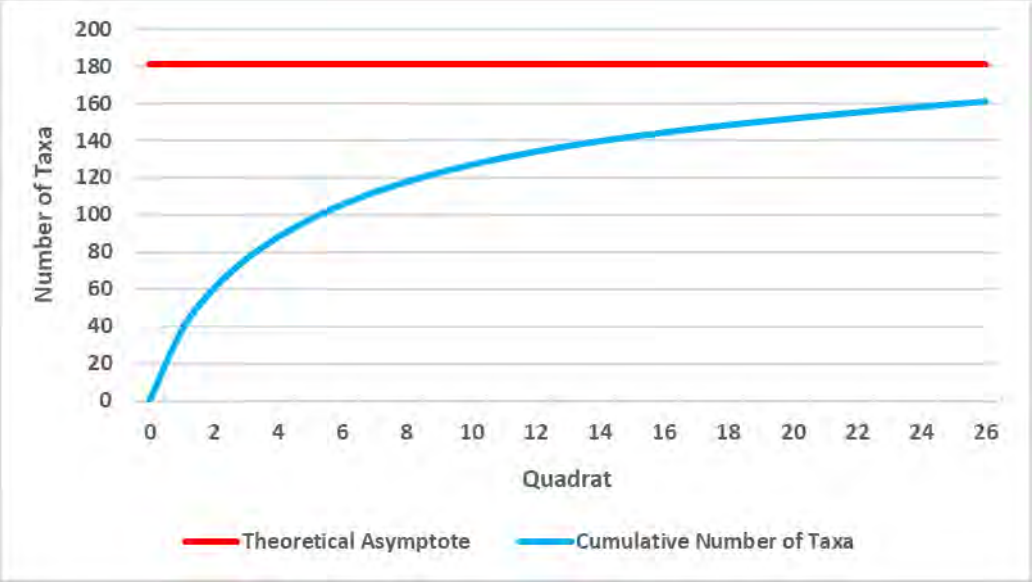


Figure 8: Average randomised species accumulation curve

Note: Only species recorded from quadrats were used to calculate the species accumulation curve and theoretical maximum number of species (asymptotic value).

3.2.3 Conservation significant flora

No Threatened flora species listed under the EPBC Act or the BC Act were recorded within the survey area from the current field survey. Conservation significant flora species listed by DBCA included; *Micromyrtus rogeri* (P1), *Lasiopetalum ogilvieanum* (P1), *Guichenotia alba* (P3), *Mesomelaena stygia* subsp. *deflexa* (P3), *Stylidium drummondianum* (P3), *Banksia scabrella* (P4), *Eucalyptus macrocarpa* subsp. *elachantha* (P4), and *Stawellia dimorphantha* (P4). Locations of these species are presented in

Figure 9 and **Appendix H**. Individual records and abundance of each species within the vegetation communities are presented in **Table 11**.

Table 11: Priority flora records and abundance within each vegetation community

Species and vegetation community	Records	Abundance
Banksia scabrella	**485**	**10776**
AcAhGp	6	43
AcDdMl	2	16
AcEbHh	97	900
BpDdHh	23	256
EtAhHh	357	9561
Echium plantagineum	**1**	**2**
EtBaHh	1	2
Eucalyptus macrocarpa* subsp. *elachantha	**1**	**10**
AcEbHh	1	10
Guichenotia alba	**63**	**607**
AcDdMl	1	1
AcEbHh	55	577
Cleared	3	17
EtBaHh	4	12
Lasiopetalum ogilvieanum	**21**	**100**
AcDdMl	1	12
AcEbHh	5	37
EtAhHh	15	51
Mesomelaena stygia* subsp. *deflexa	**55**	**4648**
AcEbHh	11	443
EtAhHh	44	4205
Micromyrtus rogeri	**18**	**939**
AcAhGp	16	829
EtAhHh	2	110
Stawellia dimorphantha	**45**	**298**
AcDdMl	40	275
AcEbHh	1	5
EtBaHh	4	18
Stylidium drummondianum	**10**	**54**
AcAhGp	3	18
AcEbHh	2	5
EtAhHh	5	31
Grand Total	**699**	**17434**

3.2.3.1 Micromyrtus rogeri

Micromyrtus rogeri was recorded from 18-point locations within the survey area, totalling 939 individuals. Of the 18-point locations occurring within the survey area, the majority (16) were located within the laterite rises of AcAhGp vegetation community. *Micromyrtus rogeri* was recorded from several populations towards the eastern end of the survey area.

Locations of *Micromyrtus rogeri* are presented in **Plate 1**, **Figure 9** and **Appendix H**.


Plate 1: *Micromyrtus rogeri* © Eco Logical Australia

3.2.3.2 Lasiopetalum ogilvieanum

Lasiopetalum ogilvieanum was recorded from 21-point locations within the survey area, totalling 100 individuals. Of the 21-point locations occurring within the survey area, the majority (15) were located within the sandy plains of EtAhHh vegetation community. *Lasiopetalum ogilvieanum* was recorded from several populations towards the eastern end of the survey area.

Locations of *Lasiopetalum ogilvieanum* are presented in **Plate 2**, **Figure 9** and in **Appendix H**.


Plate 2: *Lasiopetalum ogilvieanum* © Eco Logical Australia

3.2.3.3 Guichenotia alba

Guichenotia alba was recorded from 63-point locations within the survey area, totalling 607 individuals. Of the 63-point locations occurring within the survey area, the majority (55) were located within the sandy plains of AcEbHh vegetation community. *Guichenotia alba* was recorded from two populations towards the western end of the survey area.

Locations of *Guichenotia alba* are presented in **Plate 3**, **Figure 9** and in **Appendix H**.


Plate 3: *Guichenotia alba* © Eco Logical Australia

3.2.3.4 Mesomelaena stygia subsp. *deflexa*

Mesomelaena stygia subsp. deflexa was recorded from 55-point locations within the survey area, totalling 4,648 individuals. Of the 55-point locations occurring within the survey area, the majority (44) were located within the sandy plains of EtAhHh vegetation community. *Mesomelaena stygia subsp. deflexa* was recorded from several populations towards the eastern end of the survey area.

Locations of *Mesomelaena stygia subsp. deflexa* are presented in **Plate 4**, **Figure 9** and in **Appendix H**.


Plate 4: *Mesomelaena stygia subsp. deflexa* © Eco Logical Australia

3.2.3.5 Stylidium drummondianum

Stylidium drummondianum was recorded from 10-point locations within the survey area, totalling 54 individuals. Of the 10-point locations occurring within the survey area, five were located within EtAhHh vegetation community, three within AcAhGp and two within AcEbHh. *Stylidium drummondianum* was recorded from several populations towards the eastern end of the survey area.

Locations of *Stylidium drummondianum* are presented in **Plate 5**, **Figure 9** and in **Appendix H**.


Plate 5: *Stylidium drummondianum* © Eco Logical Australia

3.2.3.6 Banksia scabrella

Banksia scabrella was recorded from 485-point locations within the survey area, totalling 10,776 individuals. Of the 485-point locations occurring within the survey area, the majority (357) were located within EtAhHh vegetation community, 97 within AcEbHh, 23 within BpDdHh, six within AcAhGp and two within AcDdMl. *Banksia scabrella* was a dominant structural component of EtAhHh vegetation community and was recorded from several populations across the survey area.

Locations of *Banksia scabrella* are presented in **Plate 6**, **Figure 9** and in **Appendix H**.


Plate 6: *Banksia scabrella* © Eco Logical Australia

3.2.3.7 Eucalyptus macrocarpa subsp. *elachantha*

Eucalyptus macrocarpa subsp. elachantha was recorded from one-point location towards the middle of the survey area, totalling ten individuals. This location was located within the sandy plains of AcEbHh vegetation community.

Locations of *Eucalyptus macrocarpa subsp. elachantha* are presented in **Plate 7**, **Figure 9** and in **Appendix H**.

Plate 7: *Eucalyptus macrocarpa* subsp. *elachantha* © Eco Logical Australia

3.2.3.8 Stawellia dimorphantha

Stawellia dimorphantha was recorded from 45-point locations within the survey area, totalling 298 individuals. Of the 45-point locations occurring within the survey area, the majority (40) were located within AcDdMl vegetation community. *Stawellia dimorphantha* was recorded from one population towards the western end of the survey area.

Locations of *Stawellia dimorphantha* are presented in **Plate 8**, **Figure 9** and in **Appendix H**.

Plate 8: *Stawellia dimorphantha* © Eco Logical Australia

Of the 61 flora species identified from the desktop assessment as possibly occurring within the survey area, the eight species above were found to occur in the survey area. 11 species were considered as likely to occur, and 25 considered as having the potential to occur, based on the species habitat preferences and proximity of records to the survey area. The remaining 17 species were considered

unlikely to occur. The flora likelihood of occurrence assessment is presented in **Appendix C**. A flora likelihood of occurrence assessment was also undertaken by Mattiske (2020), which has been considered for this report.

3.2.4 Introduced flora

Two introduced (weed) flora species was recorded as occurring within the survey area, **Hypochaeris glabra* and **Echium plantagineum*. **E. plantagineum* is listed as a Declared Pest under the State *Biosecurity and Agriculture Management Act 2007* (BAM Act) and on the Western Australian Organism List (WAOL) database as s22. **H. glabra* is not listed as a Weed of National Significance (WoNS) or Declared Pest under the BAM Act and is listed on the WAOL database as s11 (permitted). **E. plantagineum* was recorded once opportunistically, whilst **H. glabra* was recorded in five quadrats (ELA01, ELA08, ELA14, ELA21, ELA24) at a low density (0.01% cover) and is associated with AcEbHh, EtAhHh and EtBaHh vegetation communities.

3.2.5 Vegetation communities

A total of six vegetation communities were delineated and mapped within the survey area (**Table 12**, **Figure 10**, **Appendix G**). The most widespread vegetation community was AcEbHh, which occurred across 34.02% (72.2 ha) of the survey area. Descriptions of vegetation communities resemble those described by Woodman (2013) in a far larger mapped area adject to the current survey area. This report also did not infer the presence of any threatened or priority ecological communities.

No vegetation communities delineated within the current survey area were inferred to represent any or potential conservation significant communities listed under the EPBC Act, the BC Act or by DBCA. This is supported by Woodman (2013) which also found no conservation significant communities.

Similarity Profile Analysis (SIMPROF) separated the 26 quadrats into six statistically dissimilar groupings (Global R= 6.02; Significance level of sample statistic; p = 0.01; **Appendix I**).

Table 12: Vegetation communities recorded within the survey area

Image	Vegetation community	Woodman (2013) corresponding vegetation type	Vegetation description	Quadrats	Extent within the survey area (ha)	Proportion of the survey area (%)
	AcEbHh	10 and 12	*Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland.	ELA01, ELA02, ELA05, ELA09, ELA20 and ELA21	72.2	34.02
	EtAhHh	13a	*Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland.	ELA03, ELA04, ELA07, ELA08, ELA14 and ELA17	55	25.92

Image	Vegetation community	Woodman (2013) corresponding vegetation type	Vegetation description	Quadrats	Extent within the survey area (ha)	Proportion of the survey area (%)
	BpDdHh	13b	*Banksia prionotes* mid open woodland over *Daviesia divaricata*, *Conospermum boreale*, *Allocasuarina humilis* mid open shrubland over *Hibbertia hypericoides* low open shrubland and *Ecdeiocolea monostachya*, *Mesomelaena pseudostygia* low open sedgeland.	ELA06, ELA11, ELA25 and ELA26	12	5.66
	AcAhGp	9	*Allocasuarina campestris* tall sparse shrubland over *Allocasuarina humilis*, *Hakea auriculata*, *Petrophile shuttleworthiana* mid open shrubland over *Gastrolobium plicatum* low open shrubland and *Ecdeiocolea monostachya*, *Schoenus armeria* low open sedgeland.	ELA10, ELA12 and ELA13	5.5	2.59
	AcDdMl	12	*Allocasuarina campestris* tall isolated shrubs over *Daviesia divaricata*, *Conospermum boreale*, *Beaufortia elegans* mid open shrubland over *Melaleuca leuropoma*, *Hibbertia hypericoides* low open shrub over *Ecdeiocolea monostachya* low open sedgeland.	ELA15, ELA16, ELA18 and ELA19	35.9	16.92

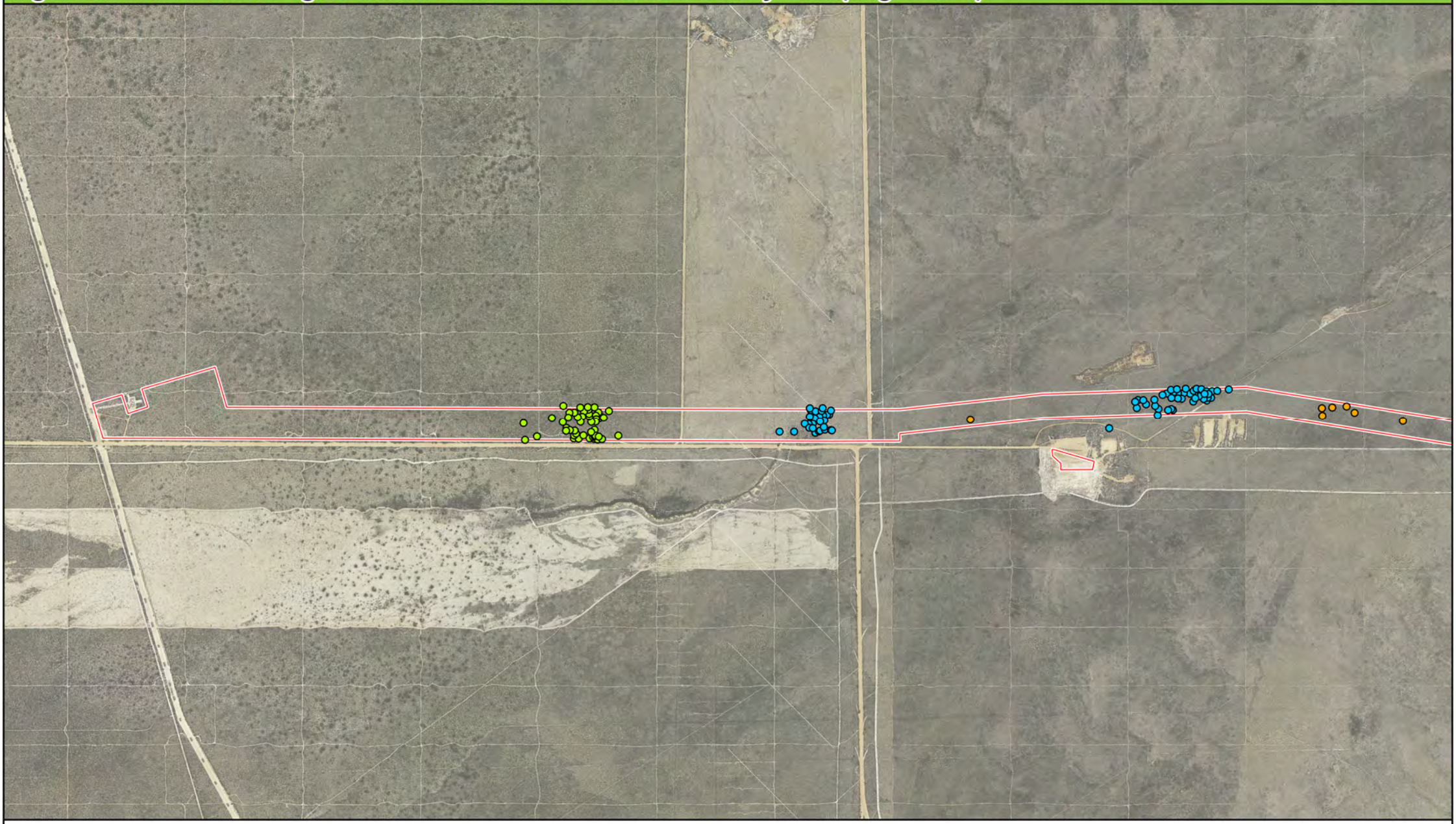
Image	Vegetation community	Woodman (2013) corresponding vegetation type	Vegetation description	Quadrats	Extent within the survey area (ha)	Proportion of the survey area (%)
	EtBaHh	10, 13b	*Eucalyptus todtiana* mid open woodland over *Banksia attenuata*, *Calothamnus blepharospermus*, *Eremaea beaufortioides* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland.	ELA22, ELA23 and ELA24	28.1	13.24
TOTAL					**212.2**	**100**

3.2.6 Vegetation condition

Vegetation condition within the survey area was Excellent (208.7 ha; 98.35%) or Cleared (3.5 ha; 1.65%), based on the Keighery (1994) vegetation scale provided in the EPA *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (2016).

The primary disturbance within the survey area was a recent prescribed burn, which occurred in April 2019. Post fire regeneration was very good, with majority of species that were expected to occur being recorded. It is noted however, that structural elements of defined vegetation communities may slightly change over time as plant growth and development continue. Minor disturbances included minimal presence of weeds and feral fauna (rabbit diggings, scats). Vegetation condition within the survey area is presented in **Figure 11**.

Figure 9: Conservation significant flora recorded within the survey area (Page 1 of 3)

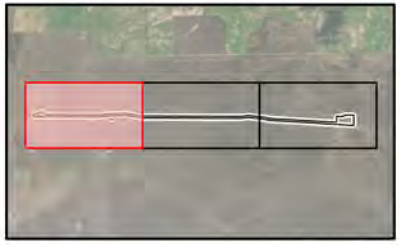


Legend

Survey Footprint

Species

- *Guichenotia alba* (P3)
- *Banksia scabrella* (P4)
- *Stawellia dimorphantha* (P4)



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Datum/Projection:
GDA 1994 MGA Zone 50

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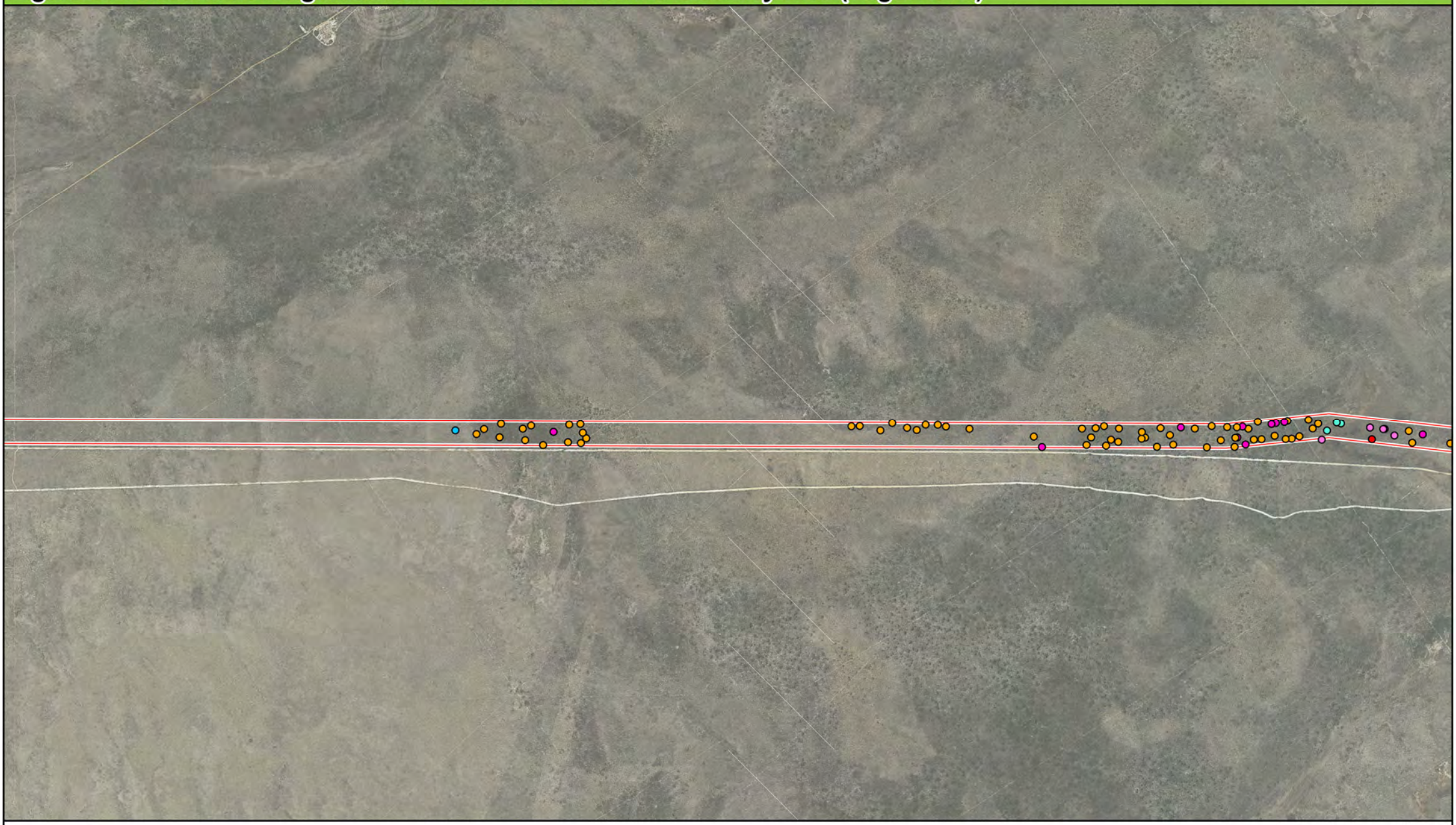
Figure 9: Conservation significant flora recorded within the survey area (Page 2 of 3)



Legend

Survey Footprint

Species

- *Lasiopetalum ogilvieanum* (P1)
- *Micromyrtus rogeri* (P1)
- *Guichenotia alba* (P3)
- *Stylidium drummondianum* (P3)
- *Banksia scabrella* (P4)
- *Eucalyptus macrocarpa* subsp. *elachantha* (P4)

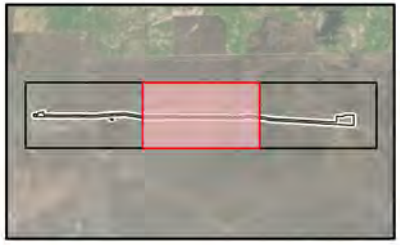


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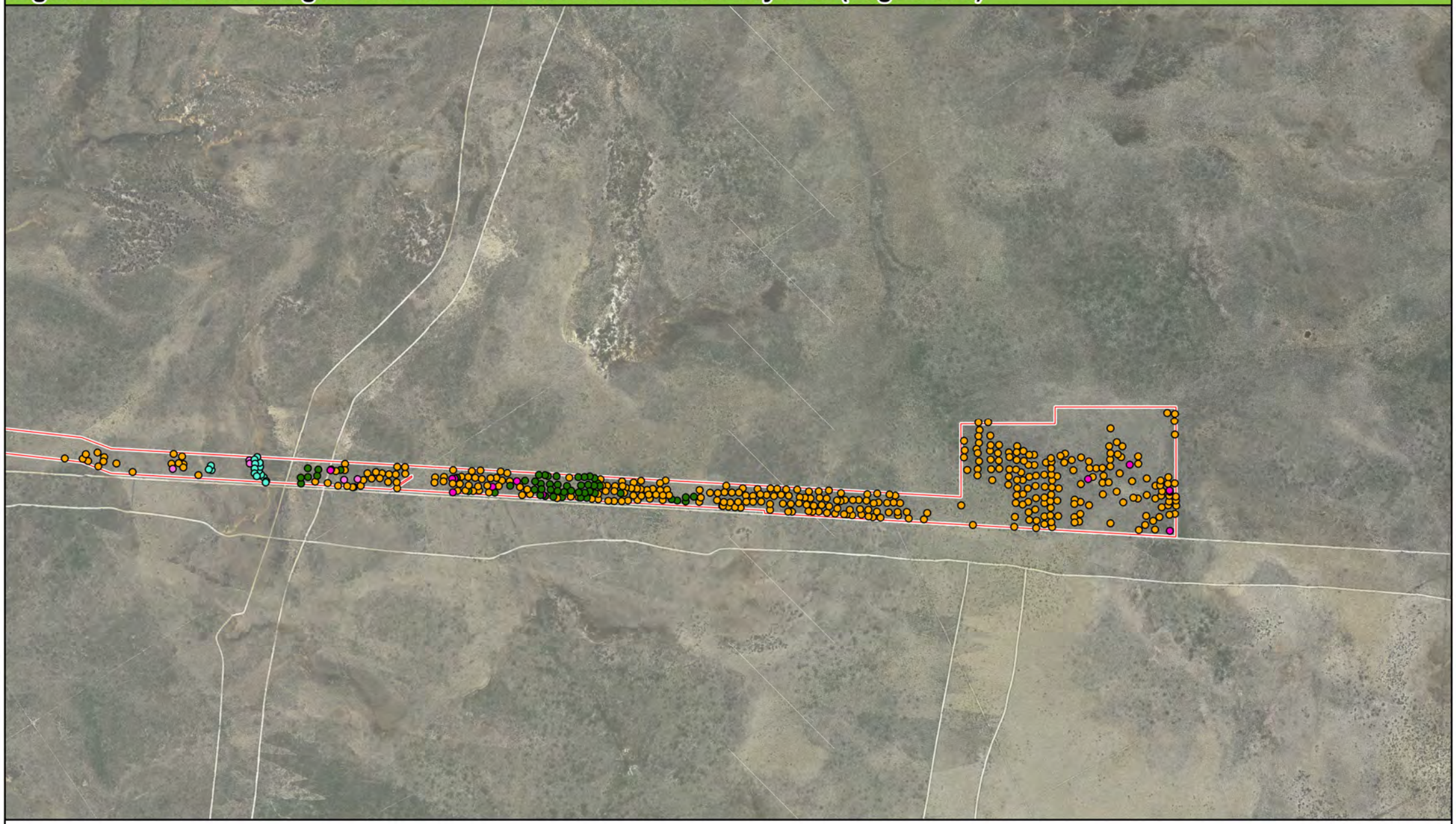
Figure 9: Conservation significant flora recorded within the survey area (Page 3 of 3)



Legend

Survey Footprint

Species

- *Lasiopetalum ogilvieanum* (P1)
- *Micromyrtus rogeri* (P1)
- *Mesomelaena stygia* subsp. *deflexa* (P3)
- *Stylidium drummondianum* (P3)
- *Banksia scabrella* (P4)

