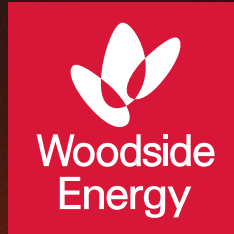


WOODSIDE SOLAR FACILITY ENVIRONMENTAL REFERRAL SUPPORTING DOCUMENT APPENDICES

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Revision 4

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WOODSIDE SOLAR FACILITY ENVIRONMENT MANAGEMENT PLAN



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1. CONTEXT, SCOPE AND RATIONALE

1.1 Introduction

Woodside Energy Ltd (Woodside) is proposing to develop a Woodside Solar Facility, approximately 15 kilometres (km) southwest of Karratha, Western Australia (WA). This will generate electricity from a large scale solar photovoltaic farm (Solar PV Farm), complemented by energy storage (battery) infrastructure (the Proposal). The Proposal will supply renewable energy for use by industrial customers, expected to include the Woodside operated Pluto LNG Facility

The Proposal is described in its entirety in Section 3 of the Environmental Referral Supporting Document (Woodside 2021a) and is summarised in Section 1.2 of this Environmental Management Plan (EMP) for ease of reference.

This EMP has been developed to address potential impacts on key environmental factors and MNES relevant to the construction and operation of the Proposal. This EMP presents management criteria, monitoring and reporting requirements to be implemented to minimise potential impacts on the environment.

This EMP has been developed in accordance with the EPA 'Instructions on how to prepare EP Act Part IV Environmental Management Plans' (EPA 2020a). Additional management plans may be prepared including, but may not be limited to, those listed within this EMP.

1.2 Proposal Description

Woodside is referring a Proposal for the Woodside Solar Facility under Section 38 of the EP Act and under the EPBC Act. This EMP addresses the construction and operations of both the initial and future expansion phases of the Proposal.

Table 1-1: Proposal Key Infrastructure Components

Infrastructure Component	Development Envelope	Location and Disturbance Footprint	Description
Solar PV Farm	942.7 hectare (ha)	Located in the Maitland Strategic Industrial Area (MSIA) Buffer Area. Disturbance footprint up to 942.7*ha.	<ul style="list-style-type: none"> Installation of solar panels and inverters with output of up to 500 MW(AC) in total, across multiple expansion phases. Approximately 1,000,000 solar panels each approximately 1 m by 2 m attached to mounting structures positioned 0.5 – 4 m above ground. Access roads for construction and maintenance. Supporting infrastructure such as a battery energy storage system, electrical substation and access roads. Supporting facilities such as workshop, laydown areas and office and/or ablutions and crib facilities.
Solar Plant Supporting Infrastructure (SPSI)	158 ha	<ul style="list-style-type: none"> Located on the eastern boundary of the MSIA. Disturbance footprint of 22.5ha for the main site and an additional 10.5 ha for access roads. 	<ul style="list-style-type: none"> Supporting infrastructure such as a battery energy storage system, electrical substation and access roads. Supporting facilities such as workshop, laydown areas and

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Infrastructure Component	Development Envelope	Location and Disturbance Footprint	Description
			office and/or ablutions and crib facilities.
Total Project		The total project comprises a disturbance footprint of up to 975.6 ha within a DE of 1100.3 ha.	

* Buffers will be established around any heritage sites and for vegetation corridors that are not accounted for in this figure

2. ENVIRONMENTAL FACTORS

The environmental factors identified as being relevant to the Proposal are outlined in Table 2-1. The environmental factors are classified as follows:

- **Key Environmental Factor:** The Proposal may potentially cause a significant impact on the environment.
- **Other Environmental Factor:** The Proposal will not cause a significant impact but has potential to interact with the environment.

Environmental Factors classified as **Not Relevant** in the Project Referral Supporting Document (Woodside 2021a) are not included in this EMP as the Proposal is not deemed to cause environmental impact.