0 125 250 500
Metres

Scale: 1:20,000
Datum/Projection:
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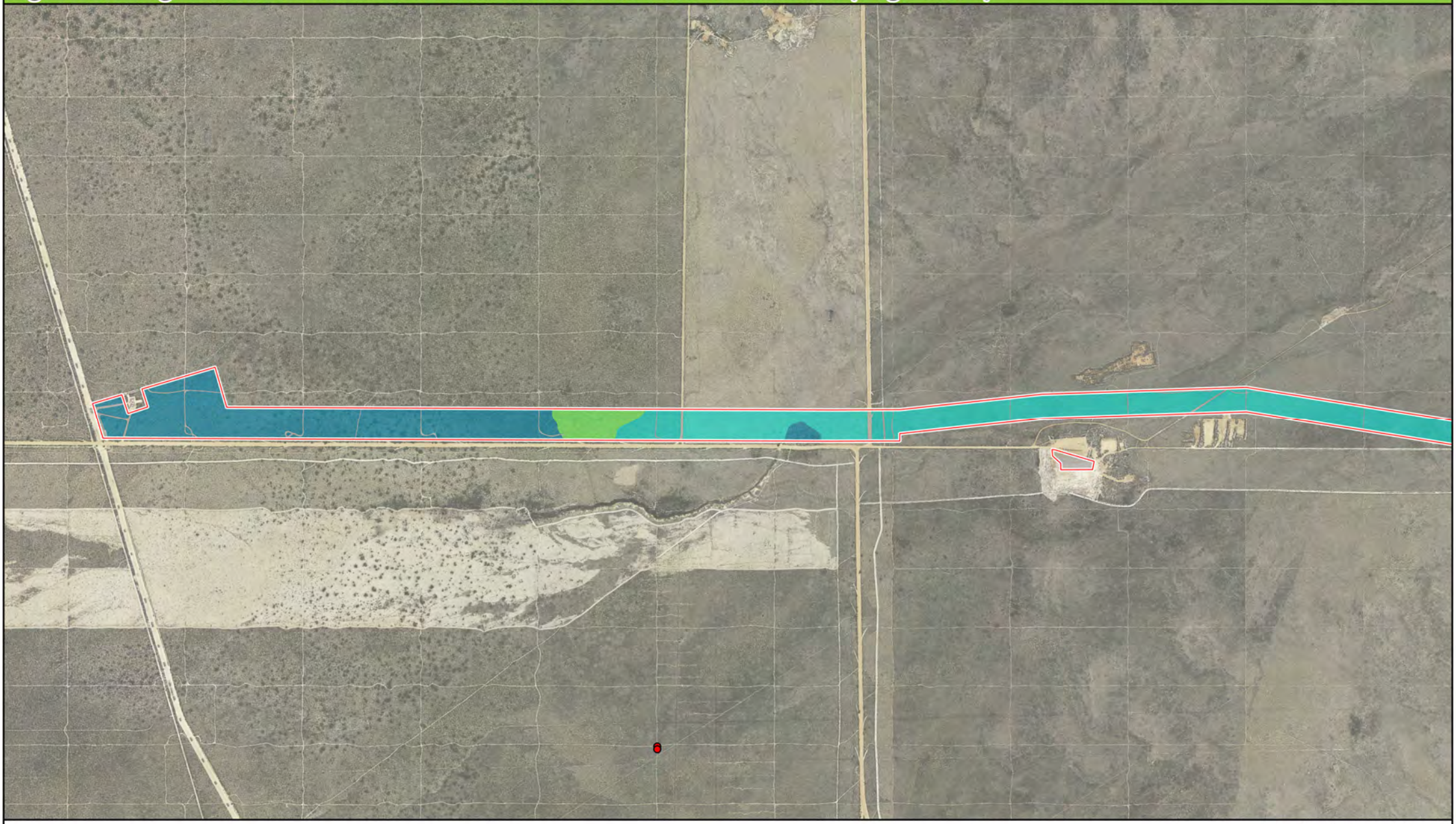
Figure 10: Vegetation communities recorded within the assessment area (Page 1 of 3)



Legend

- Survey Footprint
- *Paracalaena dixonii* (T)

Vegetation communities

- AcDdMl
- AcEbHh
- EtBaHh
- Cleared

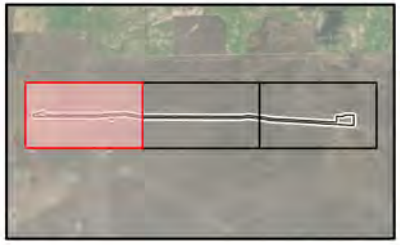


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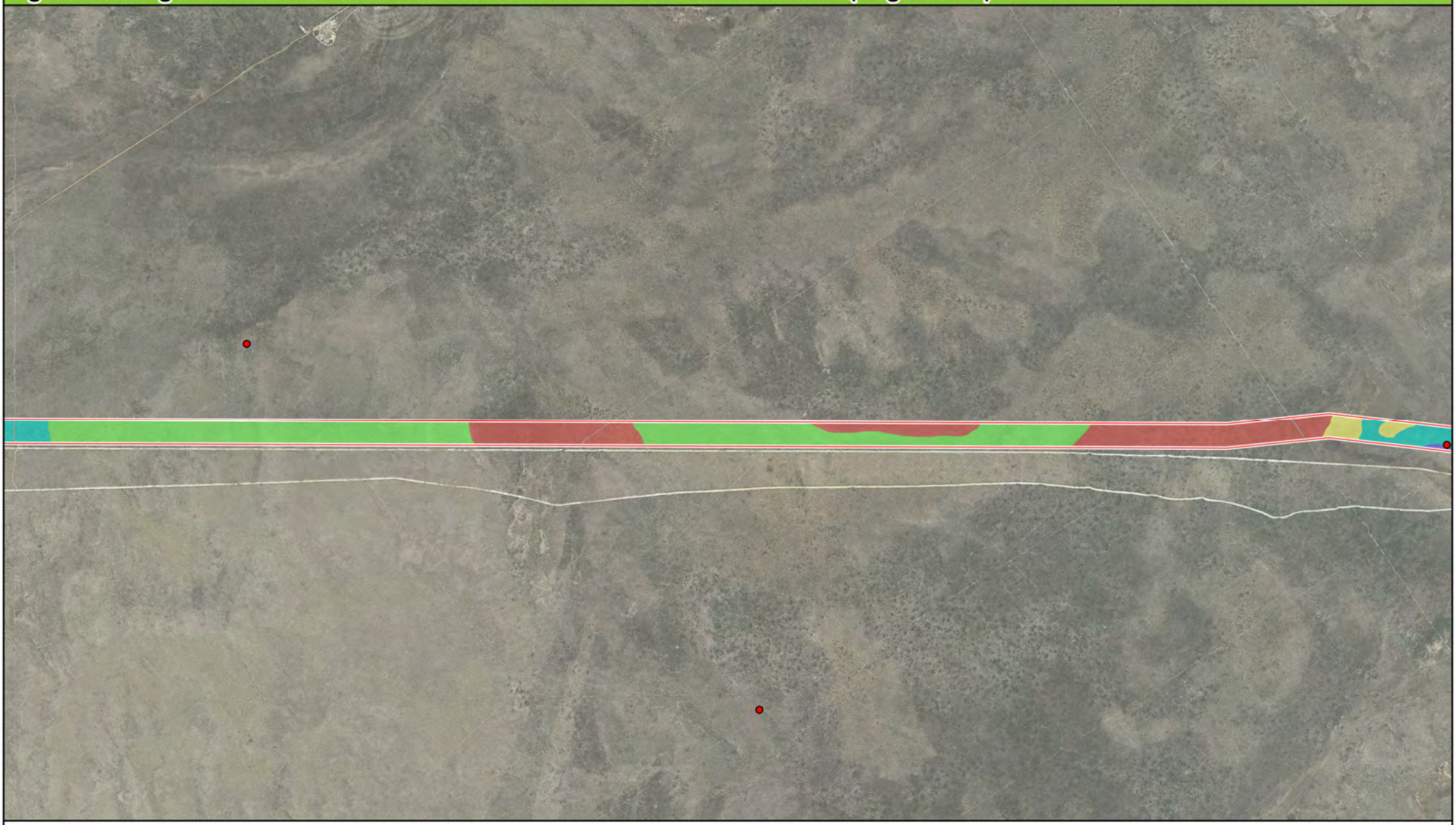
Figure 10: Vegetation communities recorded within the assessment area (Page 2 of 3)



Legend

- Survey Footprint
- *Paracalaena dixonii* (T)

Vegetation communities

- AcAhGp
- AcDdMl
- AcEbHh
- BpDdHh
- EtAhHh
- Cleared

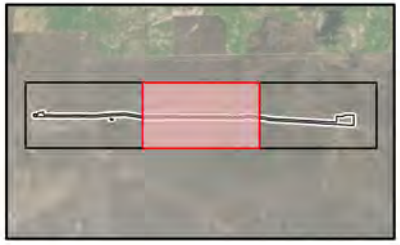


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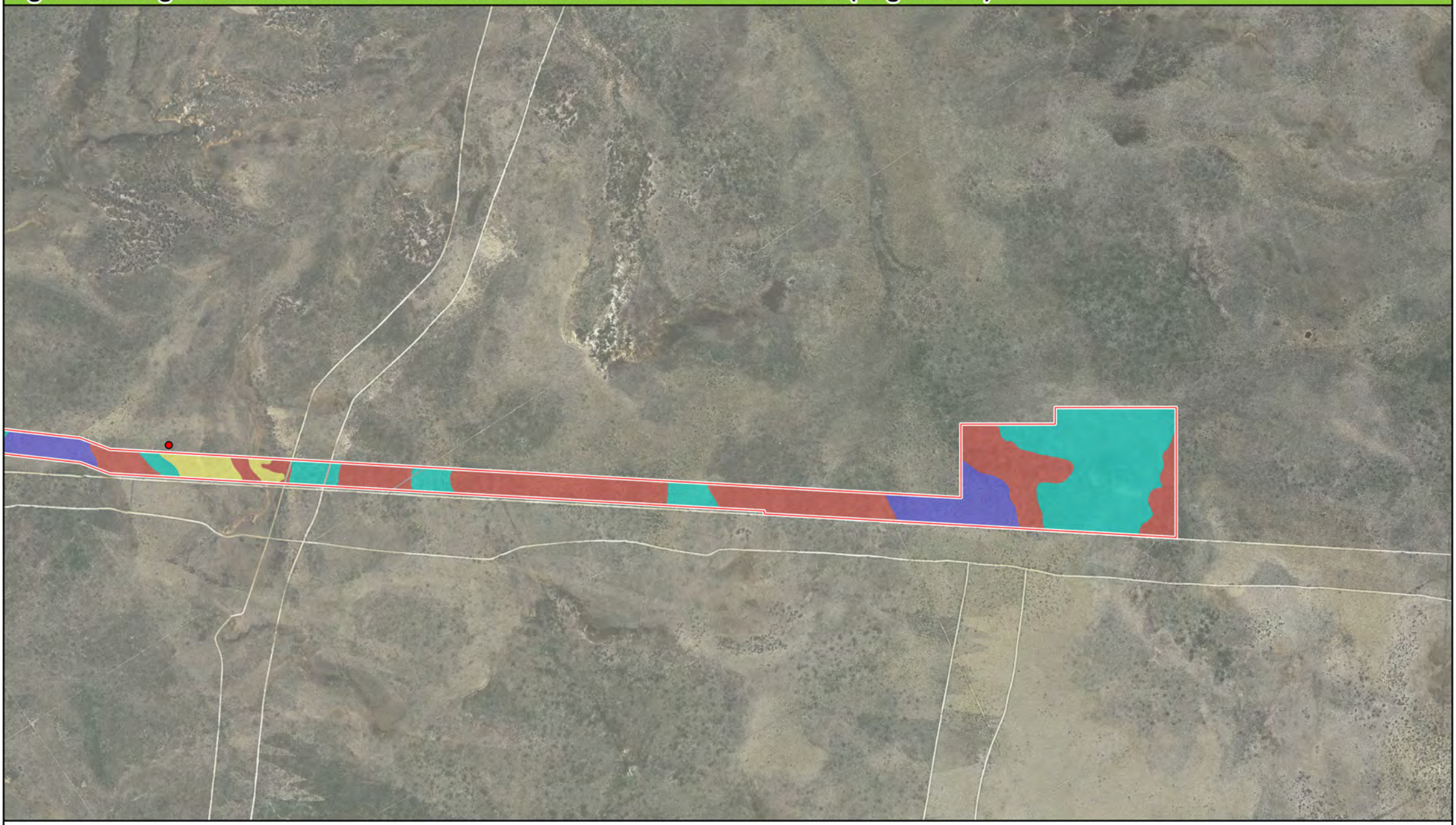
Figure 10: Vegetation communities recorded within the assessment area (Page 3 of 3)



Legend

- Survey Footprint
- *Paracalaena dixonii* (T)

Vegetation communities

- AcAhGp
- AcEbHh
- BpDdHh
- EtAhHh
- Cleared

0 125 250 500
Metres

Scale: 1:20,000
Datum/Projection:
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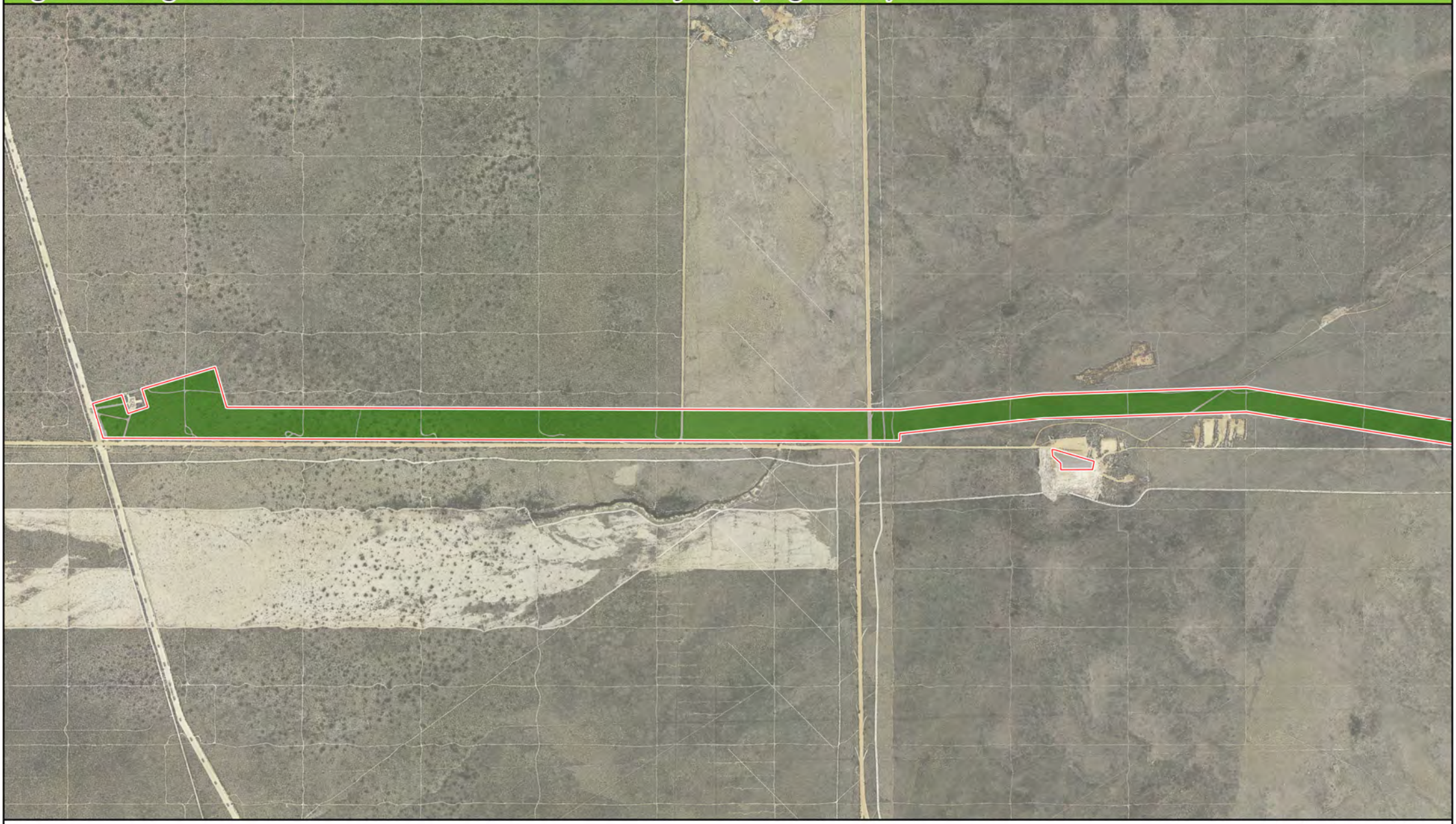
Figure 11: Vegetation condition recorded within the survey area (Page 1 of 3)



Legend

Survey Footprint

Vegetation condition

Excellent

Cleared

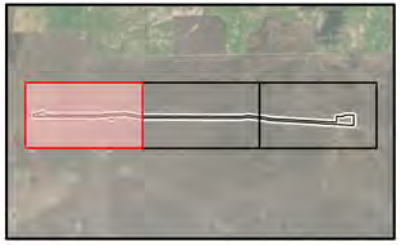


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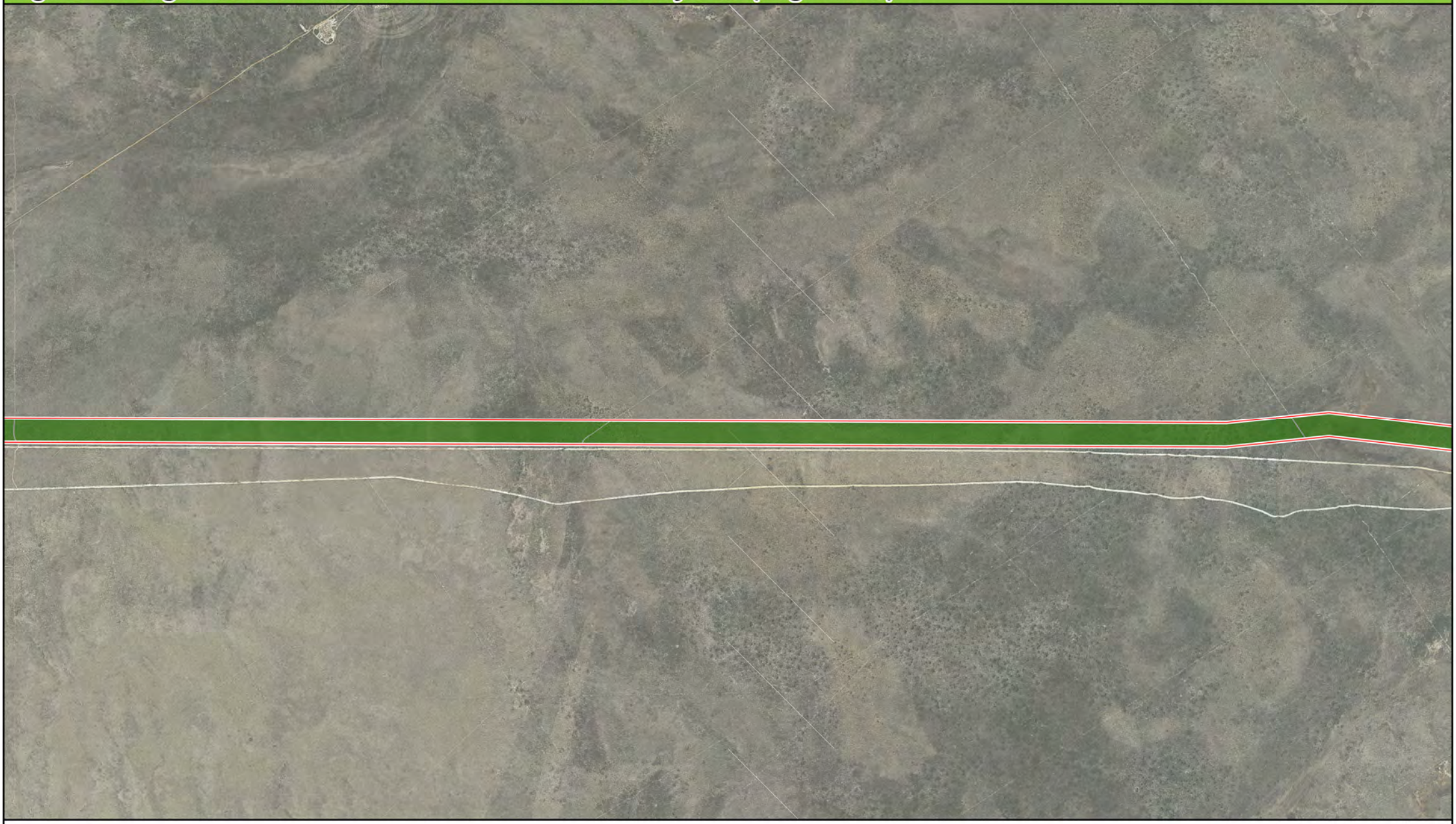
Figure 11: Vegetation condition recorded within the survey area (Page 2 of 3)



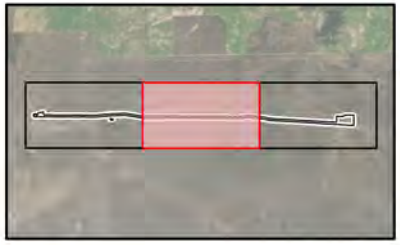
Legend

Survey Footprint

Vegetation condition

Excellent

Cleared



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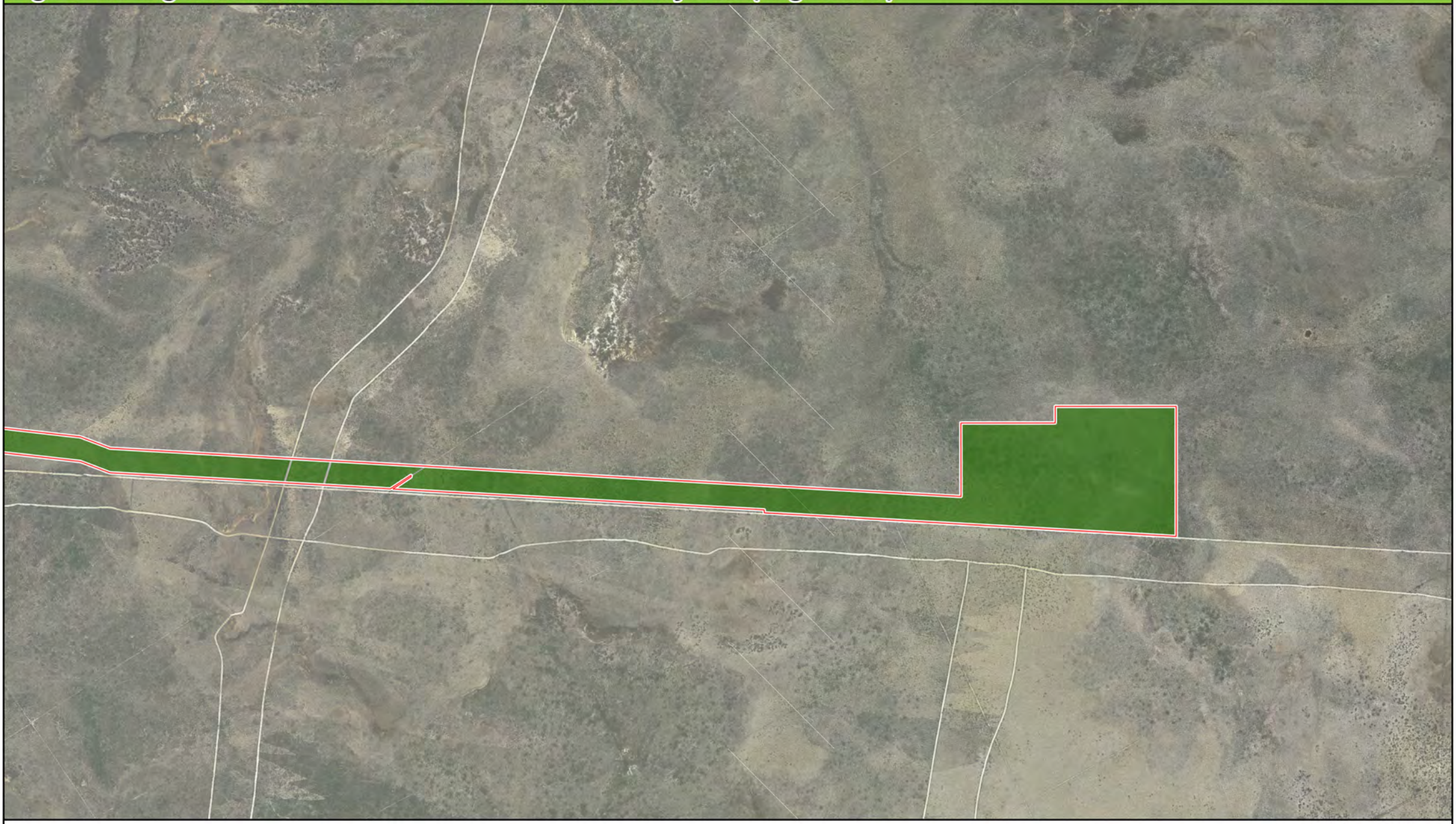
Project: 20PER16294-GM Date: 15/10/2020

Figure 11: Vegetation condition recorded within the survey area (Page 3 of 3)



Legend

Survey Footprint

Vegetation condition

Excellent

Cleared

0 125 250 500

Metres

Scale: 1:20,000

Datum/Projection:
GDA 1994 MGA Zone 50

N

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Project: 20PER16294-GM Date: 15/10/2020

3.3 Fauna survey

3.3.1 Fauna habitat

Three fauna habitats were delineated and mapped within the survey area (**Table 13**; **Figure 12**), covering a total of 212.2 ha (98.40% of the survey area). Photos of the fauna habitats are provided in **Appendix J**.

Table 13: Fauna habitats recorded within the survey area

Fauna habitat	Fauna habitat description	Extent within the survey area (ha)	Proportion of the survey area (%)
Fauna habitat 1	*Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on sandy plains	72.2	34.02
Fauna habitat 2	*Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sandy plains	95.2	44.86
Fauna habitat 3	*Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises	41.4	19.51
Cleared	-	3.4	1.60
TOTAL		**212.2**	**100**

There are no significant habitat features present within any of the three fauna habitats. As outlined in Section 3.2.6, a recent prescribed burn occurred in April 2019 across the survey area.

3.3.2 Fauna overview

A total of 35 fauna species (31 native and four introduced) were recorded within the survey area. This number comprised 28 bird species, five mammal species and two reptile species. Bird species were predominantly observed where a definitive canopy was present and vegetation cover was thickest. Evidence of mammal species (scats, tracks) was observed across the survey area, with no specific habitat preferences observed. The Spotted Military Dragon (*Ctenophorus maculatus* subsp. *maculatus*) were observed throughout the survey area.

Evidence of introduced fauna species (mainly scats and tracks) within the survey area included Cattle (*Bos taurus*), Domestic Dog (*Canis lupus familiaris*), Goat (*Capra hircus*) and European Rabbit (*Oryctolagus cuniculus*). A fauna species list is provided in **Appendix J**.

3.3.3 Conservation significant fauna

No direct (observations) or indirect (scats, tracks, diggings) evidence of conservation significant fauna species were recorded within the survey area from the current field survey. No evidence of the targeted species, Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and Malleefowl (*Leipoa ocellata*), were recorded within the survey area.

Of the 46 fauna species identified from the desktop assessment as possibly occurring within the survey area, four species were considered having the potential to occur, based on the species habitat preferences and proximity of records to the survey area; Carnaby's Cockatoo (*Calyptorhynchus latirostris*; listed as EN under the EPBC Act and BC Act), Fork-tailed Swift (*Apus pacificus;* listed as MI under the EPBC Act and BC Act), Grey Falcon (*Falco hypoleucos*; listed as VU under the BC Act) and

Peregrine Falcon (*Falco peregrinus*; listed as OS under the BC Act). The remaining 42 species were considered unlikely to occur (Appendix D). The survey area is in the non-breeding range of the Carnaby's Cockatoo, however the survey area potentially provides low quality foraging habitat (discussed further in Section 4.3).

3.3.4 Black cockatoo habitat assessment

No individuals of Carnaby's Cockatoo were recorded within the survey area. No potential or confirmed breeding or roosting trees were recorded as occurring within the survey area.

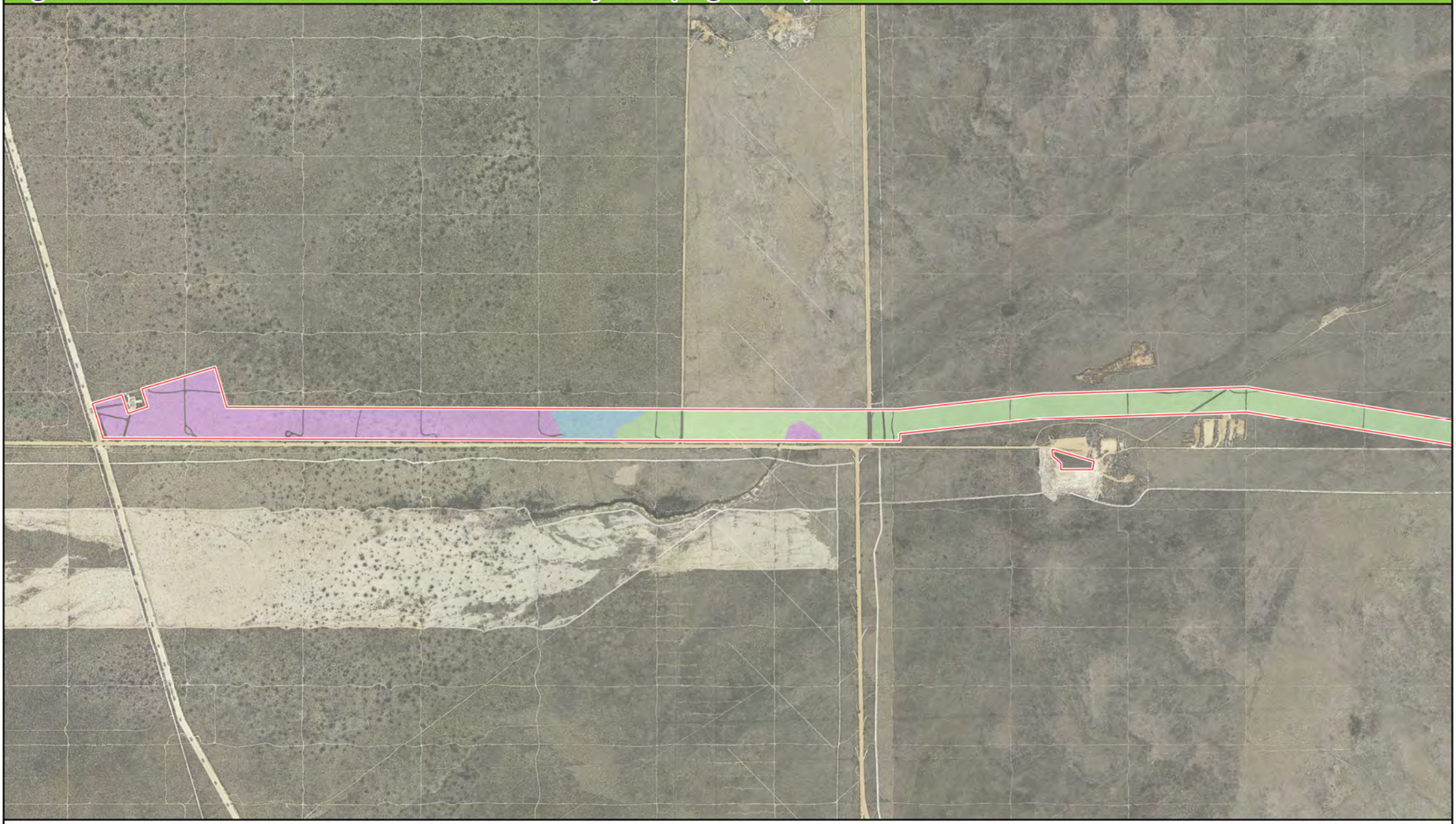
A total of 95.2 ha (44.86% of the survey area) is considered as providing 'Low' quality foraging habitat for Carnaby's Cockatoo; namely Fauna habitat 2: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sandy plains (refer to **Table 3** above for definitions of black cockatoo foraging habitat quality; Figure 13). This habitat provides suitable foraging species (*Banksia* spp. and *Hakea* spp.) at a low density (<10%) across Fauna habitat 2. This was determined by field observations and utilising the Detailed flora and vegetation survey results.

The remaining vegetated areas (113.6 ha, 53.53%) are considered as providing 'Negligible' quality foraging habitat of Carnaby's Cockatoo; namely Fauna habitat 1: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on sandy plains, and Fauna habitat 3: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises. These habitat types provide some scattered foraging species but at very low density (<2%). Cleared areas (3.4 ha, 1.6%) provide 'Nil' quality foraging habitat for black cockatoo species. No foraging evidence was observed within the survey area.

3.3.5 Malleefowl survey

No individuals of Malleefowl or their mounds were recorded within the survey area. This species was considered to be unlikely to occur (see Appendix D) as the habitat within the survey area is not suitable for the species due to the lack of leaf litter and thicker vegetation. The survey area has also been recently burnt.

Figure 12: Fauna habitat recorded within the survey area (Page 1 of 3)

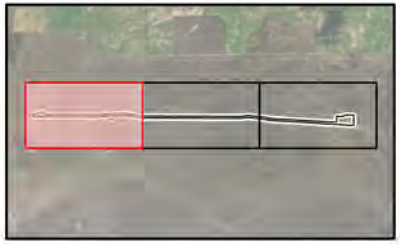


Legend

- Survey Footprint

Fauna Habitat

- Fauna Habitat 1: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on sandy plains
- Fauna Habitat 2: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sand plains
- Fauna Habitat 3: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises
- Cleared



0 125 250 500
Metres

Scale: 1:20,000
Datum/Projection:
GDA 1994 MGA Zone 50

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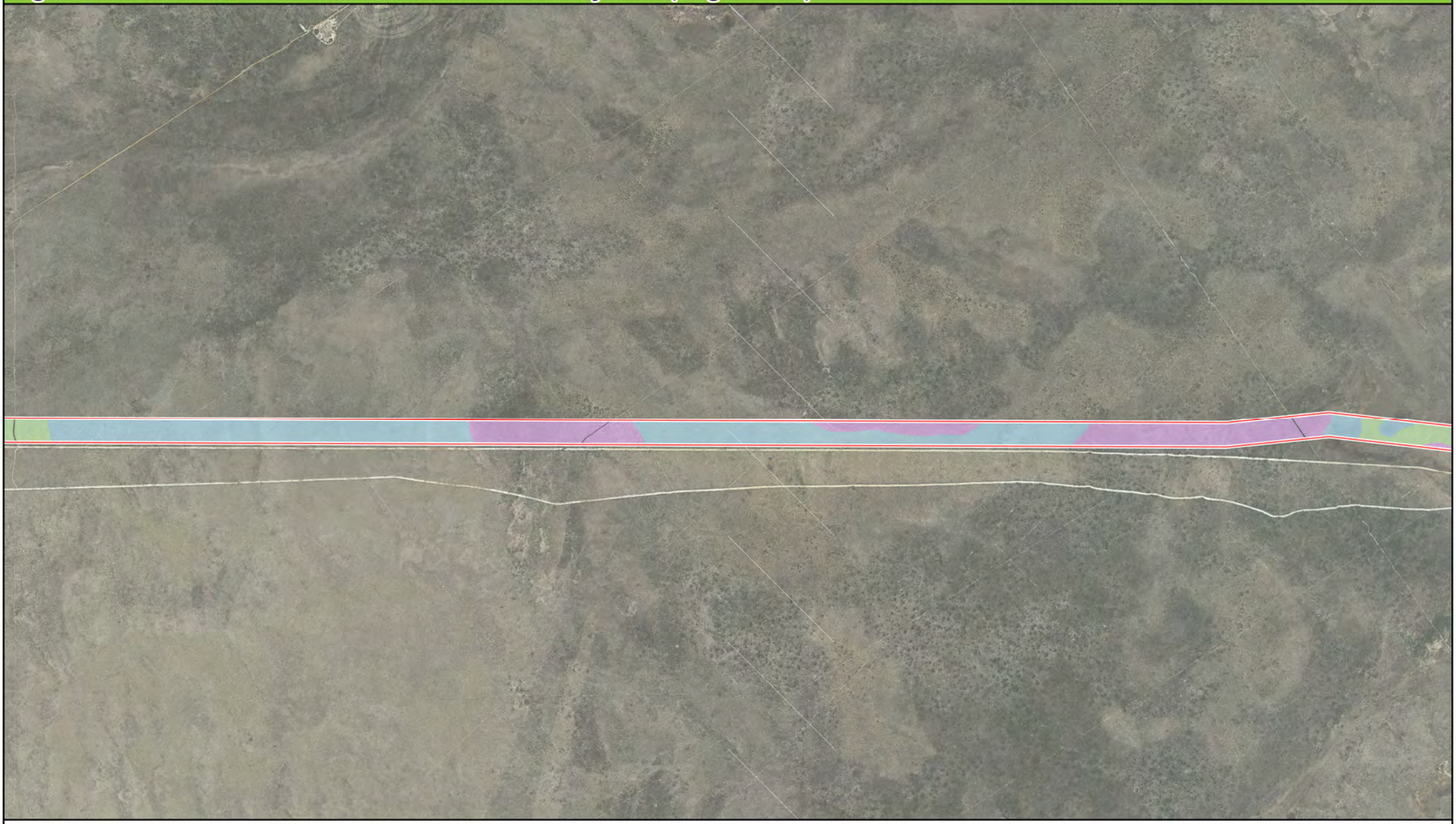
Project: 20PER16294-GM Date: 15/10/2020

Figure 12: Fauna habitat recorded within the survey area (Page 2 of 3)

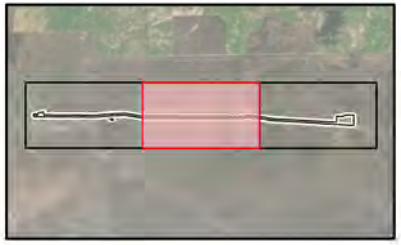


Legend

- Survey Footprint

Fauna Habitat

- Fauna Habitat 1: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on sandy plains
- Fauna Habitat 2: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sand plains
- Fauna Habitat 3: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises
- Cleared



0 125 250 500
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Scale: 1:20,000
Datum/Projection:
GDA 1994 MGA Zone 50

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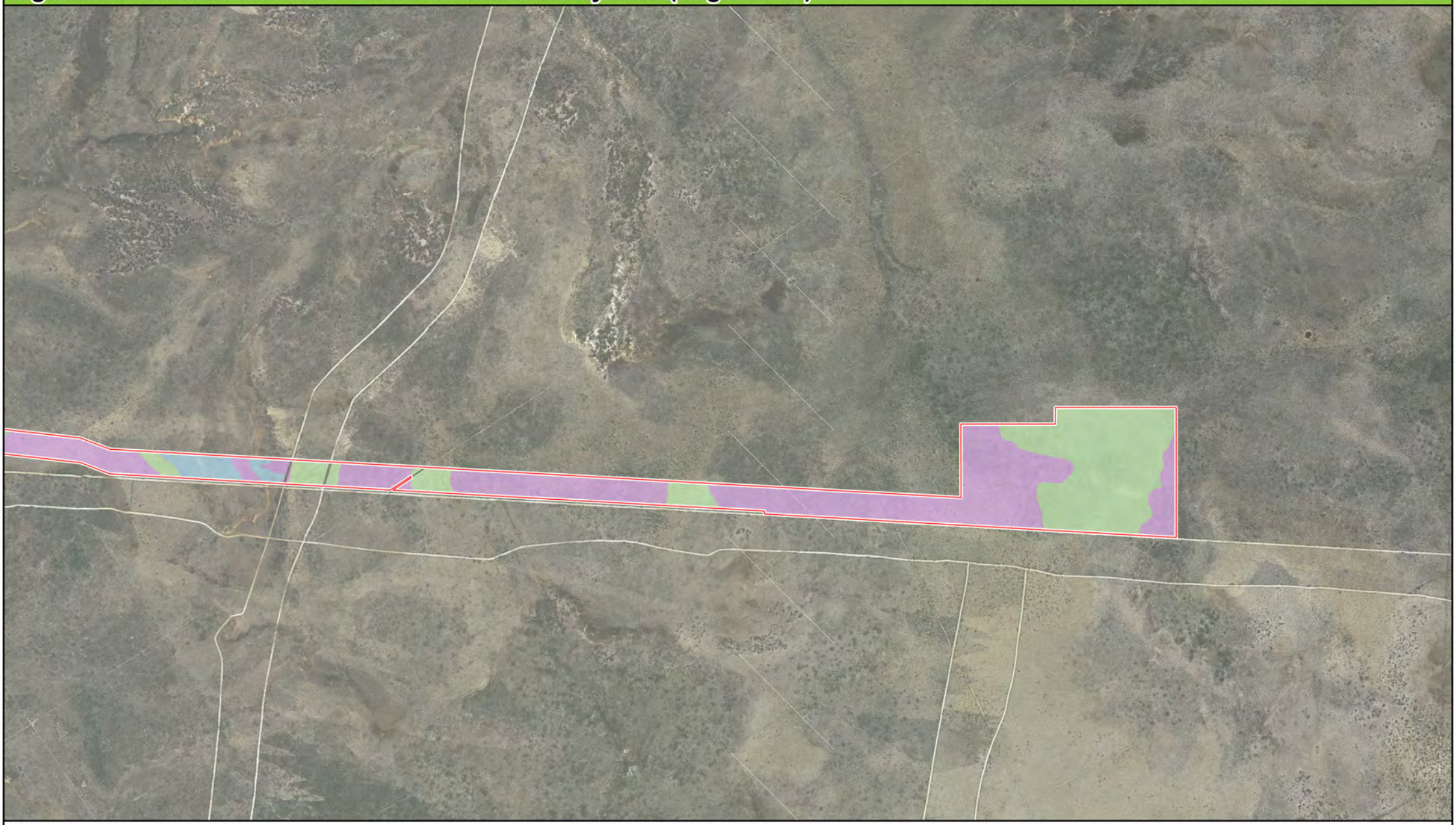
A TETRA TECH COMPANY

Project: 20PER16294-GM Date: 15/10/2020

Figure 12: Fauna habitat recorded within the survey area (Page 3 of 3)



Legend

- Survey Footprint

Fauna Habitat

- Fauna Habitat 1: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on sandy plains
- Fauna Habitat 2: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sand plains
- Fauna Habitat 3: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises
- Cleared

0 125 250 500
Metres

Scale: 1:20,000
Datum/Projection:
GDA 1994 MGA Zone 50

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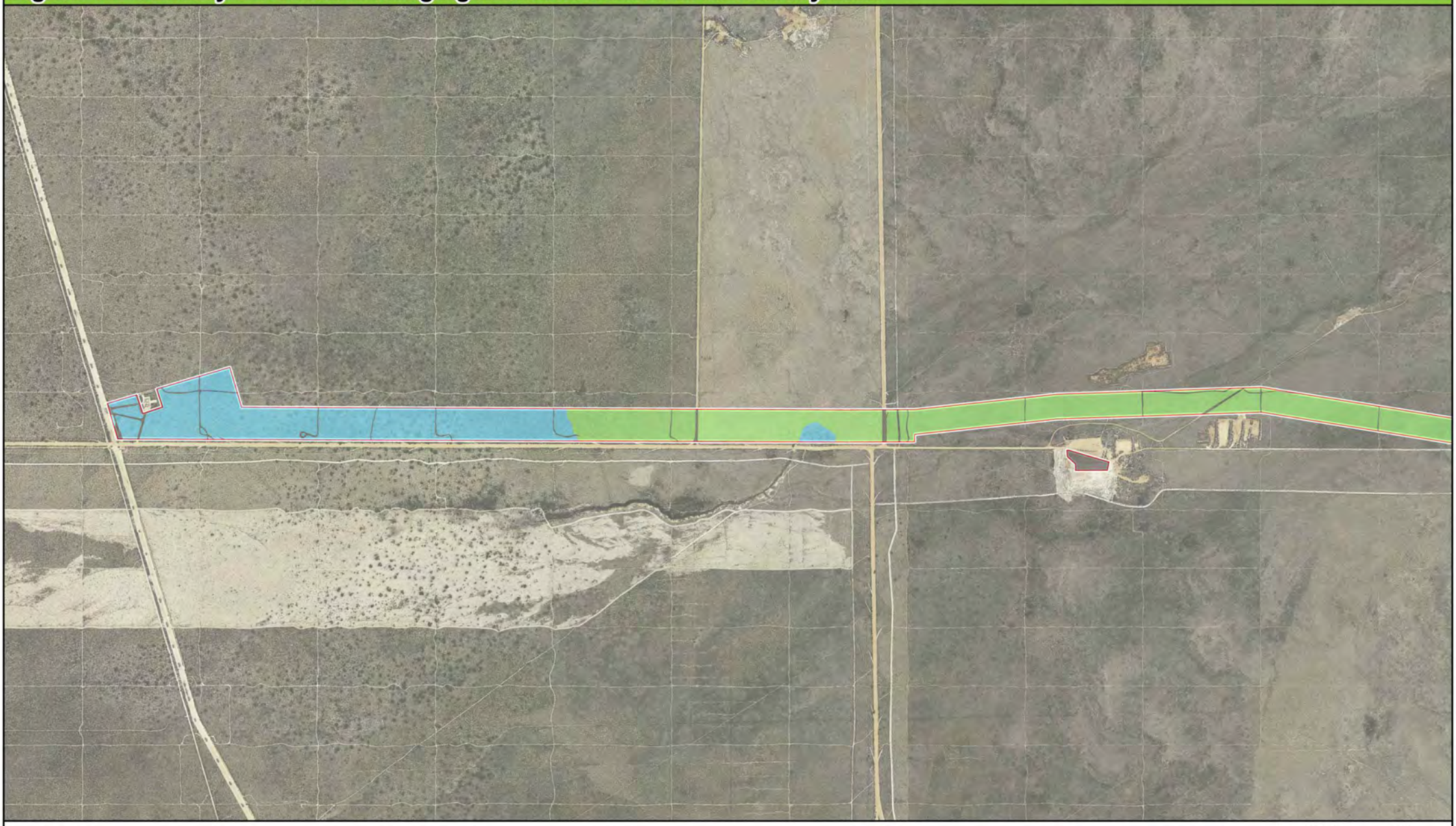
Project: 20PER16294-GM Date: 15/10/2020

Figure 13: Carnaby's Cockatoo foraging habitat recorded in the survey area



Legend

- Survey Footprint

CBC Foraging Quality

- Negligible
- Low
- Cleared

0 125 250 500

Metres

Scale: 1:20,000

Datum/Projection:
GDA 1994 MGA Zone 50

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Figure 13: Carnaby's Cockatoo foraging habitat recorded in the survey area

Legend

Survey Footprint

CBC Foraging Quality

- Negligible
- Low
- Cleared

0 125 250 500

Metres

Scale: 1:20,000

Datum/Projection:
GDA 1994 MGA Zone 50

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Figure 13: Carnaby's Cockatoo foraging habitat recorded in the survey area

Legend

Survey Footprint

CBC Foraging Quality

- Negligible
- Low
- Cleared

0 125 250 500

Metres

Scale: 1:20,000

Datum/Projection:
GDA 1994 MGA Zone 50

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4. Discussion and recommendations

4.1 Flora

A total of 167 taxa (165 native and one introduced) from 90 genera and 37 families were recorded within the survey area. Of these, 161 taxa were recorded from quadrats and five taxa were recorded from targeted and opportunistic collections. Average species richness per quadrat was 38.04 species, ranging from a low of 19 species at ELA12 to a high of 57 species at ELA02. Woodman (2013) recorded a range of species richness from 3 species to 47 species, demonstrating that the post fire regeneration for the current survey was very good. A species accumulation curve determined that approximately 88.93% of the flora species potentially present within the survey area were recorded, resulting in sufficient data to define and assess the presence, extent and significance of vegetation types within the survey area.

One Threatened flora species, *Paracaleana dixonii* (Endangered under the EPBC Act and Vulnerable under the BC Act) was recorded within the survey area from a database search and Woodman (2013). Eight flora species listed as Priority by DBCA were recorded within the survey area from the current field survey, including; *Micromyrtus rogeri* (P1), *Lasiopetalum ogilvieanum* (P1), *Guichenotia alba* (P3), *Mesomelaena stygia* subsp. *deflexa* (P3), *Stylidium drummondianum* (P3), *Banksia scabrella* (P4), *Eucalyptus macrocarpa* subsp. *elachantha* (P4), and *Stawellia dimorphantha* (P4).

Paracaleana dixonii is listed as Endangered under the EPBC Act and Vulnerable under the BC Act. Endangered species are taxa considered to be facing a very high risk of extinction in the wild. Vulnerable species are species considered to be facing a high risk of extinction in the wild in the medium-term future (Appendix A). *Paracaleana dixonii* is a tuberous, perennial herb of 0.09-0.2 m in the Orchidaceae family (DBCA and WAH 2020). It has yellow-brown flowers from October to December or January (DBCA and WAH 2020). This species is known from 74 records across a range of 190 km, from Dongara to Dandaragan (DBCA 2007-2020). It has previously been recorded from grey sand over granite (DBCA and WAH 2020).

A database search indicates that *Paracaleana dixonii* was recorded from one location (24 plants) in the current survey area in 2011. The species was recorded in the AcEbHh vegetation community, which is described as *Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland. *Paracaleana dixonii* was also recorded in Woodman (2013) from 174 locations, totalling 263 individuals. This species was recorded in vegetation type 7a, 7b, 8, 10, 11, 12 and 13a, which correspond to the AcEbHh, EtAhHh, AcDdMl and EtBaHh vegetation communities. Species such as *Paracaleana dixonii* are cryptic in nature and therefore although not recorded during the current survey, it's occurrence at this location cannot be completely discounted. In addition, it is recognised that factors such as the recent prescribed burn throughout the survey area may also influence this species emergence currently and in the future.

Micromyrtus rogeri is listed as P1 by DBCA. Priority 1 species are poorly known species that are known from one or a few locations (generally five or less) which are potentially at risk (Appendix A). *Micromyrtus rogeri* is a shrub of 0.2-0.4 m in the Myrtaceae family (DBCA and WAH 2020). It has white flowers from July to October (DBCA and WAH 2020). This species is currently known from 17 DBCA

records across a range of 175 km, from Dongara to Dandaragan (DBCA 2007-2020). It has previously been recorded from yellow-brown sandy soils, gravel, laterite, breakaways (DBCA and WAH 2020).

Within the survey area, *Micromyrtus rogeri* was recorded from 18-point locations, totalling 939 individuals. The species was recorded in the AcAhGp vegetation community, which is described as *Allocasuarina campestris* tall sparse shrubland over *Allocasuarina humilis*, *Hakea auriculata*, *Petrophile shuttleworthiana* mid open shrubland over *Gastrolobium plicatum* low open shrubland and *Ecdeiocolea monostachya*, *Schoenus armeria* low open sedgeland. *Micromyrtus rogeri* was also recorded in Woodman (2013) from 504 locations, totalling 17,174 individuals.

Lasiopetalum ogilvieanum is listed as P1 by DBCA. *Lasiopetalum ogilvieanum* is a shrub 0.45-1.5 m in the Malvaceae family (DBCA and WAH 2020). It has pink-white flowers from July to October (DBCA and WAH 2020). This species is currently known from 21 DBCA records across a range of 85 km, north and south of Dongara (DBCA 2007-2020). It has previously been recorded from white/grey or yellow sand, stony loam on undulating plains, lateritic rises (DBCA and WAH 2020).

Within the survey area, *Lasiopetalum ogilvieanum* was recorded from 21-point locations, totalling 100 individuals. The species was recorded in the EtAhHh vegetation community, which is described as *Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland. *Lasiopetalum ogilvieanum* was also recorded in Woodman (2013) from 26 locations, totalling 113 individuals.

Guichenotia alba is listed as P3 by DBCA. Priority 3 species are poorly-known 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 (Appendix A). *Guichenotia alba* is a slender, few-branched shrub 0.1-0.45 m in the Malvaceae family (DBCA and WAH 2020). It has white flowers from July to August (DBCA and WAH 2020). This species is currently known from 38 DBCA records across a range of 170 km from Dongara south (DBCA 2007-2020). It has previously been recorded from sandy and gravelly soils on low-lying flats (DBCA and WAH 2020).

Within the survey area, *Guichenotia alba* was recorded from 63-point locations, totalling 607 individuals. The species was recorded in the AcEbHh vegetation community, which is described as *Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland. *Guichenotia alba* was not recorded in Woodman (2013).

Mesomelaena stygia* subsp. *deflexa is listed as P3 by DBCA. *Mesomelaena stygia* subsp. *deflexa* is a tufted perennial grass-like or herb (sedge) 0.1-0.5 m in the Cyperaceae family (DBCA and WAH 2020). It has brown-black flowers March to October (DBCA and WAH 2020). This species is currently known from 29 DBCA records across a range of 70 km from Dongara south (DBCA 2007-2020). It has previously been recorded from white, grey or lateritic sand, clay, gravel (DBCA and WAH 2020).

Within the survey area, *Mesomelaena stygia* subsp. *deflexa* was recorded from 55-point locations, totalling 4,648 individuals. The species was recorded in the EtAhHh vegetation community, which is

described as *Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland. *Mesomelaena stygia* subsp. *deflexa* was also recorded in Woodman (2013) from 514 locations, totalling 21,527 individuals.

Stylidium drummondianum is listed as P3 by DBCA. *Stylidium drummondianum* is a rosetted perennial herb 0.05-0.22 m in the Stylidiaceae family (DBCA and WAH 2020). It has pink flowers August to October (DBCA and WAH 2020). This species is currently known from 40 DBCA records across a range of 175 km from Geraldton to Dongara (DBCA 2007-2020). It has previously been recorded from sand or clayey sand over laterite on upper hillslopes, breakaways in low heath, mallee shrubland (DBCA and WAH 2020).

Withing the survey area, *Stylidium drummondianum* was recorded from 10-point locations, totalling 54 individuals. The species was recorded in the EtAhHh, AcAhGp and AcEbHh vegetation communities. *Stylidium drummondianum* was also recorded in Woodman (2013) from 433 locations, totalling 9,294 individuals.

Banksia scabrella is listed as P4 by DBCA. Priority 4 species are described as Rare, Near Threatened and other species in need of monitoring (Appendix A). *Banksia scabrella* is a much branched, lignotuberous shrub 0.6-2 m in the Proteaceae family (DBCA and WAH 2020). It has yellow and cream flowers from September to December or January (DBCA and WAH 2020). This species is known from 53 DBCA records across a range of 110 km from Geraldton to Dongara (DBCA 2007-2020). It has previously been recorded from white, grey or yellow sand, sometimes with lateritic gravel, on sandplains and lateritic ridges (DBCA and WAH 2020).

Withing the survey area, *Banksia scabrella* was recorded from 485-point locations, totalling 10,776 individuals. The species was recorded in the EtAhHh vegetation community, which is described as *Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland. *Banksia scabrella* was also recorded in Woodman (2013) from 463 locations, totalling 7,668 individuals.