Table 2-1: Key Environmental Factors, Activities and Values

Factor	Environmental Factor	Proposal activities that would affect the factor	Site-specific environmental values, uses, condition or sensitive components which will be affected
Flora and Vegetation	Key Environmental Factor	<ul style="list-style-type: none"> Clearing of native vegetation Earthworks and movement of vehicles and machinery Alteration of surface water flows around infrastructure 	<p>Clearing of up to approx. 975.6 ha of native vegetation within a 1,100.3 ha DE.</p> <p>Native vegetation varying from excellent to degraded condition.</p> <p>No impact to WA listed threatened flora species or threatened ecological communities.</p> <p>Presence of priority ecological communities (PEC) within the DE:</p> <p>Priority 1:</p> <ul style="list-style-type: none"> Roebourne Plains coastal grasslands with gilgai microrelief on cracking clays <p>Priority 3:</p> <ul style="list-style-type: none"> Horseflat land system of the Roebourne Plains <p>Presence of weeds including declared plants and weeds of national significance (WoNS).</p>
Terrestrial Fauna	Key Environmental Factor	<ul style="list-style-type: none"> Clearing of native vegetation Earthworks and movement of vehicles and machinery Storage, handling and disposal of hazardous materials and wastes, including food wastes Installation of infrastructure posing collision/entanglement hazards. 	<p><u>Habitat for conservation significant fauna:</u></p> <ul style="list-style-type: none"> Tussock Grasslands on Cracking Clays Minor drainage lines and small areas of exposed granite Hummock Grassland on Rocky Plain (Triodia on stony soils) <p><u>Potential presence of other WA conservation significant species:</u></p> <ul style="list-style-type: none"> Peregrine Falcon (<i>Falco peregrinus</i>) Other specially protected fauna Northern Short-tailed Mouse (<i>Leggadina lakedownensis</i>) Priority 4 Lined Soil-crevice Skink (<i>Notoscincus butleri</i>) Priority 4 Bridled Tern (<i>Onychoprion anaethetus</i>) MIT¹, IA²

¹ EPBC Act listed migratory terrestrial species

² BC Act listed international migratory agreement migratory birds

Factor	Environmental Factor	Proposal activities that would affect the factor	Site-specific environmental values, uses, condition or sensitive components which will be affected
Terrestrial Environmental Quality	Other Factor	<ul style="list-style-type: none"> • Clearing of vegetation • Excavation • Importation of fill materials • Movement of vehicles and machinery • Alteration of surface water flows • Storage, handling and disposal of hazardous materials and wastes 	<ul style="list-style-type: none"> • Oriental Pratincole (<i>Glaucola maldivarum</i>) MIT, IA • Oriental Plover (<i>Charadrius veredus</i>) MIT, IA <p>Introduced species including Cats, Cattle and Black Rat.</p> <ul style="list-style-type: none"> • Construction of the Solar PV Farm will disturb up to 975.6 ha of land with the potential for soil erosion. • Construction of the Solar PV Farm and SPSI will require excavation for foundations which may oxidise acid sulfate soils within ephemeral creeklines. • Pastoral land • Substrate for native vegetation and fauna habitat
Inland Waters	Other Factor	<ul style="list-style-type: none"> • Clearing of vegetation • Excavation • Importation of fill materials (if required) • Movement of vehicles and machinery • Alteration of surface water flows • Creation of impervious surfaces • Storage, handling and disposal of hazardous materials and wastes 	<ul style="list-style-type: none"> • Ephemeral creeks • Dampier Salt Pond Zero • Pilbara Surface Water Proclamation Area • Pilbara Groundwater Proclamation Area • Potential ASS within ephemeral creeklines
Social Surroundings (Cultural Heritage and Amenity)	Key Environmental Factor	<ul style="list-style-type: none"> • Clearing of vegetation and earthworks • Installation of infrastructure • Presence and activity of people, vehicles, vessels and equipment 	<ul style="list-style-type: none"> • DE within Maitland Strategic Industrial Estate and buffer area • Access to heritage features or use of land for Traditional activities • Disturbance to flora and vegetation that will result in impacts to species used for cultural purposes • Direct, physical disturbance of Aboriginal and municipal heritage features from construction and operational activities

2.1 Rationale and approach

This EMP adopts management provisions to achieve the environmental objectives for each key environmental factor, based on consideration of:

- Survey and study findings.
- Key assumptions and uncertainties.
- Risks to environmental values including MNES.
- Scientific information on the site and region.
- Intensity, duration, magnitude and footprint of impact.
- Changes in the environment.
- External issues to the Proposal.
- Timeframe for mitigation.

2.1.1 Survey and study findings

Table 2-2 presents the surveys and studies relevant to the Proposal, which have been considered in developing this EMP. Details of the survey/study findings are presented in the Project Referral Supporting Document (Woodside 2021a).