Eucalyptus macrocarpa* subsp. *elachantha is listed as P4 by DBCA. *Eucalyptus macrocarpa* subsp. *elachantha* is a spreading or sprawling mallee 0.8-4 m in the Myrtaceae family (DBCA and WAH 2020). It has smooth bark, grey over salmon pink, and red-pink flowers from August to September or November to December (DBCA and WAH 2020). This species is known from 73 DBCA records across a range of 230 km south of Geraldton to south of Dongara (DBCA 2007-2020). It has previously been recorded from white or grey sand over laterite on hillslopes, ridges and sandplains (DBCA and WAH 2020).

Within the survey area, *Eucalyptus macrocarpa subsp. elachantha* was recorded from one-point location, totalling ten individuals. The species was recorded in the AcEbHh vegetation community, which is described as *Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland. *Eucalyptus macrocarpa subsp. elachantha* was also recorded in Woodman (2013) from 121 locations, totalling 1,310 individuals.

Stawellia dimorphantha is listed as P4 by DBCA. *Stawellia dimorphantha* is a stilt-rooted perennial herb 0.05-0.2 m in the Hemerocallidaceae family (DBCA and WAH 2020). It has purple/cream flowers from June to November (DBCA and WAH 2020). This species is known from 67 DBCA records across a range of 90 km north and south of Dongara (DBCA 2007-2020). It has previously been recorded from white, grey and yellow sand (DBCA and WAH 2020).

Within the survey area, *Stawellia dimorphantha* was recorded from 45-point locations, totalling 298 individuals. The species was recorded in the AcDdMl vegetation community, which is described as *Allocasuarina campestris* tall isolated shrubs over *Daviesia divaricata*, *Conospermum boreale*, *Beaufortia elegans* mid open shrubland over *Melaleuca leuropoma*, *Hibbertia hypericoides* low open shrub over *Ecdeiocolea monostachya* low open sedgeland. *Stawellia dimorphantha* was not recorded in Woodman (2013).

A further 53 species were identified from the likelihood of occurrence assessment as possibly occurring within the survey area. Of these, 11 species were considered as likely to occur, and 25 considered as having the potential to occur, based on the species habitat preferences and proximity of records to the survey area. The remaining 17 species are considered unlikely to occur (Appendix C).

One introduced (weed) flora species was recorded as occurring within the survey area, *Hypochaeris glabra*. This species is not listed as a Weed of National Significance (WoNS) or Declared Pest under the State BAM Act, and is listed on the Western Australian Organism List (WAOL) database as s11 (permitted). This species was recorded at a low density (0.01%) within the AcEbHh, EtAhHh and EtBaHh vegetation communities from within quadrats ELA01, ELA08, ELA14, ELA21, ELA24. It is likely this weed is being spread within the survey area via the movement of cattle and other introduced fauna species.

4.2 Vegetation

A total of six vegetation communities were delineated and mapped across the survey area. The most widespread vegetation community was AcEbHh, which occurred across 34.02% (72.2 ha) of the survey area. The least common vegetation community was AcAhGp, which occurred across 2.59% (5.5 ha) of the survey area. Vegetation communities within the survey area are not inferred to represent any known TECs or PECs listed under the EPBC Act, BC Act or by DBCA. This is supported by Woodman (2013) which also found no conservation significant communities across a larger area.

At a regional scale, the percentage impact to Beard (1976) vegetation associations (49, 378 and 379) and land systems (Mount Adams and Correy) as a result of the project is low (DPIRD 2020). Each of these land systems is well represented across the broader landscape, with the survey area representing a small percentage of the current extent of each (0.2% and 0.1% respectively). At a local scale, impacts to individual communities as a result of the project is also low. Of particular note is vegetation community EtAhHh which comprises *Banksia scabrella* as the main component. This community is similar to Woodman (2013) mapped VT 13a, of which 1,740.14 ha was mapped. Therefore, it is unlikely that the proposed pipeline would appreciably reduce the representativeness of either vegetation associations in the local area or indeed at a regional scale.

Vegetation within the survey area was classed as being in Excellent condition (208.7 ha; 98.35%), with a total of 3.5 ha (1.65% of the survey area) classed as Cleared. Minor disturbances included minimal presence of weeds and feral fauna (rabbit diggings, scats).

The recent fire has altered the structural elements of vegetation communities present within the survey area. A strong post-fire recovery was observed, with the majority of flora species expected to occur being present. However, their relative dominance and strata position is slightly different to what would otherwise be expected in an unburnt or indeed longer time since fire environment. In addition, flora species with more rapid post-fire recovery strategies were naturally more dominant than those which take longer to re-establish. For example, species such as *Grevillea biformis* subsp. *biformis* and *Conostylis* spp. were present during the current survey, however in other previous surveys, these were not considered dominant components of the vegetation. Therefore, other vegetation community mapping work undertaken in the general vicinity of the survey area (Woodman 2013) shows similarities but does not reflect these descriptions entirely.

4.3 Fauna

A total of 35 fauna species (31 native and four introduced) were recorded within the survey area. This number comprised 28 bird species, five mammal species and two reptile species. Of these, four mammal species are introduced; Cattle (*Bos taurus*), domestic Dog (*Canis lupus familiaris*), Goat (*Capra hircus*) and European Rabbit (*Oryctolagus cuniculus*).

A total of four fauna habitats were identified within the survey area. The most commonly occurring fauna habitat was Fauna habitat 2: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sandy plains (89.5 ha; 44.15% of the survey area). Fauna habitat 3: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises (40.8 ha; 20.13% of the survey area) was found to be the least common fauna habitat type occurring within the survey area.

No direct (observations) or indirect (scats, tracks, diggings) evidence of conservation significant fauna species were recorded within the survey area. Of the 46 fauna species identified from the desktop assessment as possibly occurring within the survey area, four species were considered having the potential to occur; Carnaby's Cockatoo (*Calyptorhynchus latirostris*; listed as EN under the EPBC Act and BC Act), Fork-tailed Swift (*Apus pacificus;* listed as MI under the EPBC Act and BC Act), Grey Falcon (*Falco hypoleucos*; listed as VU under the BC Act) and Peregrine Falcon (*Falco peregrinus*; listed as OS under the BC Act). Each of these species has a diverse and wide range of habitats, including those which occur within the survey area. The remaining 42 species were considered unlikely to occur (Appendix D).

The Fork-tailed Swift (*Apus pacificus*), Grey Falcon (*Falco hypoleucos*) and Peregrine Falcon (*Falco peregrinus*) have a diverse and wide range of habitats, including those which occur within the survey area (e.g. grassland). However, these species are not considered likely to occur within the survey area due to lack of access to appropriate nesting habitat, water and preferred prey species.

No individuals of Carnaby's Cockatoo were recorded within the survey area. No potential or confirmed breeding or roosting trees were recorded as occurring within the survey area. The survey area is in the non-breeding range of the Carnaby's Cockatoo (*Calyptorhynchus latirostris*), however Fauna habitat 2, totalling 95.2 ha (44.86% of the survey area), was assessed as providing 'Low' quality foraging habitat due to the presence of *Banksia* spp. and *Hakea* spp. (**Table 3**; SEWPaC 2012; DotEE 2017). The recent fire has decreased the likelihood of the species utilising the survey area in the immediate future; however, *Banksia* spp. and *Hakea* spp. are predicted to increase in density quality and structural complexity over time. The remaining vegetated areas (113.6 ha, 53.53%) are considered as providing

'Negligible' quality foraging habitat of Carnaby's Cockatoo. Cleared areas (3.4 ha, 1.6%) provide 'Nil' quality foraging habitat for black cockatoo species. No foraging evidence was observed within the survey area.

Whilst the Malleefowl (*Leipoa ocellata*) was targeted in the survey area (Section 2.2.5), the habitat is not considered suitable for the species due to the lack of leaf litter and thicker vegetation. The recent fire has also decreased the likelihood of the species, as the effect of fire on Malleefowl is severe, with breeding in burnt areas usually reduced for at least 30 years (Benshemesh 2007).

The survey area broadly comprised a mixture of *Allocasuarina* shrubland, and *Banksia* or *Eucalyptus todtiana* woodland. Habitat within the survey area is unlikely to support conservation significant fauna species, except potentially low-quality foraging habitat for the Carnaby's Cockatoo (*Calyptorhynchus latirostris*). Based on results of the fauna survey and fauna values identified within the survey area, it is unlikely that the proposed pipeline would appreciably reduce or impact the representativeness of individual species or supporting habitat within the local area or across the broader landscape.

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Appendix A Framework for conservation significant flora and fauna ranking

CATEGORIES OF THREATENED SPECIES UNDER THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Species listed as 'conservation dependent' and 'extinct' are not Matters of National Environmental Significance and therefore do not trigger the EPBC Act.

Category	Definition
Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	Taxa considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxa considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxa considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status.
Not Evaluated (NE)	Taxa has not yet been evaluated against the criteria.
Migratory (MI)	Not an IUCN category. Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the People's Republic of China for the Protection of Migratory Birds and their environment (CAMBA); • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); or • the agreement between Australia and the Republic of Korea to develop a bilateral migratory bird agreement similar to the JAMBA and CAMBA in respect to migratory bird conservation and provides a basis for collaboration on the protection of migratory shorebirds and their habitat (ROKAMBA).

CONSERVATION CODES FOR WESTERN AUSTRALIA FLORA AND FAUNA

The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

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

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

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

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

Category	Code	Description
Critically Endangered species	CR	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
Endangered species	EN	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.

Category	Code	Description
Vulnerable species	VU	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species

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

Category	Code	Description
Extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.
Extinct in the wild species	EW	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

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

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

Categories are detailed below.

Category	Code	Description
Migratory species	MI	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Species of special conservation interest (conservation dependent fauna)	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Other specially protected species	OS	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

Priority species (P)

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

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. These species require regular monitoring.

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

Category	Code	Definition
Priority 1	P1	*Poorly-known species* Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	P2	*Poorly-known species* Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	P3	*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. Such species are in need of further survey.
Priority 4	P4	*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. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix B Likelihood of occurrence assessment criteria

Likelihood rating	Criteria
Recorded	The species has previously been recorded within survey area from DBCA database search results and/or from previous surveys of the survey area, and/or the species has been confirmed through a current vouchered specimen at WA Herbarium.
Likely	The species has not previously been recorded from within the survey area. However, (to qualify requires one or more criteria to be met): • the species has been recorded in close proximity to the survey area, and occurs in similar habitat to that which occurs within the survey area • core habitat and suitable landforms for the species occurs within the survey area either year-round or seasonally. In relation to fauna species, this could be that a host plant is seasonally present on site, or habitat features such as caves are present that may be used during particular times during its life cycle e.g. for breeding. In relation to both flora and fauna species, it may be there are seasonal wetlands present • there is a medium to high probability that a species uses the survey area.
Potential	The species has not previously been recorded from within the survey area. However, (one or more criteria requires to be met): • targeted surveys may locate the species based on records occurring in proximity to the survey area and suitable habitat occurring in the survey area • the survey area has been assessed as having potentially suitable habitat through habitat modelling • the species is known to be cryptic and may not have been detected despite extensive surveys • the species is highly mobile and has an extensive foraging range so may not have been detected during previous surveys The species has been recorded in the survey area by a previous consultant survey or there is historic evidence of species occurrence within the survey area. However, (one or more criteria requires to be met): • doubt remains over taxonomic identification, or the majority of habitat does not appear suitable (although presence cannot be ruled out due to factors such as species ecology or distribution) • coordinates are doubtful.
Unlikely	The species has been recorded locally through DBCA database searches. However, it has not been recorded within the survey area and • it is unlikely to occur due to the site lacking critical habitat, having at best marginally suitable habitat, and/or being severely degraded • it is unlikely to occur due to few historic record/s and no other current collections in the local area. The species has been recorded within the bioregion based on literature review but has not been recorded locally or within the survey area through DBCA database searches. The species has not been recorded in the survey area despite adequate survey efforts, such as a standardised methodology or targeted searching within potentially suitable habitat.

Likelihood rating	Criteria
Does not occur (one or more criteria requires to be met).	The species is not known to occur within the IBRA bioregion based on current literature and distribution. The conspicuous species has not been recorded in the survey area despite adequate survey efforts at an appropriate time of year to detect the species within potentially suitable habitat. The survey area lacks important habitat for a species that has highly selective habitat requirements. The species has been historically recorded within survey area or locally; however, it is considered locally extinct due to significant habitat changes such as land clearing and/or introduced predators.

Appendix C Flora likelihood of occurrence assessment

Species	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification for likelihood
	EPBC Act	BC Act / DBCA listing				
Chorizema humile	EN	CR	Sprawling, prostrate or decumbent shrub. Fl. yellow & red/brown, Jul to Sep. Sandy clay or loam. Plains.	DAWE 2020a	Potential	Some suitable habitat within the survey area.
Eucalyptus impensa	EN	CR	Straggly mallee, to 1.5 m high, bark smooth. Fl. pink, Jun to Jul. Yellow sand. Lateritic hills.	DAWE 2020a	Unlikely	Some suitable habitat within the survey area, however conspicuous species would have been observed if present.
Eucalyptus x balanites	EN	CR	Mallee to 5 m high, bark rough, flaky. Fl. white, Oct to Dec or Jan to Feb. Sandy soils with lateritic gravel.	Mattiske 2020	Unlikely	Some suitable habitat within the survey area, however conspicuous species would have been observed if present.
Hemiandra gardneri	EN	CR	Prostrate, pungent shrub, 0.1-0.2 m high, to 1 m wide. Fl. red/pink-red, Aug to Oct. Grey or yellow sand, clayey sand. Sandplains.	DAWE 2020a	Potential	Some suitable habitat within the survey area.
Daviesia speciosa	EN	EN	Many-stemmed shrub, 0.3-0.8 m high. Fl. red, Apr to May. Gravelly lateritic soils. Undulating plains, rises.	DAWE 2020a; DBCA 2020a	Unlikely	Appears to be locally restricted, but abundant when it occurs. Conspicuous species would have been observed if present.
Eucalyptus leprophloia	EN	EN	Mallee, 2-5(-8) m high, bark rough loose & flaky to 1 m. Fl. cream-white, Aug to Oct. White or grey sand over laterite. Valley slopes.	DBCA 2007-2020; DAWE 2020a; DBCA 2020a	Unlikely	A few records surrounding the survey area (DBCA 2020a). Also recorded from Woodman (2013). Suitable habitat within the survey area, however conspicuous species would have been observed if present.
Leucopogon obtectus	EN	EN	Erect shrub, 0.5-1.7 m high, cream-yellow, August to October, Grey sand.	DAWE 2020a	Potential	Suitable habitat within the survey area.
Thelymitra stellata	EN	EN	Tuberous, perennial, herb, 0.15-0.25 m high. Fl. yellow & brown, Oct to Nov. Sand, gravel, lateritic loam.	DAWE 2020a; DBCA 2020a	Potential	A few records surrounding the survey area (DBCA 2020a). Also recorded from Woodman (2013). Suitable habitat within the survey area.

Species	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification for likelihood
	EPBC Act	BC Act / DBCA listing				
Conostylis dielsii subsp. *teres*	EN	VU	Shortly rhizomatous, tufted perennial, grass-like or herb, 0.13-0.33 m high, leaves terete. Fl. cream-yellow, Jul to Aug. White, grey or yellow sand, gravel. Low open woodland.	DAWE 2020a	Unlikely	No suitable habitat within the survey area.
Conostylis micrantha	EN	VU	Rhizomatous, tufted perennial, grass-like or herb, 0.13-0.24 m high. Fl. yellow-cream/red, Jul to Aug. White or grey sand. Sandplains.	DAWE 2020a	Potential	Some suitable habitat within the survey area.
Hakea megalosperma	EN	VU	Spreading, lignotuberous shrub, 1-2 m high. Fl. white-cream/pink, May to Jun. Grey sand, loam. Lateritic hills & rocks.	DAWE 2020a	Unlikely	Marginal habitat within the survey area. Conspicuous species would have been observed if present
Paracaleana dixonii	EN	VU	Tuberous, perennial, herb, 0.09-0.2 m high. Fl. yellow-brown, Oct to Dec or Jan. Grey sand over granite.	DBCA 2007-2020; DAWE 2020a; DBCA 2020a	Likely	One record from within the survey area from 2011 and multiple records surrounding the survey area (DBCA 2020a). Also recorded from Woodman (2013). Suitable habitat within the survey area.
Wurmbea tubulosa	EN	VU	Cormous, perennial, herb, 0.01-0.03 m high, dioecious or sometimes andromonoecious. Fl. white-pink, Jun to Aug. Clay, loam. River banks, seasonally-wet places.	DAWE 2020a	Unlikely	No suitable habitat within the survey area.
Eucalyptus crispata	VU	EN	Mallee, 3-7 m high, bark rough on the trunk, in partly decorticated curls. Fl. yellow-cream, Mar to Jun. Sand, loam with lateritic gravel. Lateritic breakaways.	DAWE 2020a; DBCA 2020a	unlikely	One record 1.5 km to the east of the survey area (DBCA 2020a). Also recorded from Woodman (2013). Suitable habitat within the survey area. Conspicuous species would have been observed if present
Drosera pedicellaris	-	P1	Fibrous-rooted perennial, herb, to 0.15 m high. Fl. white, Oct to Nov. Deep beige sand.	DBCA 2020a	Unlikely	One record 11 km south-west of the survey area, towards the coast (DBCA 2020a). No suitable habitat within the survey area.
Lasiopetalum ogilvieanum	-	P1	Shrub, 0.45-1.5 m high. Fl. pink-white, Jul to Oct. White/grey or yellow sand, stony loam. Undulating plains, lateritic rises.	DBCA 2007-2020; DBCA 20202a	**Recorded**	Species was recorded within the survey area.

Species	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification for likelihood
	EPBC Act	BC Act / DBCA listing				
Malleostemon decipiens	-	P1	Grows on sandy soils.	DBCA 2020a	Potential	One record 4.5 km north of the survey area (DBCA 2020a). Also recorded from Woodman (2013). Some suitable habitat within the survey area.
Micromyrtus rogeri	-	P1	Shrub, 0.2-0.4 m high. Fl. white, Jul to Oct. Yellow-brown sandy soils, gravel, laterite. Breakaways.	DBCA 2007-2020; DBCA 2020a	**Recorded**	Species was recorded within the survey area
Stylidium carnosum subsp. Narrow leaves (J.A. Wege 490)	-	P1	Cormaceous perennial, herb (with basal leaf rosette), to 1 m high. Fl. white, Oct to Nov. Lateritic soils.	DBCA 2020a	Unlikely	One records 9.5 km south of the survey area (DBCA 2020a). No suitable habitat within the survey area.
Verticordia dasystylis subsp. oestopoia	-	P1	Spreading shrub, 0.1-0.4 m high. Fl. cream-yellow, Oct. Gritty soils over granite. Outcrops.	DBCA 2020a	Unlikely	One record 11 km south-east of the survey area on outcrops (DBCA 2020a). No suitable habitat within the survey area.
Acacia vittata	-	P2	Dense, rounded shrub, 1-4 m high. Fl. yellow, Aug. Grey sand, sandy clay. Margins of seasonal lakes.	DBCA 2020a	Unlikely	One record 8 km south of the survey area in 2006 (DBCA 2020a). No seasonal lakes in the survey area.
Calectasia palustris	-	P2	Stilt-rooted herb (undershrub), stems to 0.7 m high. Fl. blue, Jul to Oct. White or grey sand. Seasonally inundated swamplands.	DBCA 2020a	Unlikely	One record 8 km south of the survey area in 2007 (DBCA 2020a). No inundated swamplands in the survey area.
Comesperma griffinii	-	P2	Annual or perennial, herb, to 0.15 m high. Fl. white, Oct. Yellow or grey sand. Plains.	DBCA 2020a	Potential	Multiple records surrounding the survey area (DBCA 2020a). Some suitable habitat within the survey area.
Eucalyptus abdita	-	P2	Mallee or shrub, 2-3 m high, bark smooth, grey. Laterite, sandy clay with gravel over laterite. Slopes, breakaways.	DBCA 2020a	Potential	Records to the east of the survey area (DBCA 2020a). Also recorded from Woodman (2013). Suitable habitat within the survey area.

Species	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification for likelihood
	EPBC Act	BC Act / DBCA listing				
Homalocalyx chapmanii	-	P2	Shrub, 0.2-0.5 m high. Fl. red-pink-purple, Sep to Oct. Yellow or grey/brown sand. Undulating plains, weathered granite.	DBCA 2020a	Unlikely	One record 6.5 km south-east of the survey area, between the two watercourses of Arrowsmith River (DBCA 2020a).
Schoenus badius	-	P2	Slender annual, grass-like or herb (sedge), 0.05-0.12 m high. Fl. brown-green, Sep to Oct. Grey sand. Moist areas.	DBCA 2020a	Unlikely	Multiple records surrounding the survey area but in moist areas (DBCA 2020a). Also recorded from Woodman (2013). No suitable habitat within the survey area.
Synaphea sparsiflora	-	P2	Shrub, to 0.6 m high, to 1 m wide. Fl. yellow, Aug to Sep. Sandy loam over laterite.	DBCA 2020a	Potential	Two records 7 km east of the survey area (DBCA 2020a). Some suitable habitat within the survey area.
Stylidium pseudocaespitosum	-	P2	Rosetted perennial, herb, 0.1-0.3 m high, leaves tufted, linear, 2-7 cm long, 0.5-2 mm wide, apex subacute, margin entire, scabrous. Scape glabrous. Inflorescence racemose. Fl. yellow, Sep to Nov. White, grey or yellow sand over laterite. Breakaways and hillslopes.	DBCA 2007-2020; DBCA 2020a	Potential	One record 1.5 km south of the survey area, on top of a lateritic breakaway (DBCA 2020a). Also recorded from Woodman (2013). Some suitable habitat within the survey area.
Stylidium sp. Three Springs (J.A. Wege & C. Wilkins JAW 600)	-	P2		DBCA 2020a	Unlikely	One record 12 km south of the survey area, in breakaway country (DBCA 2020a). No suitable habitat within the survey area.
Acacia lanceolata	-	P3	Open, pungent shrub, 0.3-1.2(-1.5) m high. Fl. yellow. Lateritic hills & breakaways.	DBCA 2020a	Unlikely	One record 3.6 km north of the survey area, on top of a lateritic breakaway (DBCA 2020a). No suitable habitat within the survey area.
Allocasuarina grevilleoides	-	P3	Dioecious, lignotuberous shrub, 0.15-0.4 m high. Sand over laterite, gravel.	DBCA 2020a	Potential	One record 5 km south-east of the survey area (DBCA 2020a). Also recorded from Woodman (2013). Suitable habitat within the survey area.
Austrostipa sp. Cairn Hill (A.S. George 11249)	-	P3	Perennial grass to 50 cm with pubescent leaves. Simple slope, grey light clay soil with <2% of limestone coarse fragments up to 20 mm.	DBCA 2020a	Unlikely	No suitable habitat within the survey area.

Species	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification for likelihood
	EPBC Act	BC Act / DBCA listing				
Baeckea sp. Walkaway (A.S. George 11249)	-	P3	Dense, multi-stemmed shrub, 0.5-2 m high. Fl. white, Dec or Jan. Yellow/brown or white sand. Undulating plains, hillslopes.	DBCA 2020a	Potential	Three records from 6 km north-west of the survey area (DBCA 2020a). Some suitable habitat within the survey area.
Banksia fraseri var. *crebra*	-	P3	Shrub, 0.3-4 m high, cream, pale-golden yellow & brown, July to August, Sand, gravelly clay loam, lateritic soil. Sandplains, shallow valleys, slopes.	DBCA 2007-2020; DBCA 2020a	Potential	Multiple records to the south of the survey area (DBCA 2020a). Some suitable habitat within the survey area.
Beyeria gardneri	-	P3	Shrub, 0.25-0.5 m high. Fl. yellow, Aug to Sep. Yellow sand.	DBCA 2007-2020; DBCA 2020a	Potential	Multiple records to the south of the survey area (DBCA 2020a). Some suitable habitat within the survey area.
Comesperma rhadinocarpum	-	P3	Perennial, herb. Fl. blue, Oct to Nov. Sandy soils.	DBCA 2007-2020; DBCA 2020a	Potential	One record less than 1 km south of the survey area (DBCA 2020a). Some suitable habitat within the survey area.
Eucalyptus macrocarpa x pyriformis	-	P3	Erect, open mallee tree, 1.2-6 m high. Fl. red, Apr or Aug to Oct. Sand, lateritic sandy soils. Hills, rocky ironstone ridges, sandplains.	DBCA 2007-2020	Unlikely	Recorded from Woodman (2013). Suitable habitat within the survey area., however conspicuous species would have been observed if present
Guichenotia alba	-	P3	Slender, lax, few-branched shrub, 0.1-0.45 m high. Fl. white, Jul to Aug. Sandy & gravelly soils. Low-lying flats, depressions.	DBCA 2007-2020; DBCA 2020a	**Recorded**	Species was recorded within the survey area
Hemiandra sp. Eneabba (H. Demarz 3687)	-	P3	Straggly, erect shrub, 0.5-0.9 m high, to 0.4 m wide. Fl. blue/violet, Feb. Sand. Disturbed sites.	DBCA 2020a	Potential	Multiple records surrounding the survey area (DBCA 2020a). Also recorded from Woodman (2013). Some suitable habitat within the survey area.
Hensmania stoniella	-	P3	Tufted, stilt-rooted perennial, herb, 0.1-0.2 m high. Fl. yellow-cream-white, Sep to Nov. White, grey or lateritic sand, often winter-wet.	DBCA 2020a	Unlikely	One record 6.5 km south-east of the survey area (DBCA 2020a). No suitable habitat within the survey area.

Species	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification for likelihood
	EPBC Act	BC Act / DBCA listing				
Hypocalymma gardneri	-	P3	Shrub, to 0.3 m high. Fl. yellow, Aug to Sep. Grey-brown sand, laterite. Sandplains, upper slopes, heathland.	DBCA 2020a	Unlikely	One record 4.5 km south of the survey area (DBCA 2020a). No suitable habitat within the survey area.
Melaleuca sclerophylla	-	P3	Erect-spreading to prostrate shrub, 0.15-0.9 m high. Fl. purple-pink, Jun to Sep. Gravelly sand, clayey sand. Granite outcrops, rises.	DBCA 2020a	Unlikely	One record 8 km south-east of the survey area (DBCA 2020a). No suitable habitat within the survey area.
Mesomelaena stygia subsp. *deflexa*	-	P3	Tufted perennial, grass-like or herb (sedge), 0.1-0.5 m high. Fl. brown-black, Mar to Oct. White, grey or lateritic sand, clay, gravel.	DBCA 2007-2020; DBCA 2020a	**Recorded**	Species was recorded within the survey area
Persoonia chapmaniana	-	P3	Erect, spreading shrub, 1-2 m high. Fl. yellow, Sep to Nov. White sandy clay, yellow sand. Vicinity of salt lakes.	DBCA 2020a	Unlikely	One record 8 km south of the survey area in coastal areas (DBCA 2020a). No suitable habitat within the survey area.
Persoonia filiformis	-	P3	Erect, spreading, lignotuberous shrub, 0.07-0.4 m high. Fl. yellow, Nov to Dec. Yellow or white sand over laterite.	DBCA 2007-2020; DBCA 2020a	Potential	Multiple records to the west of the survey area (DBCA 2020a). Also recorded from Woodman (2013). Suitable habitat within the survey area.
Persoonia rudis	-	P3	Erect, often spreading shrub, 0.2-1 m high. Fl. yellow, Sep to Dec or Jan. White, grey or yellow sand, often over laterite.	DBCA 2020a	Potential	Multiple records to the west of the survey area (DBCA 2020a). Also recorded from Woodman (2013). Some suitable habitat within the survey area.
Stylidium drummondianum	-	P3	Rosetted perennial, herb, 0.05-0.22 m high, Leaves narrowly oblanceolate, 0.5-3 cm long, 0.8-2 mm wide, apex mucronate, margin hyaline and serrulate, glabrous. Scape hoary. Inflorescence paniculate. Fl. pink, Aug to Oct. Sand or clayey sand over laterite. Upper hillslopes, breakaways. Low heath, mallee shrubland.	DBCA 2007-2020; DBCA 2020a	**Recorded**	Species was recorded within the survey area
Stylidium torticarpum	-	P3	Caespitose perennial, herb, 0.12-0.27 m high, Leaves tufted, broadly linear, (2-) 5-13 cm long, 0.6-1.5 mm wide, apex mucronate, margin hyaline and serrulate, glabrous.	DBCA 2020a	Unlikely	Two records to the east of the survey area (DBCA 2020a). Also recorded from Woodman

Species	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification for likelihood
	EPBC Act	BC Act / DBCA listing				
			Scape glandular throughout. Inflorescence paniculate. Capsule twisted. Fl. pink, Sep to Nov. Sandy clay and clay loam over laterite. Adjacent to creeklines, depressions, and beneath breakaways. Heath or mallee shrubland.			(2013). Nosuitable habitat within the survey area.
Synaphea oulopha	-	P3	Compact shrub, ca 0.2 m high. Fl. yellow, Jul to Oct. Grey sand, gravelly loam, clay. Lateritic breakaways & rises.	DBCA 2020a	Potential	One record 4 km north-east of the survey (DBCA 2020a). Also recorded from Woodman (2013). Some suitable habitat within the survey area.
Thryptomene nitida	-	P3	Spreading shrub to 0.8 m tall, 1-1.5 m wide; flowers pale pink/mauve.	DBCA 2020s	Unlikely	Several records 7.5 km north of the survey area along creeklines (DBCA 2020a). No suitable habitat within the survey area.
Thysanotus vernalis	-	P3	Perennial, herb (with tuberous roots), to 0.3 m high. Fl. purple, Sep to Oct. Sandy loam.	DBCA 2020a	Potential	One record 7.5 km east of the survey area (DBCA 2020a). Some suitable habitat within the survey area.
Verticordia densiflora var. roseostella	-	P3	Open shrub, 0.4-1.3 m high. Fl. pink-white, Sep to Dec. Sandy gravelly soils.	DBCA 2020a	Unlikely	One record 9 km east of the survey area on gravelly soils (DBCA 2020a). No suitable habitat within the survey area.
Verticordia luteola var. luteola	-	P3	Slender shrub, 0.5-1.4 m high. Fl. white-yellow, Nov to Dec. Grey sand over gravel. Flats.	DBCA 2020a	Potential	Multiple records surrounding the survey area (DBCA 2020a). Also recorded from Woodman (2013). Some suitable habitat within the survey area.
Banksia elegans	-	P4	Shrub (with fire-tolerant rootstock, often suckering), 1-4 m high. Fl. yellow/green-yellow, Oct to Nov. Yellow, white or red sand. Sandplains, low consolidated dunes.	DBCA 2020a	Potential	Multiple records to the west of the survey area (DBCA 2020a). Suitable habitat within the survey area.
Banksia scabrella	-	P4	Much-branched, lignotuberous shrub, 0.6-2 m high. Fl. yellow & cream & purple, Sep to Dec or Jan. White, grey or yellow sand, sometimes with lateritic gravel. Sandplains, lateritic ridges.	DBCA 2007-2020	**Recorded**	Species was recorded within the survey area

Species	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification for likelihood
	EPBC Act	BC Act / DBCA listing				
Calytrix chrysantha	-	P4	Shrub, 0.3-1.3 m high. Fl. yellow, Dec or Jan to Feb. White, grey or yellow/brown sand. Flats.	DBCA 2020a	Potential	One record 3.5 km south of the survey area (DBCA 2020a). Also recorded from Woodman (2013). Some suitable habitat within the survey area.
Eucalyptus macrocarpa subsp. *elachantha*	-	P4	(Spreading or sprawling mallee), 0.8-4 m high, bark smooth, grey over salmon pink. Fl. red-pink, Aug to Sep or Nov to Dec. White or grey sand over laterite. Hillslopes, ridges, sandplains.	DBCA 2007-2020; DBCA 2020a	**Recorded**	Species was recorded within the survey area
Eucalyptus zopherophloia	-	P4	Spreading mallee, 2.5-4(-6) m high, bark rough, fibrous. Fl. cream-white, Oct to Dec or Jan. Grey/white sand with limestone rubble. Coastal areas.	DBCA 2020a	Unlikely	One record 5.5 km west of the survey area in coastal areas (DBCA 2020a). No suitable habitat within the survey area.
Pityrodia viscida	-	P4	Viscid shrub, 0.3-0.6(-1) m high. Fl. white, Sep to Dec or Jan to Feb. Lateritic sand.	DBCA 2020a	Potential	One record 7.5 km north of the survey area in coastal areas (DBCA 2020a). Some suitable habitat within the survey area.
Schoenus griffinianus	-	P4	Small, tufted perennial, grass-like or herb (sedge), to 0.1 m high. Fl. Sep to Oct. White sand.	DBCA 2020a	Unlikely	One record 5 km south of the survey area (DBCA 2020a). No suitable habitat within the survey area.
Stawellia dimorphantha	-	P4	Stilt-rooted perennial, herb, 0.05-0.2 m high. Fl. purple/cream, Jun to Nov. White, grey, yellow sand.	DBCA 2007-2020; DBCA 2020a	**Recorded**	Species was recorded within the survey area

[1]DBCA (2007-2020), DAWE 2020c

[2]DBCA (2020a); NatureMap (DBCA 2007-2020); PMST (DAWE 2020a)

Appendix D Fauna likelihood of occurrence assessment

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Calidris ferruginea	Curlew Sandpiper	CR, MI	MI	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.	DAWE 2020a; DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Numenius madagascariensis	Eastern Curlew	CR, MI	MI	Within Australia, the Eastern Curlew has a primarily coastal distribution. During the non-breeding season in Australia, the eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass (Zosteraceae). Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes within the mangroves.	DAWE 2020a	Unlikely	No suitable habitat for this species within the survey area.
Calyptorhynchus latirostris	Carnaby's Cockatoo	EN	EN	Carnaby's Cockatoo is endemic to, and widespread in, the south-west of Western Australia. It occurs from the wheatbelt, in areas that receive between 300 and 750 mm of rainfall annually, across to wetter regions in the extreme south-west, including the Swan Coastal Plain and the southern coast. Its range extends from Cape Arid in the south-east to Kalbarri in the north, and inland to Hatter Hill, Gibb Rock, Narembeen, Noongar, Wongan Hills, Nugadong, near Perenjori, Wilroy and Nabawa.	DAWE 2020a; DBCA 2020b	Potential	The survey area occurs within the modelled non-breeding range (SEWPaC 2012). This species may utilise the survey area for foraging habitat.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Rostratula australis	Australian Painted Snipe	EN	EN	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. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum *Muehlenbeckia* or canegrass or sometimes tea-tree (*Melaleuca*).	DAWE 2020a	Unlikely	No suitable habitat for this species within the survey area.
Parantechinus apicalis	Dibbler	EN	EN	The Dibbler is currently restricted to the Western Australian coastline near Jurien on three small offshore islands (Boullanger, Whitlock and Escape Islands), and a small number of widely scattered mainland sites. Dibblers seem to prefer vegetation with a dense canopy greater than 1 m high which has been unburnt for at least 10 years or more. In some locations, the presence of Proteaceous and Myrtaceous flowering shrubs may also be important.	DAWE 2020a	Unlikely	No suitable habitat for this species within the survey area.
Egernia stokesii badia	Western Spiny-tailed Skink	EN	VU	The Western Spiny-tailed Skink is known to occur in a broad semi-arid area in south-west WA, between Shark Bay and Minnivale and east to Cue (DEC 2012). Most records of the brown form Western Spiny-tailed Skink are in York Gum (*Eucalyptus loxophleba*) woodland.	DAWE 2020a; DBCA 2020b	Unlikely	The survey area occurs within the 'species or species habitat may occur' distribution (DAWE 2020c). No suitable habitat (i.e., *Eucalyptus loxophleba*) for this species was found within the survey area. The closest records are from >40 km east of the survey area.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Idiosoma nigrum	Shield-backed trapdoor spider	EN	VU	The Shield-backed trapdoor spider is endemic to semi-arid south-west Western Australia (WA). It occurs in a number of severely fragmented populations in the central and northern Wheatbelt and more arid areas in the Midwest.	DBCA 2020b	Unlikely	The survey area occurs just outside the 'species or species habitat may occur' distribution (DAWE 2020c). One previous record 45 km south of the survey area (From 1987).
Calidris canutus	Red Knot	EN, MI	MI	In Australasia the Red Knot mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps.	DAWE 2020a	Unlikely	No suitable habitat for this species within the survey area.
Anous tenuirostris melanops	Australian Lesser Noddy	VU	EN	The Australian Lesser Noddy is a marine bird known from tropical and subtropical waters.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Dasyurus geoffroii	Chuditch, western quoll	VU	VU	The Chuditch previously occurred throughout arid and semi arid Australia, but is now restricted to south-west Western Australia. During the day it mostly rests in hollow logs or earth burrows. It primarily forages on the ground at night, although can be active during the day during the breeding season or during bad weather. It may eat any animal smaller than a rabbit and they can climb trees when hunting or escaping predators.	DAWE 2020a; DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Leipoa ocellata	Malleefowl	VU	VU	The Malleefowl is found in semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and/or acacias. A sandy substrate and abundance of leaf litter are required for breeding (Benshemesh 2007).	DAWE 2020a; DBCA 2020b	Unlikely	Whilst the survey area occurs in the 'species or species habitat likely to occur' distribution (DAWE 2020c) and DBCA (2020b) records surround the survey area (closest 17 km south-west by the coast), habitat within the survey area is not suitable for this species. The survey area has also been recently burnt.
Sternula nereis nereis	Australian Fairy Tern	VU	VU	The Fairy Tern (Australian) nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation.	DAWE 2020a	Unlikely	No suitable habitat for this species within the survey area.
Limosa lapponica	Bar-tailed Godwit	MI	VU	The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Actitis hypoleucos	Common Sandpiper	MI	MI	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. Generally the species forages in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots.	DAWE 2020a; DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Apus pacificus	Fork-tailed Swift	MI	MI	In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines.	DAWE 2020a; DBCA 2020b	Potential	This species has a wide range and utilises a variety of habitat types. Potentially suitable habitat occurs within the survey area.
Ardenna pacifica	Wedge-tailed Shearwater	MI	MI	The Wedge-tailed Shearwater is a pelagic, marine bird known from tropical and subtropical waters.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Arenaria interpres	Ruddy Turnstone	MI	MI	In Australasia, the Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. It can, however, be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Calidris acuminata	Sharp-tailed Sandpiper	MI	MI	They forage at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water. Roosting occurs at the edges of wetlands, on wet open mud or sand, in shallow water, or in short sparse vegetation, such as grass or saltmarsh.	DAWE 2020a; DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Calidris melanotos	Pectoral Sandpiper	MI	MI	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	DAWE 2020a	Unlikely	No suitable habitat for this species within the survey area.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Calidris ruficollis	Red-necked Stint	MI	MI	In Australasia, the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Hydroprogne caspia	Caspian Tern	MI	MI	The Caspian Tern is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Motacilla cinerea	Grey Wagtail	MI	MI	This species inhabits fast-flowing mountain streams and rivers with riffles and exposed rocks or shoals, often in forested areas. It is also found in more lowland watercourses, even canals, where there are artificial waterfalls, weirs, millraces or lock gates.	DAWE 2020a	Unlikely	No suitable habitat for this species within the survey area.
Pandion haliaetus	Osprey	MI	MI	Ospreys are found on the coast and in terrestrial wetlands of tropical and temperate Australia and off-shore islands, occasionally ranging inland along rivers, though mainly in the north of the country.	DAWE 2020a	Unlikely	No suitable habitat for this species within the survey area.
Plegadis falcinellus	Glossy Ibis	MI	MI	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. The species is occasionally found in coastal locations such as estuaries, deltas, saltmarshes and coastal lagoons.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Pluvialis squatarola	Grey Plover	MI	MI	Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Sterna dougallii	Roseate Tern	MI	MI	The Roseate Tern occurs in coastal and marine areas in subtropical and tropical seas. The species inhabits rocky and sandy beaches, coral reefs, sand cays and offshore islands. Birds rarely occur in inshore waters or near the mainland, usually venturing into these areas only accidentally, when nesting islands are nearby.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Thalasseus bergii	Crested Tern	MI	MI	Coastal bays and inlets, lakes and large rivers.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Tringa brevipes	Grey-tailed Tattler	MI	MI	The Grey-tailed tattler is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide. It has been found around shores of rock, shingle, gravel or shells and also on intertidal mudflats in embayments, estuaries and coastal lagoons, especially fringed with mangroves.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Tringa glareola	Wood Sandpiper	MI	MI	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.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Tringa nebularia	Common Greenshank	MI	MI	The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. Habitats include embayments, harbours, river estuaries, deltas and lagoons and are recorded less often in round tidal pools, rock-flats and rock platforms.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Tringa stagnatilis	Marsh Sandpiper, little greenshank	MI	MI	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. In north Australia they prefer intertidal mudflats.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Xenus cinereus	Terek Sandpiper	MI	MI	Preferring to roost in or among mangroves. The Terek Sandpiper mostly forages in the open, on soft wet intertidal mudflats or in sheltered estuaries, embayments, harbours or lagoons. The species has also been recorded on islets, mudbanks, sandbanks and spits, and near mangroves and occasionally in samphire.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Falco hypoleucos	Grey Falcon	-	VU	The species frequents timbered lowland plains, particularly acacia shrublands that are crossed by tree-lined water courses. The species has been observed hunting in treeless areas and frequents tussock grassland and open woodland, especially in winter.	DAWE 2020a	Potential	This species has a wide range and utilises a variety of habitat types. Potentially suitable habitat occurs within the survey area.
Pandion cristatus	Eastern Osprey	-	MI	Ospreys are found on the coast and in terrestrial wetlands of tropical and temperate Australia and off-shore islands, occasionally ranging inland along rivers, though mainly in the north of the country.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Falco peregrinus	Peregrine Falcon	-	OS	The Peregrine Falcon is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water, and may even be found nesting on high city buildings.	DBCA 2020b	Potential	This species has a wide range and utilises a variety of habitat types. Potentially suitable habitat occurs within the survey area.
Phascogale tapoatafa wambenger	South-western Brush-tailed Phascogale, wambenger	-	CD	The Brush-tailed Phascogale has a widespread but fragmented distribution throughout all states of Australia.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Aspidites ramsayi (southwest subpop.)	Woma	-	P1	Woma pythons are found in the arid regions of central Australia and in the south-west of Western Australia, near Shark Bay. By day, they shelter in hollow logs and burrows.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Idiosoma kwongan	Kwongan heath shield-backed trapdoor spider	-	P1	No habitat information available for this species.	DBCA 2020b	Unable to determine	Records are from the 1980's, 45 km south of the survey area.
Hemisaga vepreculae	Thorny bush katydid (Moora)	-	P2	No habitat information available for this species.	DBCA 2020b	Unable to determine	Record is from the 1980's, 38 km south of the survey area.
Neelaps calonotos	Black-striped snake	-	P3	The Black-striped snake is found in Banksia woodlands and sandy areas.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Hylaeus globuliferus	Woolybush bee	-	P3	No habitat information available for this species.	DBCA 2020b	Unable to determine	Records are from 28 km south of the survey area.

Species	Common name	Conservation status		Habitat[1]	Source[2]	Likelihood of occurrence	Justification
		EPBC Act	BC Act / DBCA listing				
Idiosoma arenaceum	Geraldton Sandplain shield-backed trapdoor spider	-	P3	No habitat information available for this species.	DBCA 2020b	Unable to determine	Records are from the 1950's, 35 km north-east of the survey area.
Phasmodes jeeba	Springtime corroboree stick katydid (Eneabba)	-	P3	No habitat information available for this species.	DBCA 2020b	Unable to determine	Record is from the 1980's.
Notamacropus irma	Western Brush Wallaby	-	P4	The Western Brush Wallaby's optimum habitat is open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Oxyura australis	Blue-billed Duck	-	P4	The Blue-billed Duck is endemic to Australia, being found in the temperate wetlands of the south-east and south-west parts of the continent.	DBCA 2020b	Unlikely	No suitable habitat for this species within the survey area.
Synemon gratiosa	Graceful sunmoth	-	P4	The sunmoth is only known from two general vegetation types; open areas of herbland, heathland and shrubland on secondary Quindalup dunes containing *Lomandra maritima* and banksia woodland with *L. hermaphrodita*.	DBCA 2020b	Unlikely	All records are from 50 km south-west near Leeman. No suitable habitat (i.e., *Lomandra maritima* or *L. hermaphrodita*) for this species was found within the survey area.

[1]DAWE 2020c (unless otherwise referenced)

[2]DBCA (2020b); PMST (DAWE 2020a)

Appendix E Flora species list

Family	Species	DBCA listing	Method
Amaranthaceae	*Gompholobium tomentosum*		Quadrat
Amaranthaceae	*Ptilotus manglesii*		Quadrat
Anarthriaceae	*Lyginia imberbis*		Quadrat
Araliaceae	*Trachymene pilosa*		Quadrat
Asparagaceae	*Acanthocarpus* sp. Ajana (C.A. Gardner 8596)		Quadrat
Asparagaceae	*Lomandra hastilis*		Quadrat
Asteraceae	**Hypochaeris glabra*		Quadrat
Asteraceae	*Podotheca angustifolia*		Quadrat
Asteraceae	*Pterochaeta paniculata*		Quadrat
Asteraceae	*Waitzia acuminata* var. *acuminata*		Quadrat
Asteraceae	*Waitzia suaveolens* var. *suaveolens*		Quadrat
Boraginaceae	**Echium plantagineum*		Opportunistic
Boryaceae	*Borya sphaerocephala*		Quadrat
Casuarinaceae	*Allocasuarina campestris*		Quadrat
Casuarinaceae	*Allocasuarina humilis*		Quadrat
Casuarinaceae	*Allocasuarina microstachya*		Quadrat
Celastraceae	*Stackhousia monogyna*		Quadrat
Celastraceae	*Tripterococcus brunonis*		Quadrat
Colchicaceae	*Burchardia congesta*		Quadrat
Cyperaceae	*Caustis dioica*		Quadrat
Cyperaceae	*Chaetospora curvifolia*		Quadrat
Cyperaceae	*Mesomelaena pseudostygia*		Quadrat
Cyperaceae	*Mesomelaena stygia* subsp. *deflexa*	P3	Quadrat
Cyperaceae	*Schoenus armeria*		Quadrat
Cyperaceae	*Schoenus clandestinus*		Quadrat
Cyperaceae	*Schoenus nanus*		Quadrat
Cyperaceae	*Schoenus pleiostemoneus*		Quadrat
Cyperaceae	*Schoenus* sp.		Quadrat
Dilleniaceae	*Hibbertia hypericoides*		Quadrat
Dilleniaceae	*Hibbertia spicata*		Quadrat
Dilleniaceae	*Hibbertia subvaginata*		Quadrat
Droseraceae	*Drosera erythrorhiza*		Quadrat
Droseraceae	*Drosera macrantha*		Quadrat

Family	Species	DBCA listing	Method
Droseraceae	*Drosera menziesii*		Quadrat
Droseraceae	*Drosera porrecta*		Quadrat
Ecdeiocoleaceae	*Ecdeiocolea monostachya*		Quadrat
Ericaceae	*Styphelia hamulosa*		Quadrat
Ericaceae	*Styphelia microdonta*		Quadrat
Euphorbiaceae	*Beyeria gardneri*		Quadrat
Euphorbiaceae	*Monotaxis bracteata*		Quadrat
Fabaceae	*Acacia blakelyi*		Quadrat
Fabaceae	*Acacia dilatata*		Quadrat
Fabaceae	*Acacia pulchella*		Quadrat
Fabaceae	*Acacia* sp.		Quadrat
Fabaceae	*Acacia stenoptera*		Quadrat
Fabaceae	*Acacia tetragonaphylla*		Quadrat
Fabaceae	*Chorizema aciculare* subsp. *laxum*		Quadrat
Fabaceae	*Daviesia divaricata*		Quadrat
Fabaceae	*Daviesia incrassata* subsp. *teres*		Quadrat
Fabaceae	*Daviesia pedunculata*		Quadrat
Fabaceae	*Gastrolobium calycinum*		Quadrat
Fabaceae	*Gastrolobium plicatum*		Quadrat
Fabaceae	*Gastrolobium spinosum*		Quadrat
Fabaceae	*Isotropis cuneifolia*		Quadrat
Fabaceae	*Isotropis drummondii*		Quadrat
Fabaceae	*Jacksonia angulata*		Quadrat
Fabaceae	*Jacksonia hakeoides*		Quadrat
Fabaceae	*Mirbelia trichocalyx*		Quadrat
Goodeniaceae	*Dampiera alata*		Quadrat
Goodeniaceae	*Dampiera altissima*		Quadrat
Goodeniaceae	*Lechenaultia biloba*		Quadrat
Goodeniaceae	*Lechenaultia hirsuta*		Opportunistic
Goodeniaceae	*Lechenaultia linarioides*		Quadrat
Goodeniaceae	*Scaevola canescens*		Quadrat
Goodeniaceae	*Scaevola glandulifera*		Quadrat
Gyrostemonaceae	*Gyrostemon racemiger*		Quadrat
Gyrostemonaceae	*Tersonia cyathiflora*		Quadrat
Haemodoraceae	*Anigozanthos humilis* subsp. *humilis*		Quadrat
Haemodoraceae	*Conostylis aculeata*		Quadrat

Family	Species	DBCA listing	Method
Haemodoraceae	*Conostylis candicans*		Quadrat
Haemodoraceae	*Conostylis canteriata*		Quadrat
Haemodoraceae	*Conostylis dielsii* subsp. *dielsii*		Opportunistic
Haemodoraceae	*Conostylis* sp.		Quadrat
Haloragaceae	*Glischrocaryon angustifolium*		Opportunistic
Hemerocallidaceae	*Dianella revoluta*		Quadrat
Hemerocallidaceae	*Johnsonia pubescens* subsp. *pubescens*		Quadrat
Hemerocallidaceae	*Stawellia dimorphantha*	P4	Targeted search
Iridaceae	*Patersonia occidentalis*		Quadrat
Lamiaceae	*Hemiandra rubriflora*		Quadrat
Lamiaceae	*Quoya verbascina*		Quadrat
Loranthaceae	*Nuytsia floribunda*		Quadrat
Malvaceae	*Guichenotia alba*	P3	Targeted search
Malvaceae	*Guichenotia sarotes*		Quadrat
Malvaceae	*Lasiopetalum drummondii*		Quadrat
Malvaceae	*Lasiopetalum ogilvieanum*	P1	Quadrat
Montiaceae	*Calandrinia corrigioloides*		Quadrat
Myrtaceae	*Babingtonia camphorosmae*		Quadrat
Myrtaceae	*Beaufortia elegans*		Quadrat
Myrtaceae	*Calothamnus blepharospermus*		Quadrat
Myrtaceae	*Calothamnus quadrifidus* subsp. *angustifolius*		Quadrat
Myrtaceae	*Calothamnus sanguineus*		Quadrat
Myrtaceae	*Calytrix depressa*		Quadrat
Myrtaceae	*Calytrix* sp.		Quadrat
Myrtaceae	*Darwinia speciosa*		Quadrat
Myrtaceae	*Eremaea beaufortioides*		Quadrat
Myrtaceae	*Eremaea* sp.		Quadrat
Myrtaceae	*Eremaea violacea*		Quadrat
Myrtaceae	*Eucalyptus macrocarpa* subsp. *elachantha*	P4	Targeted search
Myrtaceae	*Eucalyptus todtiana*		Quadrat
Myrtaceae	*Hypocalymma hirsutum*		Quadrat
Myrtaceae	*Hypocalymma* sp.		Quadrat
Myrtaceae	*Leptospermum oligandrum*		Quadrat
Myrtaceae	*Leptospermum spinescens*		Quadrat
Myrtaceae	*Melaleuca aspalathoides*		Quadrat
Myrtaceae	*Melaleuca* sp.		Quadrat

Family	Species	DBCA listing	Method
Myrtaceae	*Melaleuca leuropoma*		Quadrat
Myrtaceae	*Micromyrtus rogeri*	P1	Targeted search
Myrtaceae	*Scholtzia laxiflora*		Quadrat
Myrtaceae	*Verticordia grandis*		Quadrat
Orchidaceae	*Caladenia brunonis*		Quadrat
Orchidaceae	*Caladenia flava*		Quadrat
Orchidaceae	*Cyanicula gemmata*		Quadrat
Orchidaceae	*Diuris* sp.		Opportunistic
Orchidaceae	*Leporella fimbriata*		Quadrat
Orchidaceae	*Thelymitra campanulata*		Quadrat
Orchidaceae	*Thysanotus dichotomus*		Quadrat
Orchidaceae	*Thysanotus multiflorus*		Quadrat
Orchidaceae	*Thysanotus patersonii*		Quadrat
Orchidaceae	*Thysanotus* sp.		Quadrat
Poaceae	*Austrostipa macalpinei*		Quadrat
Poaceae	*Neurachne alopecuroidea*		Quadrat
Proteaceae	*Banksia attenuata*		Quadrat
Proteaceae	*Banksia carlinoides*		Quadrat
Proteaceae	*Banksia dallanneyi* subsp. *media*		Quadrat
Proteaceae	*Banksia fraseri* var. *fraseri*		Quadrat
Proteaceae	*Banksia prionotes*		Quadrat
Proteaceae	*Banksia scabrella*	P4	Quadrat
Proteaceae	*Banksia sessilis*		Quadrat
Proteaceae	*Banksia shuttleworthiana*		Quadrat
Proteaceae	*Conospermum boreale*		Quadrat
Proteaceae	*Conospermum stoechadis*		Quadrat
Proteaceae	*Grevillea biformis*		Quadrat
Proteaceae	*Grevillea leucopteris*		Quadrat
Proteaceae	*Grevillea shuttleworthiana* subsp. *canarina*		Quadrat
Proteaceae	*Grevillea synapheae*		Quadrat
Proteaceae	*Hakea auriculata*		Quadrat
Proteaceae	*Hakea candolleana*		Quadrat
Proteaceae	*Hakea incrassata*		Quadrat
Proteaceae	*Hakea lissocarpha*		Quadrat
Proteaceae	*Hakea* sp. 1		Quadrat
Proteaceae	*Hakea* sp. 2		Quadrat