Table 2-2: Surveys and Studies relevant to the Proposal

Factor	Survey / Study	Consultant	Description
Flora and Vegetation	Reconnaissance Flora and Vegetation Survey	Vicki Long & Associates (2019) Vicki Long & Associates (2021)	Desktop assessment and field survey in June-July 2019 over DE. Field survey in April 2020 included assessing vegetation type, condition, habitat and presence of priority flora, PECs and weeds.
Terrestrial Fauna	Level 1 Terrestrial Fauna Survey	GHD (2019)	Desktop assessment and field survey in June-July 2019 over DEs. Field survey included habitat assessment, opportunistic fauna searches, camera trapping and bat survey. Moderate limitation due to survey timing, which may under represent migratory birds, but these are not predicted to be directly impacted.
Terrestrial Environmental Quality	n/a	n/a	An acid sulfate soil (ASS) investigation will be undertaken for all proposed excavation areas within areas mapped at risk of ASS.
Inland Waters	Surface water & flood risk evaluation	RPS (2018a) and RPS (2018b) GHD (2017)	Information regarding surface water flows within the MSIA and storm surge modelling.
Inland Waters	Groundwater quality	GHD (2017)	Measurement of groundwater levels and information on groundwater quality
Social Surroundings	Aboriginal Heritage Database Search	Woodside (2021)	Desktop search of relevant heritage sites

Factor	Survey / Study	Consultant	Description
(Amenity and Cultural Heritage)	Heritage assessment	Black Wattle Archaeology Pty Ltd (2019)	Archaeological site avoidance survey in Solar PV Farm (partial) and SPSI.
	Ethnographic Assessment	DB-Consulting (2019)	Ethnographic site avoidance and site assessment survey for the Solar PV Farm (partial) and SPSI.

2.1.2 Key assumptions and uncertainties

This EMP presents management provisions which address the key assumptions and uncertainties relating to the Proposal implementation and the values and sensitivities of the key environmental factors.

The key assumptions include:

1. Presence of migratory or conservation significant fauna. The Level 1 survey (GHD 2019) identified the potential for conservation significant fauna to use potential habitats within the proposed DE but did not record the presence of certain species, which may be wide ranging or cryptic. The Level 1 survey also noted the potential under representation of migratory birds due to survey timing. The EMP addresses this uncertainty through provisions that protect potential habitats for conservation significant species such as drainage lines.
2. No soil sampling has been undertaken for ASS. Prior to construction requiring significant excavation, an ASS investigation will be undertaken to confirm the presence or absence of ASS and the required site specific management measures to be implemented in accordance with the DWER guidelines.
3. A search of the DWER contaminated sites database indicates the Proposal DE is not located within 5 km of any registered contaminated sites.
4. Management of the risk of disturbance to Aboriginal Heritage Sites is covered within the Social Surrounds - Cultural Heritage Management Plan (Woodside 2021b).

2.1.3 Existing and Proposed Mitigation Measures

In order to ensure the Proposal is implemented in a manner that meets the EPA's environmental objectives, existing and proposed mitigation measures have been identified for each potential impact and risk to the relevant environmental factors. As defined by Woodside's Health, Safety and Environment Risk Assessment Guideline (Woodside 2017c), mitigation measures have been categorised in accordance with the hierarchy of controls:

- 1 Elimination of the risk by removing the hazard [Avoid].
- 2 Substitution of a hazard with a less hazardous one [Avoid/Minimise].
- 3 Engineering controls which include design measures to prevent or reduce the frequency of the risk event, detect or control the risk event (limiting the magnitude, intensity and duration) [Minimise].
- 4 Procedures and administration which include management systems and work instructions used to prevent or mitigate environmental exposure to hazards [Avoid/Minimise].
- 5 Emergency response and contingency planning which includes methods to enable recovery from the impact of an event [Rehabilitate].

2.1.4 Rationale for choice of provisions

This EMP adopts provisions based on industry standard practices for avoidance, minimisation and rehabilitation of environmental impacts during construction.

The provisions reflect the temporary duration of construction activities presented in Table 2-1, and the intermittent, episodic and acute nature of impacts posed by construction activities, such as unauthorised clearing, dust emissions during high winds, or accidental spills of hazardous materials or wastes.

The provisions have also reflected the potential for chronic impacts to occur post construction, such as the spread of introduced weeds or ongoing erosion of areas disturbed during construction, as well as impacts relating to maintenance and operating activities (e.g. Solar PV Farm maintenance).