Family	Species	DBCA listing	Method
Proteaceae	*Hakea stenocarpa*		Quadrat
Proteaceae	*Hakea trifurcata*		Quadrat
Proteaceae	*Isopogon divergens*		Quadrat
Proteaceae	*Isopogon tridens*		Quadrat
Proteaceae	*Lambertia multiflora* var. *multiflora*		Quadrat
Proteaceae	*Persoonia acicularis*		Quadrat
Proteaceae	*Petrophile brevifolia*		Quadrat
Proteaceae	*Petrophile macrostachya*		Quadrat
Proteaceae	*Petrophile shuttleworthiana*		Quadrat
Proteaceae	*Proteaceae* sp.		Quadrat
Restionaceae	*Alexgeorgea nitens*		Quadrat
Restionaceae	*Desmocladus asper*		Quadrat
Restionaceae	*Desmocladus semiplanus*		Quadrat
Restionaceae	*Lepidobolus preissianus*		Quadrat
Rhamnaceae	*Stenanthemum notiale* subsp. *notiale*		Quadrat
Rubiaceae	*Opercularia vaginata*		Quadrat
Rutaceae	*Boronia coerulescens* subsp. *spinescens*		Quadrat
Rutaceae	*Boronia cymosa*		Quadrat
Rutaceae	*Boronia ramosa* subsp. *anethifolia*		Quadrat
Rutaceae	*Diplolaena ferruginea*		Quadrat
Sapindaceae	*Diplopeltis huegelii* subsp. *lehmanii*		Quadrat
Stylidiaceae	*Levenhookia pusilla*		Quadrat
Stylidiaceae	*Stylidium crossocephalum*		Quadrat
Stylidiaceae	*Stylidium drummondianum*	P3	Quadrat
Stylidiaceae	*Stylidium rigidulum*		Quadrat
Thymelaeaceae	*Pimelea angustifolia*		Quadrat
Thymelaeaceae	*Pimelea microcephala*		Quadrat
Thymelaeaceae	*Pimelea sulphurea*		Quadrat
Xanthorrhoeaceae	*Chamaescilla corymbosa*		Quadrat

Appendix F Flora species matrix

Family	Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	ELA07	ELA08	ELA09	ELA10	ELA11	ELA12	ELA13	ELA14	ELA15	ELA16	ELA17	ELA18	ELA19	ELA20	ELA21	ELA22	ELA23	ELA24	ELA25	ELA26
Amaranthaceae	*Gompholobium tomentosum*	X	X	X	X										X	X											
Amaranthaceae	*Ptilotus manglesii*	X	X	X	X							X				X			X								
Anarthriaceae	*Lyginia imberbis*						X																X	X	X	X	X
Araliaceae	*Trachymene pilosa*				X				X						X	X		X									
Asparagaceae	*Acanthocarpus* sp. Ajana (C.A. Gardner 8596)										X			X										X	X		
Asparagaceae	*Lomandra hastilis*			X					X						X												
Asteraceae	**Hypochaeris glabra*	X							X						X							X			X		
Asteraceae	*Podotheca angustifolia*	X	X			X		X	X			X			X	X		X	X			X		X			
Asteraceae	*Pterochaeta paniculata*	X	X			X			X		X		X	X								X					
Asteraceae	*Waitzia acuminata* var. *acuminata*				X						X																
Asteraceae	*Waitzia suaveolens* var. *suaveolens*	X	X		X	X		X				X			X		X		X							X	X
Boryaceae	*Borya sphaerocephala*	X	X				X															X					
Casuarinaceae	*Allocasuarina campestris*	X	X			X							X	X			X				X	X					
Casuarinaceae	*Allocasuarina humilis*			X	X			X	X	X	X	X	X	X				X		X						X	X
Casuarinaceae	*Allocasuarina microstachya*	X	X			X													X		X	X					
Celastraceae	*Stackhousia monogyna*	X	X	X	X	X						X						X									
Celastraceae	*Tripterococcus brunonis*	X	X		X	X		X	X	X		X						X	X	X	X	X				X	X
Colchicaceae	*Burchardia congesta*	X	X	X		X	X	X	X	X	X	X	X	X		X	X	X		X	X	X	X			X	X
Cyperaceae	*Caustis dioica*		X	X	X			X	X	X								X	X	X	X					X	
Cyperaceae	*Chaetospora curvifolia*		X	X	X										X						X						
Cyperaceae	*Mesomelaena pseudostygia*	X	X	X	X	X	X		X			X			X	X	X	X	X	X	X	X	X	X	X	X	X
Cyperaceae	*Mesomelaena stygia* var. *deflexa* (P3)								X																		

Family	Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	ELA07	ELA08	ELA09	ELA10	ELA11	ELA12	ELA13	ELA14	ELA15	ELA16	ELA17	ELA18	ELA19	ELA20	ELA21	ELA22	ELA23	ELA24	ELA25	ELA26
Cyperaceae	*Schoenus armeria*										X		X	X													
Cyperaceae	*Schoenus clandestinus*	X	X	X	X	X	X	X	X	X		X				X	X		X	X	X	X	X	X	X	X	X
Cyperaceae	*Schoenus nanus*	X					X												X								
Cyperaceae	*Schoenus pleiostemoneus*																										X
Cyperaceae	*Schoenus* sp.							X																			
Dilleniaceae	*Hibbertia hypericoides*	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dilleniaceae	*Hibbertia spicata*			X	X	X		X	X	X							X	X		X	X	X				X	X
Dilleniaceae	*Hibbertia subvaginata*			X				X							X												
Droseraceae	*Drosera erythrorhiza*	X				X											X		X		X	X		X			
Droseraceae	*Drosera macrantha*					X	X	X																			
Droseraceae	*Drosera menziesii*	X	X	X	X		X			X		X	X	X		X	X		X	X		X	X		X	X	X
Droseraceae	*Drosera porrecta*	X	X	X	X	X	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X
Ecdeiocoleaceae	*Ecdeiocolea monostachya*	X	X			X	X			X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X
Ericaceae	*Styphelia hamulosa*									X																	
Ericaceae	*Styphelia microdonta*		X				X					X							X		X						X
Euphorbiaceae	*Beyeria gardneri*		X																								
Euphorbiaceae	*Monotaxis bracteata*		X				X															X		X	X	X	
Fabaceae	*Acacia blakelyi*			X	X				X						X	X											
Fabaceae	*Acacia dilatata*	X				X						X									X	X					
Fabaceae	*Acacia pulchella*			X	X			X							X			X									
Fabaceae	*Acacia sp.*								X																		
Fabaceae	*Acacia stenoptera*			X																							
Fabaceae	*Acacia tetragonaphylla*																			X			X	X	X		
Fabaceae	*Chorizema aciculare* subsp. *laxum*	X	X																								
Fabaceae	*Daviesia divaricata*	X			X		X		X	X		X				X	X		X	X			X	X	X	X	X
Fabaceae	*Daviesia incrassata* subsp. *teres*													X													
Fabaceae	*Daviesia pedunculata*							X									X	X	X	X	X	X		X			

Family	Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	ELA07	ELA08	ELA09	ELA10	ELA11	ELA12	ELA13	ELA14	ELA15	ELA16	ELA17	ELA18	ELA19	ELA20	ELA21	ELA22	ELA23	ELA24	ELA25	ELA26
Fabaceae	*Gastrolobium calycinum*		X		X	X	X			X	X									X		X				X	X
Fabaceae	*Gastrolobium plicatum*	X											X	X													
Fabaceae	*Gastrolobium spinosum*									X	X		X	X													
Fabaceae	*Isotropis cuneifolia*	X	X	X	X	X		X	X	X		X			X	X		X				X			X		X
Fabaceae	*Isotropis drummondii*													X													
Fabaceae	*Jacksonia angulata*	X	X																								
Fabaceae	*Jacksonia hakeoides*														X	X		X					X	X			
Fabaceae	*Mirbelia trichocalyx*				X			X																			
Goodeniaceae	*Dampiera alata*	X	X			X				X	X																
Goodeniaceae	*Dampiera altissima*	X	X		X	X	X		X							X	X		X	X	X	X	X		X	X	X
Goodeniaceae	*Lechenaultia biloba*	X																									
Goodeniaceae	*Lechenaultia linarioides*									X																	
Goodeniaceae	*Scaevola canescens*						X	X	X			X					X		X	X	X	X	X	X	X	X	X
Goodeniaceae	*Scaevola glandulifera*										X		X	X													
Gyrostemonaceae	*Gyrostemon racemiger*											X										X					
Gyrostemonaceae	*Tersonia cyathiflora*				2		2		2							2	2	2	2	2			2	2			
Haemodoraceae	*Anigozanthos humilis* subsp. *humilis*	X	X	X	X		X	X	X						X		X	X			X	X				X	X
Haemodoraceae	*Conostylis aculeata*								X																		
Haemodoraceae	*Conostylis candicans*																	X									
Haemodoraceae	*Conostylis canteriata*			X	X			X							X		X				X	X					X
Haemodoraceae	*Conostylis* sp.																									X	
Hemerocallidaceae	*Dianella revoluta*																						X				
Hemerocallidaceae	*Johnsonia pubescens* subsp. *pubescens*			X				X													X						
Iridaceae	*Patersonia occidentalis*															X											
Lamiaceae	*Hemiandra rubriflora*			X	X													X									

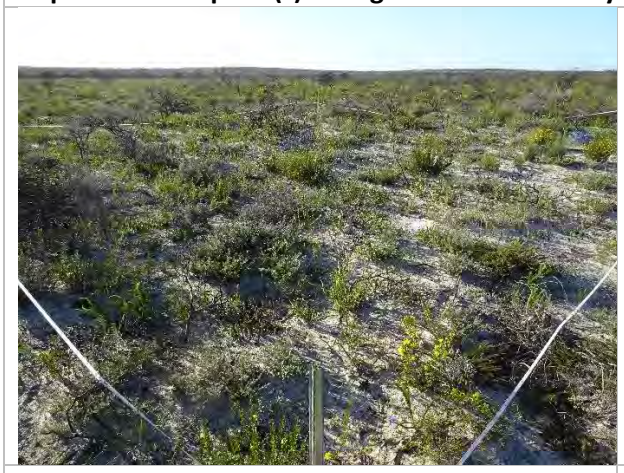
Family	Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	ELA07	ELA08	ELA09	ELA10	ELA11	ELA12	ELA13	ELA14	ELA15	ELA16	ELA17	ELA18	ELA19	ELA20	ELA21	ELA22	ELA23	ELA24	ELA25	ELA26
Lamiaceae	*Quoya verbascina*			X											X										X	X	
Loranthaceae	*Nuytsia floribunda*								X																		
Malvaceae	*Guichenotia sarotes*										X																
Malvaceae	*Lasiopetalum drummondii*		X					X		X					X					X	X				X		
Malvaceae	*Lasiopetalum ogilvieanum* (P1)																	X									
Montiaceae	*Calandrinia corrigioloides*														X			X			X		X	X	X		
Myrtaceae	*Babingtonia camphorosmae*	X				X						X							X	X							
Myrtaceae	*Beaufortia elegans*			X	X			X	X						X		X	X	X	X	X	X				X	X
Myrtaceae	*Calothamnus blepharospermus*																						X	X	X		
Myrtaceae	*Calothamnus quadrifidus* subsp. *angustifolius*	X	X	X	X	X	X	X	X	X			X		X			X			X	X			X	X	
Myrtaceae	*Calothamnus sanguineus*			X	X				X		X				X	X	X		X					X			
Myrtaceae	*Calytrix depressa*				X																						
Myrtaceae	*Calytrix* sp.						X	X				X									X		X	X	X	X	X
Myrtaceae	*Darwinia speciosa*		X	X		X	X									X										X	
Myrtaceae	*Eremaea beaufortioides*	X	X	X		X		X		X					X		X	X			X	X	X	X	X		X
Myrtaceae	*Eremaea* sp.	X	X	X		X				X									X								
Myrtaceae	*Eremaea violacea*																			X							X
Myrtaceae	*Eucalyptus todtiana*			X	X				X	X					X	X		X					X	X	X		
Myrtaceae	*Hypocalymma hirsutum*	X	X				X			X									X						X	
Myrtaceae	*Hypocalymma* sp.		X																								
Myrtaceae	*Leptospermum oligandrum*			X															X	X	X		X		X	X	X
Myrtaceae	*Leptospermum spinescens*									X						X				X	X					X	
Myrtaceae	*Melaleuca aspalathoides*	X	X			X					X			X			X				X	X					
Myrtaceae	*Melaleuca* sp.														X												
Myrtaceae	*Melaleuca leuropoma*	X	X	X	X	X		X	X	X		X			X	X	X	X	X	X	X		X	X	X	X	X

Family	Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	ELA07	ELA08	ELA09	ELA10	ELA11	ELA12	ELA13	ELA14	ELA15	ELA16	ELA17	ELA18	ELA19	ELA20	ELA21	ELA22	ELA23	ELA24	ELA25	ELA26
Myrtaceae	*Scholtzia laxiflora*						X																X	X	X		
Myrtaceae	*Verticordia grandis*		X						X						X	X	X						X	X	X	X	
Orchidaceae	*Caladenia brunonis*												X														
Orchidaceae	*Caladenia flava*						X								X									X	X		
Orchidaceae	*Cyanicula gemmata*												X	X													
Orchidaceae	*Leporella fimbriata*				X	X		X	X													X					
Orchidaceae	*Thelymitra campanulata*																				X						
Orchidaceae	*Thysanotus dichotomus*																		X	X							
Orchidaceae	*Thysanotus multiflorus*																			X							
Orchidaceae	*Thysanotus patersonii*						X		X									X						X		X	
Orchidaceae	*Thysanotus* sp.																					X					
Poaceae	*Austrostipa macalpinei*														X	X		X									
Poaceae	*Neurachne alopecuroidea*	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		X	X			X	X	X
Proteaceae	*Banksia attenuata*																						X	X	X		
Proteaceae	Banksia carlinoides	X	X					X		X												X					
Proteaceae	*Banksia dallanneyi* subsp. *media*			X	X				X									X					X	X	X		
Proteaceae	*Banksia fraseri* var. *fraseri*					X				X	X			X					X								
Proteaceae	*Banksia prionotes*						X																			X	X
Proteaceae	*Banksia scabrella* (P4)		X	X	X			X	X	X					X												
Proteaceae	*Banksia sessilis*				X				X						X												
Proteaceae	*Banksia shuttleworthiana*		X	X	X	X	X	X				X						X	X	X	X	X	X			X	X
Proteaceae	*Conospermum boreale*		X		X	X	X	X	X			X				X	X	X	X	X	X		X	X	X	X	X
Proteaceae	*Conospermum stoechadis*			X	X										X												
Proteaceae	*Grevillea biformis*		X																								
Proteaceae	*Grevillea leucopteris*																										X
Proteaceae	*Grevillea shuttleworthiana* subsp. *canarina*																			X							

Family	Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	ELA07	ELA08	ELA09	ELA10	ELA11	ELA12	ELA13	ELA14	ELA15	ELA16	ELA17	ELA18	ELA19	ELA20	ELA21	ELA22	ELA23	ELA24	ELA25	ELA26
Proteaceae	*Grevillea synapheae*		X																								
Proteaceae	*Hakea auriculata*					X					X		X	X					X		X	X					
Proteaceae	*Hakea candolleana*																				X	X		X			
Proteaceae	*Hakea incrassata*			X	X				X						X												
Proteaceae	*Hakea lissocarpha*	X				X				X	X		X														
Proteaceae	*Hakea* sp. 1	X	X			X				X									X								
Proteaceae	*Hakea* sp. 2		X													X	X	X	X								
Proteaceae	*Hakea stenocarpa*					X				X																	
Proteaceae	*Hakea trifurcata*			X	X			X	X									X			X				X	X	X
Proteaceae	*Isopogon divergens*																					X					
Proteaceae	*Isopogon tridens*	X	X	X	X	X		X	X	X		X			X			X									
Proteaceae	*Lambertia multiflora* var. *multiflora*				X		X	X	X	X																	
Proteaceae	*Persoonia acicularis*																		X								
Proteaceae	*Petrophile brevifolia*	2	X	X						X						X											
Proteaceae	*Petrophile macrostachya*																	X	X		X					X	X
Proteaceae	*Petrophile shuttleworthiana*									X	X		X	X													
Proteaceae	*Proteaceae* sp.																										X
Restionaceae	*Alexgeorgea nitens*			X								X			X												
Restionaceae	*Desmocladus asper*		X		X				X							X											
Restionaceae	*Desmocladus semiplanus*	X				X	X	X				X				X	X		X	X	X	X		X	X		X
Restionaceae	*Lepidobolus preissianus*		X																								
Rhamnaceae	*Stenanthemum notiale* subsp. *notiale*						X	X								X	X	X								X	X
Rubiaceae	*Opercularia vaginata*	X	X	X	X	X		X	X	X		X	X		X	X	X	X	X	X		X		X		X	X
Rutaceae	*Boronia coerulescens* subsp. *spinescens*																X		X					X	X		
Rutaceae	*Boronia cymosa*	X	X			X				X	X			X		X	X	X	X	X		X					
Rutaceae	*Boronia ramosa* subsp. *anethifolia*														X			X						X			

Family	Species	ELA01	ELA02	ELA03	ELA04	ELA05	ELA06	ELA07	ELA08	ELA09	ELA10	ELA11	ELA12	ELA13	ELA14	ELA15	ELA16	ELA17	ELA18	ELA19	ELA20	ELA21	ELA22	ELA23	ELA24	ELA25	ELA26
Rutaceae	*Diplolaena ferruginea*		X						X							X					X						
Sapindaceae	*Diplopeltis huegelii* subsp. *lehmanii*			X	X			X										X									
Stylidiaceae	*Levenhookia pusilla*	X	X			X															X						X
Stylidiaceae	*Stylidium crossocephalum*														X												
Stylidiaceae	*Stylidium drummondianum* (P3)										X																
Stylidiaceae	*Stylidium rigidulum*	X	X	X	X	X		X	X			X			X	X		X	X						X	X	X
Thymelaeaceae	*Pimelea angustifolia*			X			X								X	X											
Thymelaeaceae	*Pimelea microcephala*																										X
Thymelaeaceae	*Pimelea sulphurea*										X								X		X						
Xanthorrhoeaceae	*Chamaescilla corymbosa*										X		X	X													

Appendix G Summary of vegetation communities

Mapping code	AcEbHh	**Woodman (2013) corresponding vegetation type**	10 and 12	**Extent of survey area mapped (ha)**	69.3
Vegetation community description	*Allocasuarina campestris* tall sparse shrubland over *Eremaea beaufortioides*, *Calothamnus quadrifidus* subsp. *angustifolius*, *Isopogon tridens* mid sparse shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland.				
Associated species	*Allocasuarina microstachya, Banksia shuttleworthiana, Boronia cymosa, Dampiera alata, Dampiera altissima, Hibbertia spicata, Isotropis cuneifolia, Isopogon tridens, Melaleuca aspalathoides, Neurachne alopecuroidea, Opercularia vaginata, Schoenus clandestinus* and *Tripterococcus brunonis.*				
Assigned survey sites	ELA01, ELA02, ELA05, ELA09, ELA20 and ELA21			**General vegetation condition**	Excellent
Common soil type	Sand with light clay	**General soil notes**	Grey over brown	**Common landform**	Flat with gentle slope
Rock type	Nil	**Outcropping (%)**	0	**General time since fire**	1-10 years
Average species richness		45	**Similarity percentage (SIMPER)**		50.9%
Representative plate(s) of vegetation community					
					
ELA01			**ELA02**		

ELA05

ELA09

ELA20

ELA21

Mapping code	EtAhHh	**Woodman (2013) corresponding vegetation type**	13a	**Extent of survey area mapped (ha)**	55
Vegetation community description	*Eucalyptus todtiana* mid open woodland over *Allocasuarina humilis*, *Banksia scabrella* (P4), *Calothamnus sanguineus* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Caustis dioica* low open sedgeland.				
Associated species	*Acacia blakelyi, Acacia pulchella, Anigozanthos humilis* subsp. *humilis, Banksia dallanneyi* subsp. *media, Calothamnus quadrifidus* subsp. *angustifolius, Hakea trifurcata, Hibbertia spicata, Isotropis cuneifolia, Isopogon tridens, Mesomelaena pseudostygia, Neurachne alopecuroidea* and *Opercularia vaginata.*				
Assigned survey sites	ELA03, ELA04, ELA07, ELA08, ELA14 and ELA17			**General vegetation condition**	Excellent
Common soil type	Sand loam	**General soil notes**	Grey over brown	**Common landform**	Flat with gentle slope
Rock type	Nil	**Outcropping (%)**	0	**General time since fire**	1-10 years
Average species richness		44.33	**Similarity percentage (SIMPER)**		54.75%
Representative plate(s) of vegetation community					

ELA03

ELA04

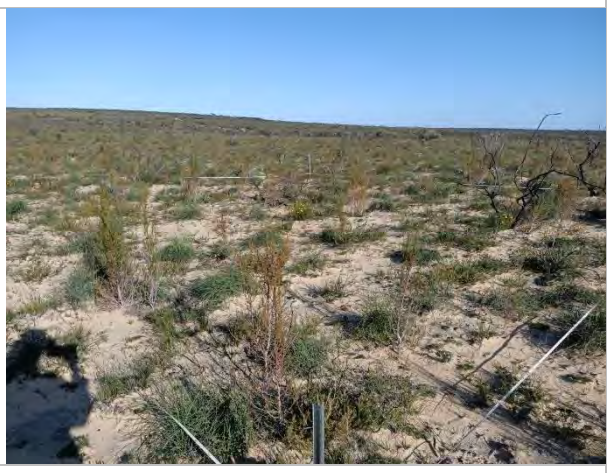
ELA07

ELA08

	
ELA14	**ELA17**

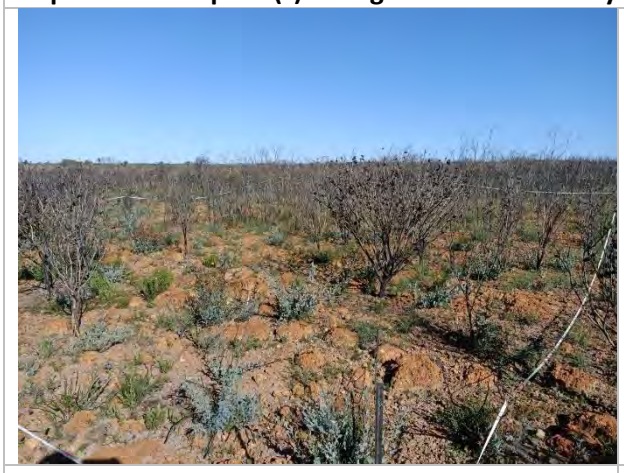
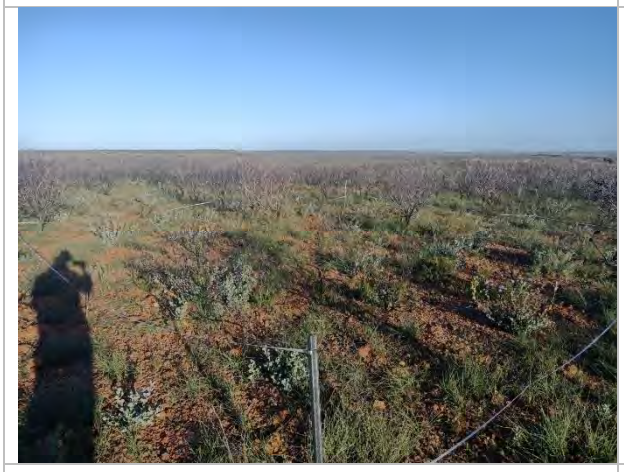
Mapping code	BpDdHh	**Woodman (2013) corresponding vegetation type**	13b	**Extent of survey area mapped (ha)**	12
Vegetation community description	*Banksia prionotes* mid open woodland over *Daviesia divaricata*, *Conospermum boreale*, *Allocasuarina humilis* mid open shrubland over *Hibbertia hypericoides* low open shrubland and *Ecdeiocolea monostachya*, *Mesomelaena pseudostygia* low open sedgeland.				
Associated species	*Banksia shuttleworthiana, Dampiera altissima, Desmocladus semiplanus, Gastrolobium calycinum, Leptospermum oligandrum, Lyginia imberbis, Melaleuca leuropoma, Neurachne alopecuroidea, Opercularia vaginata, Scaevola canescens, Schoenus clandestinus* and *Styphelia microdonta.*				
Assigned survey sites	ELA06, ELA11, ELA25 and ELA26			**General vegetation condition**	Excellent
Common soil type	Sand loam	**General soil notes**	Grey over brown	**Common landform**	Flat with gentle slope
Rock type	Nil	**Outcropping (%)**	0	**General time since fire**	1-10 years
Average species richness		36	**Similarity percentage (SIMPER)**		55.07%
Representative plate(s) of vegetation community					

ELA06



ELA11

ELA25

Mapping code	AcAhGp	**Woodman (2013) corresponding vegetation type**	9	**Extent of survey area mapped (ha)**	5.5
Vegetation community description	*Allocasuarina campestris* tall sparse shrubland over *Allocasuarina humilis*, *Hakea auriculata*, *Petrophile shuttleworthiana* mid open shrubland over *Gastrolobium plicatum* low open shrubland and *Ecdeiocolea monostachya*, *Schoenus armeria* low open sedgeland.				
Associated species	*Banksia fraseri* var. *fraseri, Boronia cymosa, Calothamnus sanguineus, Chamaescilla corymbosa, Daviesia incrassata* subsp. *teres, Gastrolobium calycinum, Guichenotia sarotes, Hakea lissocarpha, Melaleuca aspalathoides, Neurachne alopecuroidea, Pterochaeta paniculata* and *Scaevola glandulifera.*				
Assigned survey sites	ELA10, ELA12 and ELA13			**General vegetation condition**	Excellent
Common soil type	Sand loam	**General soil notes**	Grey	**Common landform**	Flat with gentle slope
Rock type	Laterite	**Outcropping (%)**	10-20	**General time since fire**	1-10 years
Average species richness		21.66	**Similarity percentage (SIMPER)**		63.33%
Representative plate(s) of vegetation community					
					
ELA10			**ELA12**		
					
ELA13					

Mapping code	AcDdMl	**Woodman (2013) corresponding vegetation type**	12	**Extent of survey area mapped (ha)**	35.2
Vegetation community description	*Allocasuarina campestris* tall isolated shrubs over *Daviesia divaricata*, *Conospermum boreale*, *Beaufortia elegans* mid open shrubland over *Melaleuca leuropoma*, *Hibbertia hypericoides* low open shrub over *Ecdeiocolea monostachya* low open sedgeland.				
Associated species	*Boronia cymosa, Calothamnus sanguineus, Caustis dioica, Dampiera altissima, Daviesia pedunculata, Desmocladus semiplanus, Leptospermum oligandrum, Mesomelaena pseudostygia, Opercularia vaginata, Scaevola canescens, Schoenus clandestinus, Tersonia cyathiflora* and *Verticordia grandis.*				
Assigned survey sites	ELA15, ELA16, ELA18 and ELA19			**General vegetation condition**	Excellent
Common soil type	Sand loam	**General soil notes**	Grey over brown	**Common landform**	Flat with gentle slope
Rock type	Nil	**Outcropping (%)**	0	**General time since fire**	1-10 years
Average species richness		36.25	**Similarity percentage (SIMPER)**		54.59%
Representative plate(s) of vegetation community					

ELA15

ELA16

ELA18

ELA19

Mapping code	EtBaHh	**Woodman (2013) corresponding vegetation type**	10, 13b	**Extent of survey area mapped (ha)**	22.5
Vegetation community description	*Eucalyptus todtiana* mid open woodland over *Banksia attenuata*, *Calothamnus blepharospermus*, *Eremaea beaufortioides* mid open shrubland over *Hibbertia hypericoides*, *Melaleuca leuropoma* low open shrubland and *Ecdeiocolea monostachya* low open sedgeland.				
Associated species	*Acacia tetragonophylla, Banksia dallanneyi* subsp. *media, Conospermum boreale, Jacksonia hakeoides, Leptospermum oligandrum, Lyginia imberbis, Melaleuca leuropoma, Mesomelaena pseudostygia, Scaevola canescens, Schoenus clandestinus, Scholtzia laxiflora, Tersonia cyathiflora* and *Verticordia grandis.*				
Assigned survey sites	ELA22, ELA23 and ELA24			**General vegetation condition**	Excellent
Common soil type	Sand loam	**General soil notes**	Grey	**Common landform**	Flat with gentle slope
Rock type	Nil	**Outcropping (%)**	0	**General time since fire**	1-10 years
Average species richness		33	**Similarity percentage (SIMPER)**		67.84%
Representative plate(s) of vegetation community					
					
ELA22			**ELA23**		
					
ELA24					

Appendix H Locations of Priority species within the survey area

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	1	323061	6745601	Dead, burnt
Banksia scabrella	P4	30	324493	6745648	Dead, burnt
Banksia scabrella	P4	2	324495	6745617	Dead, burnt
Banksia scabrella	P4	10	324535	6745651	Dead, burnt
Banksia scabrella	P4	20	324593	6745655	Dead, burnt
Banksia scabrella	P4	20	324626	6745629	Dead, burnt
Banksia scabrella	P4	4	324823	6745595	Dead, burnt
Banksia scabrella	P4	3	327024	6745536	Dead, burnt
Banksia scabrella	P4	10	327055	6745557	Dead, burnt
Banksia scabrella	P4	1	327118	6745523	Dead, burnt
Banksia scabrella	P4	10	327124	6745579	Dead, burnt
Banksia scabrella	P4	15	327213	6745558	Dead, burnt
Banksia scabrella	P4	13	327222	6745511	Dead, burnt
Banksia scabrella	P4	5	327246	6745571	Dead, burnt
Banksia scabrella	P4	5	327295	6745492	Dead, burnt
Banksia scabrella	P4	5	327338	6745545	Dead, burnt
Banksia scabrella	P4	4	327397	6745503	Dead, burnt
Banksia scabrella	P4	20	327402	6745575	Dead, burnt
Banksia scabrella	P4	10	327447	6745578	Dead, burnt
Banksia scabrella	P4	3	327449	6745500	Dead, burnt
Banksia scabrella	P4	5	327457	6745542	Dead, burnt
Banksia scabrella	P4	4	327471	6745519	Dead, burnt
Banksia scabrella	P4	2	328551	6745568	Dead, burnt
Banksia scabrella	P4	3	328585	6745569	Dead, burnt
Banksia scabrella	P4	5	328669	6745551	Dead, burnt
Banksia scabrella	P4	20	328717	6745582	Dead, burnt
Banksia scabrella	P4	5	328778	6745562	Dead, burnt
Banksia scabrella	P4	1	328817	6745553	Dead, burnt
Banksia scabrella	P4	5	328853	6745575	Dead, burnt
Banksia scabrella	P4	20	328903	6745574	Dead, burnt
Banksia scabrella	P4	20	328936	6745567	Dead, burnt
Banksia scabrella	P4	5	329032	6745558	Dead, burnt
Banksia scabrella	P4	6	329294	6745526	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	10	329490	6745559	Dead, burnt
Banksia scabrella	P4	5	329508	6745492	Dead, burnt
Banksia scabrella	P4	30	329527	6745523	Dead, burnt
Banksia scabrella	P4	60	329546	6745561	Dead, burnt
Banksia scabrella	P4	30	329580	6745569	Dead, burnt
Banksia scabrella	P4	35	329588	6745489	Dead, burnt
Banksia scabrella	P4	50	329608	6745514	Dead, burnt
Banksia scabrella	P4	15	329638	6745504	Dead, burnt
Banksia scabrella	P4	10	329640	6745559	Dead, burnt
Banksia scabrella	P4	10	329733	6745517	Dead, burnt
Banksia scabrella	P4	10	329734	6745545	Dead, burnt
Banksia scabrella	P4	10	329747	6745522	Dead, burnt
Banksia scabrella	P4	15	329795	6745484	Dead, burnt
Banksia scabrella	P4	5	329810	6745561	Dead, burnt
Banksia scabrella	P4	10	329848	6745532	Dead, burnt
Banksia scabrella	P4	50	329862	6745493	Dead, burnt
Banksia scabrella	P4	10	329892	6745564	Dead, burnt
Banksia scabrella	P4	40	329949	6745559	Dead, burnt
Banksia scabrella	P4	30	329998	6745482	Dead, burnt
Banksia scabrella	P4	40	330018	6745569	Dead, burnt
Banksia scabrella	P4	30	330055	6745511	Dead, burnt
Banksia scabrella	P4	200	330081	6745565	Dead, burnt
Banksia scabrella	P4	50	330111	6745484	Dead, burnt
Banksia scabrella	P4	40	330114	6745521	Dead, burnt
Banksia scabrella	P4	150	330121	6745564	Dead, burnt
Banksia scabrella	P4	80	330168	6745558	Dead, burnt
Banksia scabrella	P4	60	330190	6745514	Dead, burnt
Banksia scabrella	P4	100	330206	6745588	Dead, burnt
Banksia scabrella	P4	60	330221	6745515	Dead, burnt
Banksia scabrella	P4	60	330262	6745578	Dead, burnt
Banksia scabrella	P4	40	330274	6745529	Dead, burnt
Banksia scabrella	P4	100	330280	6745582	Dead, burnt
Banksia scabrella	P4	25	330319	6745516	Dead, burnt
Banksia scabrella	P4	100	330327	6745591	Dead, burnt
Banksia scabrella	P4	25	330344	6745518	Dead, burnt
Banksia scabrella	P4	40	330375	6745527	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	150	330412	6745595	Dead, burnt
Banksia scabrella	P4	50	330430	6745559	Dead, burnt
Banksia scabrella	P4	80	330452	6745580	Dead, burnt
Banksia scabrella	P4	1	330821	6745549	Dead, burnt
Banksia scabrella	P4	4	330835	6745501	Dead, burnt
Banksia scabrella	P4	1	330990	6745498	Dead, burnt
Banksia scabrella	P4	4	331026	6745519	Dead, burnt
Banksia scabrella	P4	8	331326	6745435	Dead, burnt
Banksia scabrella	P4	15	331399	6745433	Dead, burnt
Banksia scabrella	P4	5	331412	6745452	Dead, burnt
Banksia scabrella	P4	5	331421	6745424	Dead, burnt
Banksia scabrella	P4	5	331459	6745459	Dead, burnt
Banksia scabrella	P4	2	331462	6745402	Dead, burnt
Banksia scabrella	P4	10	331483	6745423	Dead, burnt
Banksia scabrella	P4	15	331486	6745440	Dead, burnt
Banksia scabrella	P4	2	331536	6745414	Dead, burnt
Banksia scabrella	P4	2	331602	6745380	Dead, burnt
Banksia scabrella	P4	10	331761	6745413	Dead, burnt
Banksia scabrella	P4	15	331770	6745453	Dead, burnt
Banksia scabrella	P4	3	331790	6745416	Dead, burnt
Banksia scabrella	P4	7	331804	6745443	Dead, burnt
Banksia scabrella	P4	8	331809	6745398	Dead, burnt
Banksia scabrella	P4	5	331810	6745411	Dead, burnt
Banksia scabrella	P4	5	331871	6745367	Dead, burnt
Banksia scabrella	P4	10	332347	6745340	Dead, burnt
Banksia scabrella	P4	2	332355	6745364	Alive
Banksia scabrella	P4	4	332355	6745364	Dead, burnt
Banksia scabrella	P4	11	332359	6745389	Dead, burnt
Banksia scabrella	P4	25	332398	6745335	Dead, burnt
Banksia scabrella	P4	10	332412	6745390	Dead, burnt
Banksia scabrella	P4	10	332431	6745383	Dead, burnt
Banksia scabrella	P4	8	332440	6745324	Dead, burnt
Banksia scabrella	P4	1	332450	6745388	Dead, burnt
Banksia scabrella	P4	3	332467	6745387	Dead, burnt
Banksia scabrella	P4	7	332468	6745413	Dead, burnt
Banksia scabrella	P4	15	332477	6745323	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	5	332499	6745318	Dead, burnt
Banksia scabrella	P4	10	332520	6745351	Dead, burnt
Banksia scabrella	P4	2	332532	6745323	Dead, burnt
Banksia scabrella	P4	10	332543	6745347	Dead, burnt
Banksia scabrella	P4	30	332560	6745374	Dead, burnt
Banksia scabrella	P4	40	332577	6745353	Dead, burnt
Banksia scabrella	P4	10	332594	6745379	Dead, burnt
Banksia scabrella	P4	10	332610	6745354	Dead, burnt
Banksia scabrella	P4	15	332619	6745374	Dead, burnt
Banksia scabrella	P4	20	332644	6745339	Dead, burnt
Banksia scabrella	P4	20	332648	6745370	Dead, burnt
Banksia scabrella	P4	15	332675	6745370	Dead, burnt
Banksia scabrella	P4	5	332679	6745338	Dead, burnt
Banksia scabrella	P4	5	332681	6745313	Dead, burnt
Banksia scabrella	P4	12	332681	6745401	Dead, burnt
Banksia scabrella	P4	15	332713	6745400	Dead, burnt
Banksia scabrella	P4	3	332714	6745372	Dead, burnt
Banksia scabrella	P4	3	332833	6745336	Dead, burnt
Banksia scabrella	P4	5	332836	6745358	Dead, burnt
Banksia scabrella	P4	10	332870	6745342	Dead, burnt
Banksia scabrella	P4	4	332872	6745359	Dead, burnt
Banksia scabrella	P4	10	332905	6745352	Dead, burnt
Banksia scabrella	P4	70	332907	6745333	Dead, burnt
Banksia scabrella	P4	11	332909	6745387	Dead, burnt
Banksia scabrella	P4	20	332924	6745356	Dead, burnt
Banksia scabrella	P4	8	332927	6745303	Dead, burnt
Banksia scabrella	P4	90	332936	6745331	Dead, burnt
Banksia scabrella	P4	80	332943	6745360	Dead, burnt
Banksia scabrella	P4	50	332960	6745304	Dead, burnt
Banksia scabrella	P4	80	332971	6745359	Dead, burnt
Banksia scabrella	P4	70	332973	6745326	Dead, burnt
Banksia scabrella	P4	21	332986	6745383	Dead, burnt
Banksia scabrella	P4	30	332991	6745302	Dead, burnt
Banksia scabrella	P4	50	332999	6745356	Dead, burnt
Banksia scabrella	P4	5	333011	6745321	Dead, burnt
Banksia scabrella	P4	10	333015	6745304	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	7	333021	6745386	Dead, burnt
Banksia scabrella	P4	20	333026	6745351	Dead, burnt
Banksia scabrella	P4	30	333049	6745324	Dead, burnt
Banksia scabrella	P4	10	333056	6745297	Dead, burnt
Banksia scabrella	P4	30	333062	6745354	Dead, burnt
Banksia scabrella	P4	22	333079	6745296	Dead, burnt
Banksia scabrella	P4	25	333086	6745356	Dead, burnt
Banksia scabrella	P4	30	333095	6745322	Dead, burnt
Banksia scabrella	P4	37	333103	6745382	Dead, burnt
Banksia scabrella	P4	30	333109	6745345	Dead, burnt
Banksia scabrella	P4	36	333130	6745375	Dead, burnt
Banksia scabrella	P4	20	333140	6745342	Dead, burnt
Banksia scabrella	P4	20	333142	6745324	Dead, burnt
Banksia scabrella	P4	20	333169	6745342	Dead, burnt
Banksia scabrella	P4	15	333182	6745318	Dead, burnt
Banksia scabrella	P4	8	333191	6745286	Dead, burnt
Banksia scabrella	P4	10	333202	6745344	Dead, burnt
Banksia scabrella	P4	10	333212	6745309	Dead, burnt
Banksia scabrella	P4	5	333222	6745289	Dead, burnt
Banksia scabrella	P4	15	333241	6745308	Dead, burnt
Banksia scabrella	P4	6	333244	6745341	Dead, burnt
Banksia scabrella	P4	4	333267	6745332	Dead, burnt
Banksia scabrella	P4	10	333270	6745310	Dead, burnt
Banksia scabrella	P4	5	333304	6745330	Dead, burnt
Banksia scabrella	P4	40	333307	6745307	Dead, burnt
Banksia scabrella	P4	15	333333	6745273	Dead, burnt
Banksia scabrella	P4	60	333335	6745302	Dead, burnt
Banksia scabrella	P4	10	333336	6745328	Dead, burnt
Banksia scabrella	P4	70	333362	6745298	Dead, burnt
Banksia scabrella	P4	40	333373	6745323	Dead, burnt
Banksia scabrella	P4	11	333383	6745357	Dead, burnt
Banksia scabrella	P4	26	333389	6745279	Dead, burnt
Banksia scabrella	P4	90	333390	6745303	Dead, burnt
Banksia scabrella	P4	60	333422	6745297	Dead, burnt
Banksia scabrella	P4	20	333422	6745276	Dead, burnt
Banksia scabrella	P4	30	333431	6745325	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	2	333446	6745295	Alive
Banksia scabrella	P4	30	333446	6745295	Dead, burnt
Banksia scabrella	P4	50	333460	6745328	Dead, burnt
Banksia scabrella	P4	100	333466	6745301	Dead, burnt
Banksia scabrella	P4	25	333475	6745270	Dead, burnt
Banksia scabrella	P4	60	333484	6745325	Dead, burnt
Banksia scabrella	P4	3	333501	6745291	Alive
Banksia scabrella	P4	90	333501	6745291	Dead, burnt
Banksia scabrella	P4	28	333501	6745269	Dead, burnt
Banksia scabrella	P4	2	333508	6745323	Alive
Banksia scabrella	P4	30	333508	6745323	Dead, burnt
Banksia scabrella	P4	9	333510	6745350	Dead, burnt
Banksia scabrella	P4	40	333517	6745325	Dead, burnt
Banksia scabrella	P4	20	333531	6745302	Dead, burnt
Banksia scabrella	P4	40	333537	6745323	Dead, burnt
Banksia scabrella	P4	35	333542	6745262	Dead, burnt
Banksia scabrella	P4	22	333566	6745261	Dead, burnt
Banksia scabrella	P4	50	333567	6745302	Dead, burnt
Banksia scabrella	P4	1	333570	6745322	Alive
Banksia scabrella	P4	10	333570	6745322	Dead, burnt
Banksia scabrella	P4	10	333592	6745293	Dead, burnt
Banksia scabrella	P4	50	333597	6745261	Dead, burnt
Banksia scabrella	P4	6	333598	6745341	Dead, burnt
Banksia scabrella	P4	8	333600	6745322	Alive
Banksia scabrella	P4	10	333600	6745322	Dead, burnt
Banksia scabrella	P4	10	333607	6745294	Dead, burnt
Banksia scabrella	P4	5	333613	6745315	Alive
Banksia scabrella	P4	20	333613	6745315	Dead, burnt
Banksia scabrella	P4	15	333622	6745263	Dead, burnt
Banksia scabrella	P4	4	333636	6745314	Alive
Banksia scabrella	P4	10	333636	6745314	Dead, burnt
Banksia scabrella	P4	20	333644	6745284	Dead, burnt
Banksia scabrella	P4	4	333645	6745337	Dead, burnt
Banksia scabrella	P4	30	333659	6745312	Dead, burnt
Banksia scabrella	P4	40	333661	6745265	Dead, burnt
Banksia scabrella	P4	5	333674	6745310	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	1	333676	6745344	Dead, burnt
Banksia scabrella	P4	50	333677	6745282	Dead, burnt
Banksia scabrella	P4	4	333700	6745306	Alive
Banksia scabrella	P4	20	333700	6745306	Dead, burnt
Banksia scabrella	P4	30	333707	6745287	Dead, burnt
Banksia scabrella	P4	15	333711	6745270	Dead, burnt
Banksia scabrella	P4	50	333724	6745311	Dead, burnt
Banksia scabrella	P4	60	333737	6745287	Dead, burnt
Banksia scabrella	P4	12	333753	6745335	Dead, burnt
Banksia scabrella	P4	40	333754	6745306	Dead, burnt
Banksia scabrella	P4	15	333764	6745265	Dead, burnt
Banksia scabrella	P4	60	333764	6745285	Dead, burnt
Banksia scabrella	P4	4	333776	6745345	Dead, burnt
Banksia scabrella	P4	20	333781	6745308	Dead, burnt
Banksia scabrella	P4	40	333790	6745285	Dead, burnt
Banksia scabrella	P4	20	333913	6745258	Dead, burnt
Banksia scabrella	P4	1	333914	6745306	Dead, burnt
Banksia scabrella	P4	15	333919	6745276	Dead, burnt
Banksia scabrella	P4	15	333957	6745295	Dead, burnt
Banksia scabrella	P4	40	333985	6745265	Dead, burnt
Banksia scabrella	P4	30	333988	6745294	Dead, burnt
Banksia scabrella	P4	30	334006	6745241	Dead, burnt
Banksia scabrella	P4	12	334009	6745241	Alive
Banksia scabrella	P4	50	334013	6745257	Dead, burnt
Banksia scabrella	P4	2	334016	6745297	Alive
Banksia scabrella	P4	10	334016	6745297	Dead, burnt
Banksia scabrella	P4	6	334023	6745324	Dead, burnt
Banksia scabrella	P4	25	334032	6745238	Dead, burnt
Banksia scabrella	P4	100	334040	6745255	Dead, burnt
Banksia scabrella	P4	30	334046	6745296	Dead, burnt
Banksia scabrella	P4	25	334058	6745236	Dead, burnt
Banksia scabrella	P4	60	334072	6745258	Dead, burnt
Banksia scabrella	P4	20	334075	6745296	Dead, burnt
Banksia scabrella	P4	15	334082	6745234	Dead, burnt
Banksia scabrella	P4	4	334090	6745314	Dead, burnt
Banksia scabrella	P4	50	334103	6745284	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	40	334105	6745258	Dead, burnt
Banksia scabrella	P4	40	334132	6745282	Dead, burnt
Banksia scabrella	P4	60	334132	6745258	Dead, burnt
Banksia scabrella	P4	20	334151	6745310	Dead, burnt
Banksia scabrella	P4	40	334162	6745289	Dead, burnt
Banksia scabrella	P4	20	334166	6745259	Dead, burnt
Banksia scabrella	P4	30	334188	6745286	Dead, burnt
Banksia scabrella	P4	90	334201	6745249	Dead, burnt
Banksia scabrella	P4	20	334202	6745225	Dead, burnt
Banksia scabrella	P4	14	334204	6745313	Dead, burnt
Banksia scabrella	P4	30	334217	6745282	Dead, burnt
Banksia scabrella	P4	12	334231	6745311	Dead, burnt
Banksia scabrella	P4	3	334247	6745287	Alive
Banksia scabrella	P4	30	334247	6745287	Dead, burnt
Banksia scabrella	P4	100	334254	6745251	Dead, burnt
Banksia scabrella	P4	22	334267	6745309	Dead, burnt
Banksia scabrella	P4	20	334276	6745218	Dead, burnt
Banksia scabrella	P4	25	334278	6745283	Dead, burnt
Banksia scabrella	P4	70	334286	6745250	Dead, burnt
Banksia scabrella	P4	15	334291	6745217	Dead, burnt
Banksia scabrella	P4	18	334312	6745308	Dead, burnt
Banksia scabrella	P4	20	334319	6745252	Dead, burnt
Banksia scabrella	P4	10	334323	6745277	Dead, burnt
Banksia scabrella	P4	10	334343	6745275	Dead, burnt
Banksia scabrella	P4	60	334350	6745246	Dead, burnt
Banksia scabrella	P4	10	334359	6745220	Dead, burnt
Banksia scabrella	P4	9	334360	6745301	Dead, burnt
Banksia scabrella	P4	5	334367	6745272	Dead, burnt
Banksia scabrella	P4	15	334375	6745218	Dead, burnt
Banksia scabrella	P4	30	334380	6745242	Dead, burnt
Banksia scabrella	P4	8	334400	6745301	Dead, burnt
Banksia scabrella	P4	40	334401	6745218	Dead, burnt
Banksia scabrella	P4	30	334404	6745274	Dead, burnt
Banksia scabrella	P4	40	334412	6745245	Dead, burnt
Banksia scabrella	P4	25	334432	6745272	Dead, burnt
Banksia scabrella	P4	20	334434	6745213	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	8	334442	6745304	Dead, burnt
Banksia scabrella	P4	30	334443	6745240	Dead, burnt
Banksia scabrella	P4	20	334467	6745210	Dead, burnt
Banksia scabrella	P4	10	334475	6745264	Dead, burnt
Banksia scabrella	P4	80	334476	6745231	Dead, burnt
Banksia scabrella	P4	20	334489	6745261	Dead, burnt
Banksia scabrella	P4	17	334491	6745294	Dead, burnt
Banksia scabrella	P4	30	334503	6745208	Dead, burnt
Banksia scabrella	P4	30	334507	6745265	Dead, burnt
Banksia scabrella	P4	30	334514	6745207	Dead, burnt
Banksia scabrella	P4	30	334527	6745226	Dead, burnt
Banksia scabrella	P4	60	334537	6745203	Dead, burnt
Banksia scabrella	P4	20	334539	6745265	Dead, burnt
Banksia scabrella	P4	5	334563	6745265	Dead, burnt
Banksia scabrella	P4	40	334569	6745228	Dead, burnt
Banksia scabrella	P4	60	334574	6745206	Dead, burnt
Banksia scabrella	P4	30	334595	6745263	Dead, burnt
Banksia scabrella	P4	19	334598	6745289	Dead, burnt
Banksia scabrella	P4	20	334603	6745226	Dead, burnt
Banksia scabrella	P4	40	334603	6745198	Dead, burnt
Banksia scabrella	P4	6	334621	6745195	Dead, burnt
Banksia scabrella	P4	10	334624	6745252	Alive
Banksia scabrella	P4	20	334624	6745252	Dead, burnt
Banksia scabrella	P4	10	334637	6745218	Dead, burnt
Banksia scabrella	P4	17	334639	6745292	Dead, burnt
Banksia scabrella	P4	20	334644	6745256	Dead, burnt
Banksia scabrella	P4	5	334652	6745194	Dead, burnt
Banksia scabrella	P4	10	334679	6745254	Dead, burnt
Banksia scabrella	P4	60	334686	6745215	Dead, burnt
Banksia scabrella	P4	19	334689	6745288	Dead, burnt
Banksia scabrella	P4	30	334706	6745255	Dead, burnt
Banksia scabrella	P4	36	334712	6745283	Dead, burnt
Banksia scabrella	P4	50	334722	6745217	Dead, burnt
Banksia scabrella	P4	4	334724	6745203	Dead, burnt
Banksia scabrella	P4	4	334732	6745253	Alive
Banksia scabrella	P4	30	334732	6745253	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	10	334759	6745217	Dead, burnt
Banksia scabrella	P4	5	334767	6745190	Dead, burnt
Banksia scabrella	P4	6	334829	6745187	Dead, burnt
Banksia scabrella	P4	3	334843	6745212	Dead, burnt
Banksia scabrella	P4	2	334981	6745244	Dead, burnt
Banksia scabrella	P4	51	334992	6745439	Dead, burnt
Banksia scabrella	P4	33	334993	6745507	Dead, burnt
Banksia scabrella	P4	85	334995	6745468	Dead, burnt
Banksia scabrella	P4	3	335006	6745388	Dead, burnt
Banksia scabrella	P4	1	335029	6745164	Dead, burnt
Banksia scabrella	P4	90	335044	6745474	Dead, burnt
Banksia scabrella	P4	1	335047	6745366	Dead, burnt
Banksia scabrella	P4	40	335048	6745391	Dead, burnt
Banksia scabrella	P4	40	335048	6745457	Dead, burnt
Banksia scabrella	P4	50	335052	6745582	Alive
Banksia scabrella	P4	20	335052	6745526	Alive
Banksia scabrella	P4	10	335052	6745526	Dead, burnt
Banksia scabrella	P4	5	335054	6745498	Alive
Banksia scabrella	P4	60	335054	6745498	Dead, burnt
Banksia scabrella	P4	100	335054	6745423	Dead, burnt
Banksia scabrella	P4	50	335056	6745551	Alive
Banksia scabrella	P4	10	335091	6745583	Alive
Banksia scabrella	P4	30	335099	6745466	Dead, burnt
Banksia scabrella	P4	10	335100	6745528	Alive
Banksia scabrella	P4	40	335100	6745528	Dead, burnt
Banksia scabrella	P4	40	335101	6745489	Dead, burnt
Banksia scabrella	P4	70	335101	6745430	Dead, burnt
Banksia scabrella	P4	30	335103	6745391	Dead, burnt
Banksia scabrella	P4	10	335108	6745347	Dead, burnt
Banksia scabrella	P4	29	335131	6745457	Dead, burnt
Banksia scabrella	P4	32	335135	6745426	Dead, burnt
Banksia scabrella	P4	46	335136	6745490	Dead, burnt
Banksia scabrella	P4	9	335137	6745393	Dead, burnt
Banksia scabrella	P4	8	335174	6745328	Dead, burnt
Banksia scabrella	P4	8	335176	6745361	Dead, burnt
Banksia scabrella	P4	12	335176	6745459	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	2	335178	6745390	Dead, burnt
Banksia scabrella	P4	24	335178	6745441	Dead, burnt
Banksia scabrella	P4	6	335197	6745156	Dead, burnt
Banksia scabrella	P4	1	335200	6745197	Dead, burnt
Banksia scabrella	P4	13	335204	6745253	Dead, burnt
Banksia scabrella	P4	10	335205	6745390	Dead, burnt
Banksia scabrella	P4	10	335207	6745285	Dead, burnt
Banksia scabrella	P4	25	335207	6745429	Dead, burnt
Banksia scabrella	P4	50	335207	6745460	Dead, burnt
Banksia scabrella	P4	10	335209	6745347	Dead, burnt
Banksia scabrella	P4	40	335209	6745485	Dead, burnt
Banksia scabrella	P4	40	335210	6745314	Dead, burnt
Banksia scabrella	P4	20	335226	6745378	Dead, burnt
Banksia scabrella	P4	3	335232	6745247	Dead, burnt
Banksia scabrella	P4	40	335232	6745347	Dead, burnt
Banksia scabrella	P4	6	335233	6745290	Dead, burnt
Banksia scabrella	P4	38	335235	6745465	Dead, burnt
Banksia scabrella	P4	15	335237	6745425	Dead, burnt
Banksia scabrella	P4	38	335253	6745313	Dead, burnt
Banksia scabrella	P4	12	335254	6745258	Dead, burnt
Banksia scabrella	P4	37	335255	6745409	Dead, burnt
Banksia scabrella	P4	22	335256	6745216	Dead, burnt
Banksia scabrella	P4	45	335259	6745450	Dead, burnt
Banksia scabrella	P4	29	335259	6745360	Dead, burnt
Banksia scabrella	P4	30	335259	6745184	Dead, burnt
Banksia scabrella	P4	63	335278	6745450	Dead, burnt
Banksia scabrella	P4	50	335280	6745408	Dead, burnt
Banksia scabrella	P4	5	335283	6745227	Dead, burnt
Banksia scabrella	P4	24	335284	6745323	Dead, burnt
Banksia scabrella	P4	38	335286	6745273	Dead, burnt
Banksia scabrella	P4	36	335286	6745365	Dead, burnt
Banksia scabrella	P4	7	335287	6745151	Dead, burnt
Banksia scabrella	P4	13	335289	6745182	Dead, burnt
Banksia scabrella	P4	20	335320	6745369	Dead, burnt
Banksia scabrella	P4	35	335320	6745167	Dead, burnt
Banksia scabrella	P4	8	335320	6745199	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	30	335320	6745276	Dead, burnt
Banksia scabrella	P4	12	335321	6745253	Dead, burnt
Banksia scabrella	P4	10	335322	6745320	Dead, burnt
Banksia scabrella	P4	20	335327	6745418	Dead, burnt
Banksia scabrella	P4	30	335345	6745261	Dead, burnt
Banksia scabrella	P4	10	335345	6745203	Dead, burnt
Banksia scabrella	P4	15	335346	6745234	Dead, burnt
Banksia scabrella	P4	10	335347	6745436	Dead, burnt
Banksia scabrella	P4	5	335348	6745394	Dead, burnt
Banksia scabrella	P4	5	335348	6745287	Dead, burnt
Banksia scabrella	P4	1	335349	6745175	Alive
Banksia scabrella	P4	20	335349	6745175	Dead, burnt
Banksia scabrella	P4	30	335349	6745369	Dead, burnt
Banksia scabrella	P4	30	335349	6745422	Dead, burnt
Banksia scabrella	P4	10	335351	6745317	Dead, burnt
Banksia scabrella	P4	2	335352	6745155	Dead, burnt
Banksia scabrella	P4	8	335352	6745345	Dead, burnt
Banksia scabrella	P4	6	335372	6745362	Dead, burnt
Banksia scabrella	P4	5	335373	6745263	Dead, burnt
Banksia scabrella	P4	3	335377	6745200	Dead, burnt
Banksia scabrella	P4	2	335379	6745313	Dead, burnt
Banksia scabrella	P4	2	335386	6745446	Dead, burnt
Banksia scabrella	P4	7	335402	6745418	Dead, burnt
Banksia scabrella	P4	5	335405	6745454	Dead, burnt
Banksia scabrella	P4	10	335432	6745428	Dead, burnt
Banksia scabrella	P4	5	335439	6745387	Alive
Banksia scabrella	P4	15	335443	6745250	Alive
Banksia scabrella	P4	5	335443	6745196	Dead, burnt
Banksia scabrella	P4	4	335444	6745174	Alive
Banksia scabrella	P4	3	335444	6745174	Dead, burnt
Banksia scabrella	P4	6	335444	6745267	Alive
Banksia scabrella	P4	2	335462	6745178	Dead, burnt
Banksia scabrella	P4	5	335467	6745209	Dead, burnt
Banksia scabrella	P4	2	335468	6745258	Dead, burnt
Banksia scabrella	P4	5	335469	6745331	Dead, burnt
Banksia scabrella	P4	6	335470	6745439	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	9	335502	6745423	Dead, burnt
Banksia scabrella	P4	4	335503	6745244	Dead, burnt
Banksia scabrella	P4	8	335505	6745395	Dead, burnt
Banksia scabrella	P4	6	335518	6745359	Dead, burnt
Banksia scabrella	P4	12	335532	6745394	Dead, burnt
Banksia scabrella	P4	15	335557	6745396	Dead, burnt
Banksia scabrella	P4	14	335557	6745335	Dead, burnt
Banksia scabrella	P4	5	335559	6745289	Dead, burnt
Banksia scabrella	P4	10	335562	6745364	Dead, burnt
Banksia scabrella	P4	4	335583	6745337	Dead, burnt
Banksia scabrella	P4	10	335585	6745485	Dead, burnt
Banksia scabrella	P4	40	335589	6745430	Dead, burnt
Banksia scabrella	P4	1	335589	6745403	Dead, burnt
Banksia scabrella	P4	1	335590	6745171	Dead, burnt
Banksia scabrella	P4	8	335590	6745557	Dead, burnt
Banksia scabrella	P4	10	335590	6745456	Dead, burnt
Banksia scabrella	P4	1	335615	6745300	Dead, burnt
Banksia scabrella	P4	1	335616	6745501	Dead, burnt
Banksia scabrella	P4	8	335619	6745452	Dead, burnt
Banksia scabrella	P4	8	335628	6745374	Dead, burnt
Banksia scabrella	P4	4	335634	6745440	Dead, burnt
Banksia scabrella	P4	3	335639	6745484	Dead, burnt
Banksia scabrella	P4	1	335642	6745256	Dead, burnt
Banksia scabrella	P4	2	335678	6745342	Dead, burnt
Banksia scabrella	P4	3	335683	6745275	Dead, burnt
Banksia scabrella	P4	2	335702	6745272	Dead, burnt
Banksia scabrella	P4	35	335703	6745443	Dead, burnt
Banksia scabrella	P4	15	335703	6745413	Dead, burnt
Banksia scabrella	P4	2	335706	6745143	Dead, burnt
Banksia scabrella	P4	20	335731	6745164	Dead, burnt
Banksia scabrella	P4	1	335736	6745201	Dead, burnt
Banksia scabrella	P4	2	335738	6745353	Dead, burnt
Banksia scabrella	P4	1	335738	6745286	Dead, burnt
Banksia scabrella	P4	7	335764	6745180	Dead, burnt
Banksia scabrella	P4	5	335772	6745145	Dead, burnt
Banksia scabrella	P4	2	335773	6745271	Dead, burnt