The provisions consider the effects of issues external to the Proposal, including:

- Heavy rainfall events (e.g. cyclones), flooding and wet ground conditions.
- Movements of stock across disturbed areas.

The majority of provisions address episodic and acute impacts and provide short term mitigation. Provisions also address the longer term timeframes to demonstrate weed control and rehabilitation success.

2.1.5 Index of Biodiversity Surveys for Assessment

The biological surveys summarised in Table 2-2 have been submitted as part of the referral documentation and include an Index of Biodiversity Surveys for Assessments (IBSA) data package in accordance with EPA and Department of Water and Environmental Regulation (DWER) requirements.

3. INTERNAL MANAGEMENT FRAMEWORK

Woodside has a corporate Health, Safety, Environment and Quality (HSEQ) Management System (MS). The Company aims to be recognised as an industry leader in HSEQ through managing activities in a sustainable manner giving regard to Woodside's workforce, communities and the environment. Woodside is committed to managing activities to minimise adverse health, safety or environmental impacts, incorporating the right first time approach to quality.

The principles of Woodside's HSEQ Policy are:

- Implementing a systematic approach to HSEQ risk management
- Complying with relevant laws and regulations and applying responsible standards where laws do not exist
- Setting, measuring and reviewing objectives and targets that will drive continuous improvement in HSEQ performance
- Embedding HSEQ considerations in business planning and decision making processes
- Integrating HSEQ requirements when designing, purchasing, constructing and modifying equipment and facilities
- Maintaining a culture in which everybody is aware of their HSEQ obligations and feels empowered to speak up and intervene on HSEQ issues
- Undertaking and supporting research to improve Woodside's understanding of HSEQ and using science to support impact assessments and evidence based decision making
- Taking a collaborative and pro-active approach with stakeholders
- To require that contractors comply with HSEQ expectations in a mutually beneficial manner
- Publicly reporting on HSEQ performance.

A set of specific HSEQ policies and procedures is maintained for each Woodside facility. Proposal specific policies and procedures will be developed and maintained as required, in line with the HSEQ MS.

Risk control measures must be identified and implemented, using the hierarchy of controls, to manage risks to a tolerable and as low as reasonably practicable (ALARP) level.

3.1 Roles and responsibilities

Responsibility for the application of HSEQ policy rests with all Woodside employees, contractors and joint venturers engaged in activities under Woodside operational control.

Critical HSE roles are identified within each business unit, asset and function. Role specific training and competency development is provided to ensure competence to carry out work in a healthy and safe workplace and minimise impacts to the environment. All Woodside employees and contractors are made aware of the HSE hazards, risks, impacts, controls and required response to incidents in their workplace. The Woodside HSE Management Process Hierarchy is provided in Figure 3-1.