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Banksia scabrella	P4	11	335774	6745324	Dead, burnt
Banksia scabrella	P4	1	335790	6745196	Dead, burnt
Banksia scabrella	P4	30	335793	6745325	Dead, burnt
Banksia scabrella	P4	16	335794	6745345	Dead, burnt
Banksia scabrella	P4	15	335797	6745283	Dead, burnt
Banksia scabrella	P4	5	335799	6745236	Dead, burnt
Banksia scabrella	P4	18	335800	6745301	Dead, burnt
Banksia scabrella	P4	12	335821	6745622	Dead, burnt
Banksia scabrella	P4	30	335824	6745332	Dead, burnt
Banksia scabrella	P4	6	335825	6745244	Dead, burnt
Banksia scabrella	P4	10	335826	6745359	Dead, burnt
Banksia scabrella	P4	4	335829	6745259	Dead, burnt
Banksia scabrella	P4	13	335830	6745283	Dead, burnt
Banksia scabrella	P4	8	335830	6745206	Dead, burnt
Banksia scabrella	P4	1	335832	6745299	Alive
Banksia scabrella	P4	20	335832	6745140	Dead, burnt
Banksia scabrella	P4	2	335851	6745588	Dead, burnt
Banksia scabrella	P4	5	335852	6745333	Dead, burnt
Banksia scabrella	P4	4	335853	6745533	Dead, burnt
Banksia scabrella	P4	15	335853	6745619	Dead, burnt
Banksia scabrella	P4	8	335853	6745209	Dead, burnt
Banksia scabrella	P4	10	335856	6745279	Dead, burnt
Banksia scabrella	P4	6	335857	6745264	Dead, burnt
Banksia scabrella	P4	12	335858	6745242	Dead, burnt
Eucalyptus macrocarpa subsp. *elachantha*	P4	10	330671	6745515	
Guichenotia alba	P3	5	322387	6745584	
Guichenotia alba	P3	20	322403	6745582	
Guichenotia alba	P3	5	322405	6745567	
Guichenotia alba	P3	25	322407	6745613	
Guichenotia alba	P3	5	322411	6745640	
Guichenotia alba	P3	35	322419	6745565	
Guichenotia alba	P3	30	322419	6745583	
Guichenotia alba	P3	20	322427	6745607	
Guichenotia alba	P3	1	322430	6745546	
Guichenotia alba	P3	10	322431	6745636	

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Guichenotia alba	P3	2	322445	6745552	
Guichenotia alba	P3	20	322446	6745612	
Guichenotia alba	P3	15	322449	6745593	
Guichenotia alba	P3	3	322449	6745555	
Guichenotia alba	P3	20	322455	6745638	
Guichenotia alba	P3	30	322462	6745617	
Guichenotia alba	P3	22	322465	6745570	
Guichenotia alba	P3	6	322466	6745598	
Guichenotia alba	P3	1	322469	6745559	
Guichenotia alba	P3	5	322477	6745621	
Guichenotia alba	P3	5	322486	6745622	
Guichenotia alba	P3	1	322493	6745639	
Guichenotia alba	P3	3	322493	6745558	
Guichenotia alba	P3	3	323626	6745565	
Guichenotia alba	P3	1	323732	6745674	
Guichenotia alba	P3	1	323739	6745649	
Guichenotia alba	P3	5	323744	6745682	
Guichenotia alba	P3	9	323765	6745681	
Guichenotia alba	P3	5	323777	6745664	
Guichenotia alba	P3	6	323810	6745683	
Guichenotia alba	P3	2	323814	6745657	
Guichenotia alba	P3	3	323824	6745619	
Guichenotia alba	P3	4	323827	6745645	
Guichenotia alba	P3	3	323844	6745702	
Guichenotia alba	P3	10	323861	6745708	
Guichenotia alba	P3	1	323866	6745640	
Guichenotia alba	P3	6	323878	6745723	
Guichenotia alba	P3	3	323879	6745645	
Guichenotia alba	P3	15	323880	6745690	
Guichenotia alba	P3	1	323886	6745641	
Guichenotia alba	P3	5	323888	6745713	
Guichenotia alba	P3	20	323902	6745725	
Guichenotia alba	P3	20	323906	6745688	
Guichenotia alba	P3	5	323907	6745709	
Guichenotia alba	P3	2	323922	6745687	
Guichenotia alba	P3	10	323930	6745710	

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Guichenotia alba	P3	1	323938	6745727	
Guichenotia alba	P3	4	323956	6745707	
Guichenotia alba	P3	3	323969	6745675	
Guichenotia alba	P3	2	323970	6745719	
Guichenotia alba	P3	5	323973	6745705	
Guichenotia alba	P3	28	323977	6745689	
Guichenotia alba	P3	17	323982	6745727	
Guichenotia alba	P3	30	323992	6745697	
Guichenotia alba	P3	10	324002	6745725	
Guichenotia alba	P3	10	324011	6745686	
Guichenotia alba	P3	16	324015	6745707	
Guichenotia alba	P3	5	324022	6745717	
Guichenotia alba	P3	4	324024	6745680	
Guichenotia alba	P3	20	324028	6745691	
Guichenotia alba	P3	20	324031	6745706	
Guichenotia alba	P3	15	324042	6745691	
Guichenotia alba	P3	14	324046	6745717	
Guichenotia alba	P3	19	324066	6745719	
Guichenotia alba	P3	1	324113	6745724	
Guichenotia alba	P3	1	326938	6745551	
Lasiopetalum ogilvieanum	P1	2	327338	6745545	
Lasiopetalum ogilvieanum	P1	12	329327	6745484	
Lasiopetalum ogilvieanum	P1	2	329892	6745564	
Lasiopetalum ogilvieanum	P1	3	330122	6745522	
Lasiopetalum ogilvieanum	P1	6	330144	6745567	
Lasiopetalum ogilvieanum	P1	2	330156	6745494	
Lasiopetalum ogilvieanum	P1	1	330262	6745578	
Lasiopetalum ogilvieanum	P1	3	330280	6745582	
Lasiopetalum ogilvieanum	P1	4	330314	6745586	
Lasiopetalum ogilvieanum	P1	1	330878	6745535	
Lasiopetalum ogilvieanum	P1	1	332409	6745386	
Lasiopetalum ogilvieanum	P1	3	332905	6745352	
Lasiopetalum ogilvieanum	P1	18	332908	6745297	
Lasiopetalum ogilvieanum	P1	2	332915	6745353	
Lasiopetalum ogilvieanum	P1	5	333070	6745319	
Lasiopetalum ogilvieanum	P1	9	333169	6745342	

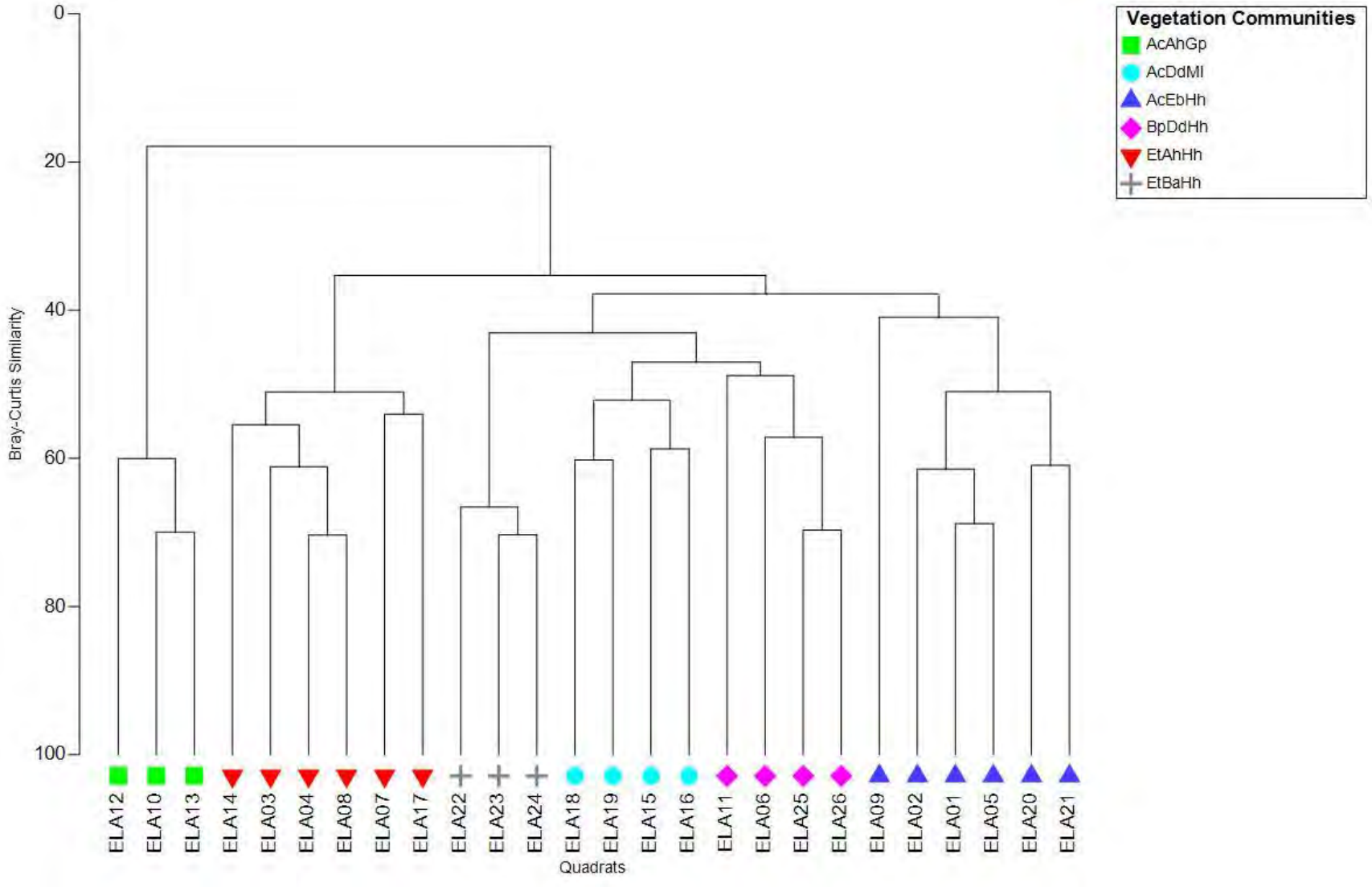
Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Lasiopetalum ogilvieanum	P1	2	333275	6745287	
Lasiopetalum ogilvieanum	P1	15	335499	6745351	
Lasiopetalum ogilvieanum	P1	2	335668	6745409	
Lasiopetalum ogilvieanum	P1	1	335831	6745304	
Lasiopetalum ogilvieanum	P1	6	335832	6745140	
Mesomelaena stygia subsp. *deflexa*	P3	5	332288	6745356	
Mesomelaena stygia subsp. *deflexa*	P3	15	332289	6745333	
Mesomelaena stygia subsp. *deflexa*	P3	8	332317	6745395	
Mesomelaena stygia subsp. *deflexa*	P3	20	332317	6745359	
Mesomelaena stygia subsp. *deflexa*	P3	5	332355	6745364	
Mesomelaena stygia subsp. *deflexa*	P3	10	332359	6745389	
Mesomelaena stygia subsp. *deflexa*	P3	6	332450	6745388	
Mesomelaena stygia subsp. *deflexa*	P3	10	332520	6745351	
Mesomelaena stygia subsp. *deflexa*	P3	10	332924	6745356	
Mesomelaena stygia subsp. *deflexa*	P3	5	332972	6745302	
Mesomelaena stygia subsp. *deflexa*	P3	20	333079	6745296	
Mesomelaena stygia subsp. *deflexa*	P3	1	333142	6745324	
Mesomelaena stygia subsp. *deflexa*	P3	40	333202	6745344	
Mesomelaena stygia subsp. *deflexa*	P3	20	333241	6745308	
Mesomelaena stygia subsp. *deflexa*	P3	80	333244	6745341	
Mesomelaena stygia subsp. *deflexa*	P3		333259	6745368	
Mesomelaena stygia subsp. *deflexa*	P3	500	333265	6745285	
Mesomelaena stygia subsp. *deflexa*	P3	100	333267	6745332	
Mesomelaena stygia subsp. *deflexa*	P3	80	333270	6745310	
Mesomelaena stygia subsp. *deflexa*	P3		333284	6745367	
Mesomelaena stygia subsp. *deflexa*	P3	300	333285	6745282	
Mesomelaena stygia subsp. *deflexa*	P3		333296	6745363	
Mesomelaena stygia subsp. *deflexa*	P3	120	333304	6745330	
Mesomelaena stygia subsp. *deflexa*	P3	150	333307	6745307	
Mesomelaena stygia subsp. *deflexa*	P3	180	333318	6745279	
Mesomelaena stygia subsp. *deflexa*	P3		333331	6745363	
Mesomelaena stygia subsp. *deflexa*	P3	40	333333	6745273	
Mesomelaena stygia subsp. *deflexa*	P3	200	333335	6745302	
Mesomelaena stygia subsp. *deflexa*	P3	150	333336	6745328	
Mesomelaena stygia subsp. *deflexa*	P3	80	333354	6745277	
Mesomelaena stygia subsp. *deflexa*	P3	200	333362	6745298	

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Mesomelaena stygia subsp. *deflexa*	P3	200	333373	6745323	
Mesomelaena stygia subsp. *deflexa*	P3		333383	6745357	
Mesomelaena stygia subsp. *deflexa*	P3	200	333390	6745303	
Mesomelaena stygia subsp. *deflexa*	P3		333419	6745359	
Mesomelaena stygia subsp. *deflexa*	P3	200	333422	6745297	
Mesomelaena stygia subsp. *deflexa*	P3	12	333430	6745275	
Mesomelaena stygia subsp. *deflexa*	P3	200	333431	6745325	
Mesomelaena stygia subsp. *deflexa*	P3		333445	6745359	
Mesomelaena stygia subsp. *deflexa*	P3	200	333446	6745295	
Mesomelaena stygia subsp. *deflexa*	P3	250	333454	6745274	
Mesomelaena stygia subsp. *deflexa*	P3	150	333460	6745328	
Mesomelaena stygia subsp. *deflexa*	P3	50	333466	6745301	
Mesomelaena stygia subsp. *deflexa*	P3		333466	6745362	
Mesomelaena stygia subsp. *deflexa*	P3	80	333484	6745325	
Mesomelaena stygia subsp. *deflexa*	P3		333486	6745354	
Mesomelaena stygia subsp. *deflexa*	P3	30	333488	6745294	
Mesomelaena stygia subsp. *deflexa*	P3		333499	6745333	
Mesomelaena stygia subsp. *deflexa*	P3	30	333508	6745323	
Mesomelaena stygia subsp. *deflexa*	P3	4	333592	6745293	
Mesomelaena stygia subsp. *deflexa*	P3	50	333800	6745269	
Mesomelaena stygia subsp. *deflexa*	P3	50	333823	6745263	
Mesomelaena stygia subsp. *deflexa*	P3	30	333858	6745259	
Mesomelaena stygia subsp. *deflexa*	P3	100	333858	6745277	
Mesomelaena stygia subsp. *deflexa*	P3	150	333891	6745279	
Micromyrtus rogeri	P1	30	330488	6745551	
Micromyrtus rogeri	P1	20	330527	6745584	
Micromyrtus rogeri	P1	40	330545	6745580	
Micromyrtus rogeri	P1	70	331913	6745390	
Micromyrtus rogeri	P1	100	331921	6745405	
Micromyrtus rogeri	P1	50	331924	6745388	
Micromyrtus rogeri	P1	80	332099	6745430	
Micromyrtus rogeri	P1	100	332100	6745374	
Micromyrtus rogeri	P1	100	332100	6745394	
Micromyrtus rogeri	P1	100	332102	6745413	
Micromyrtus rogeri	P1	10	332108	6745363	
Micromyrtus rogeri	P1	70	332110	6745440	

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Micromyrtus rogeri	P1	30	332117	6745385	
Micromyrtus rogeri	P1	30	332120	6745417	
Micromyrtus rogeri	P1	20	332122	6745401	
Micromyrtus rogeri	P1	60	332126	6745368	
Micromyrtus rogeri	P1	3	332137	6745358	
Micromyrtus rogeri	P1	45	332145	6745337	
Micromyrtus rogeri	P1	26	332147	6745342	
Stawellia dimorphantha	P4	1	321241	6745586	
Stawellia dimorphantha	P4	10	321357	6745607	
Stawellia dimorphantha	P4	5	321401	6745591	
Stawellia dimorphantha	P4	2	321416	6745566	
Stawellia dimorphantha	P4	5	321424	6745609	
Stawellia dimorphantha	P4	1	321428	6745630	
Stawellia dimorphantha	P4	3	321448	6745630	
Stawellia dimorphantha	P4	5	321462	6745610	
Stawellia dimorphantha	P4	5	321473	6745592	
Stawellia dimorphantha	P4	1	321480	6745613	
Stawellia dimorphantha	P4	10	321487	6745635	
Stawellia dimorphantha	P4	2	321506	6745642	
Stawellia dimorphantha	P4	10	321508	6745625	
Stawellia dimorphantha	P4	5	321509	6745613	
Stawellia dimorphantha	P4	20	321518	6745591	
Stawellia dimorphantha	P4	1	321531	6745558	
Stawellia dimorphantha	P4	10	321535	6745592	
Stawellia dimorphantha	P4	2	321536	6745618	
Stawellia dimorphantha	P4	5	321538	6745603	
Stawellia dimorphantha	P4	10	321546	6745631	
Stawellia dimorphantha	P4	20	321549	6745620	
Stawellia dimorphantha	P4	5	321551	6745606	
Stawellia dimorphantha	P4	5	321554	6745614	
Stawellia dimorphantha	P4	20	321568	6745609	
Stylidium drummondianum	P3	20	330467	6745513	
Stylidium drummondianum	P3	4	330663	6745563	
Stylidium drummondianum	P3	5	330717	6745557	
Stylidium drummondianum	P3	12	330722	6745557	
Stylidium drummondianum	P3	1	330762	6745530	

Species	DBCA listing	Number of individuals	Easting	Northing	Comments
Stylidium drummondianum	P3	1	331766	6745392	
Stylidium drummondianum	P3	15	332079	6745427	
Stylidium drummondianum	P3	3	332080	6745414	
Stylidium drummondianum	P3	6	332464	6745348	
Stylidium drummondianum	P3	2	332500	6745317	
Stylidium drummondianum	P3	6	332505	6745319	
Stylidium drummondianum	P3	1	332520	6745351	

Appendix I Hierarchical clustering dendrogram



Appendix J Fauna habitat photos

Fauna habitat 1: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on sandy plains

Fauna habitat 2: *Banksia* spp. and occasional *Eucalyptus todtiana* mid open woodland over shrubs and sedgeland on sandy plains

Fauna habitat 3: *Allocasuarina campestris* tall sparse shrubland over shrubs and sedgeland on stony rises

Appendix K Fauna species list

Species	Common name	Sign
Accipiter fasciatus	Brown Goshawk	Observed/heard
Anthus novaeseelandiae	Australasian Pipit	Observed/heard
Artamus personatus	Masked Woodswallow	Observed/heard
Barnardius zonarius	Australian Ringneck	Observed/heard
Chrysococcyx basalis	Horsfield's Bronze-cuckoo	Observed/heard
Coracina novaehollandiae	Black-faced Cuckoo Shrike	Observed/heard
Corvus coronoides	Australian Raven	Observed/heard
Cracticus tibicen	Australian Magpie	Observed/heard
Dromaius novaehollandiae	Emu	Observed/heard
Eolophus roseicapilla	Galah	Observed/heard
Falco cenchroides	Nankeen Kestrel	Observed/heard
Gliciphila melanops	Tawny-crowned Honeyeater	Observed/heard
Grallina cyanoleuca	Magpie-lark	Observed/heard
Lalage tricolor	White-winged Triller	Observed/heard
Lichenostomus virescens	Singing Honeyeater	Observed/heard
Lichmera indistincta	Brown Honeyeater	Observed/heard
Malurus lamberti	Variegated Fairywren	Observed/heard
Malurus leucopterus	White-winged Fairy Wren	Observed/heard
Malurus splendens	Splendid Fairy Wren	Observed/heard
Merops ornatus	Rainbow Bee-eater	Observed/heard
Motacilla alba	White Wagtail	Observed/heard
Ocyphaps lophotes	Crested Pigeon	Observed/heard
Pachycephala rufiventris	Rufous Whistler	Observed/heard
Phaps chalcoptera	Common Bronzewing	Observed/heard
Phylidonyris niger	White-cheeked Honeyeater	Observed/heard
Phylidonyris novaehollandiae	New Holland Honeyeater	Observed/heard
Rhipidura leucophrys	Willie Wagtail	Observed/heard
Stipiturus malachurus	Southern Emu-wren	Observed/heard
**Bos taurus*	Cattle	Observed, tracks, scats
**Canis lupus familiaris*	Domestic Dog	Tracks, scats
**Capra hircus*	Goat	Tracks, scats
Macropus fuliginosus	Western Grey Kangaroo	Observed, scats
**Oryctolagus cuniculus*	European Rabbit	Observed, scats
Ctenophorus maculatus subsp. *maculatus*	Spotted Military Dragon	Observed
Notechis scutatus	Tiger Snake	Observed

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