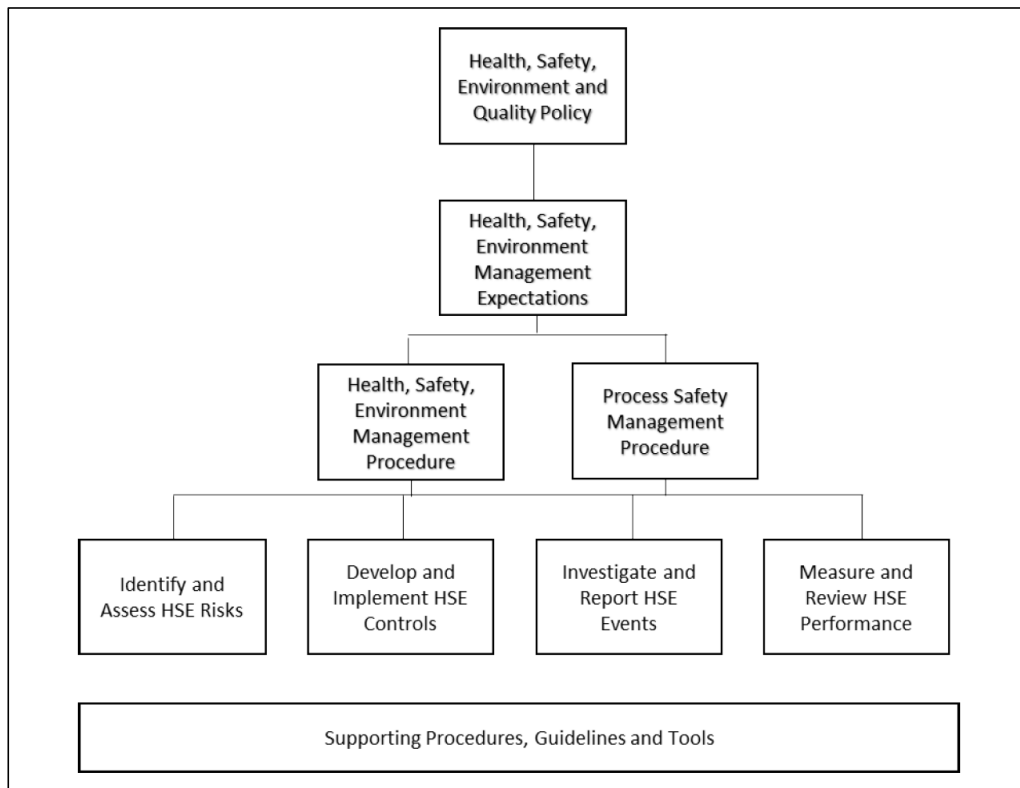


Figure 3-1: Woodside HSE Management Process Hierarchy

3.2 Communication

Woodside will communicate and distribute environmental information to the workforce by way of the following methods: site inductions, toolbox meetings, training, pre-start meetings, on-site notice boards, electronic media, environmental alerts and incident investigations lessons learnt.

Woodside has engaged with government departments, local government, traditional owner and neighbouring industries during the design and planning stage for the Proposal and will continue to consult as the Proposal evolves. Details of stakeholder consultation are presented in the Environmental Referral Supporting Document (Woodside 2021a). Community consultation is also planned as the Proposal progresses through to RFSU (Ready for Start-Up).

3.3 Environmental awareness training and inductions

Woodside will ensure that all personnel, including subcontractors, complete a site induction. This induction will include an environmental component where the following information will be provided.

- Environmental Code of Conduct
- Requirements of relevant environmental management documentation
- Significant environmental values to be protected
- Control strategies for the management of environmental risk in day-to-day activities
- Roles and responsibilities for implementing management, monitoring and reporting associated with the environment

- Applicable legislative responsibilities and requirements and the risks associated with noncompliance.
- Additional training will be provided to personnel, where applicable, which might include spill response or fire and emergency response.

Records of training and inductions will be maintained in a training register.

3.4 Complaints procedure

All complaints will be recorded within a register that will be developed and maintained by Woodside. Woodside maintains a 24/7 complaints hotline that members of the public can find access to via the Woodside public website. Incidents will be recorded by the person who causes or identifies the incident. Complaints will be recorded by the person who receives the complaint (at the time it is received). Records to be obtained about a complaint include:

- Contact details for person making complaint (name and phone number as a minimum)
- The approximate location that the issue was identified
- Date, time and issue/s that the complaint relates to.

3.5 Environmental incidents / non-compliances

Incident reporting and investigations are carried out in accordance with Woodside Health, Safety and Environment Event Reporting and Investigation Procedures. The overarching process for incident reporting and investigation is shown in Figure 3-2.



Figure 3-2: HSE Event Reporting and Investigation Process

The following procedure will be implemented when an incident / near miss / non-compliance occurs:

- Raise an incident report (no later than the end of the working day or shift)
- Preserve site evidence (to ensure integrity of investigations)
- Preliminary classification of the incident (Workplace Supervisor in consultation with the Responsible Manager is to determine the 'actual impact' and the 'potential risk rating', to establish who must be notified and how the incident will be investigated)
- Complete appropriate internal and external notifications:
- Record the incident in Woodside's *Incident Reporting Database*.
- Investigate the incident and report on findings (including the final classification of the incident)

Implement corrective actions:

- Identify and analyse root causes
- Identify required actions to prevent recurrence (e.g. install temporary fencing or signs)
- Identify any additional opportunities for improvement (e.g. improved training / education for personnel).

3.6 Emergency response

Woodside will prepare both a construction and operations phase Emergency Response Plan. This Plan will detail how emergencies are responded to within the DE.

3.7 Audits

To ensure the management measures outlined in this EMP are being adequately implemented and comply with relevant design and environmental standards, regular environmental audits will be undertaken. Auditing of the commitments outlined in this EMP will be undertaken as follows:

- Regular system audits of the EMS and compliance procedures, including:
- Prior to construction commencing – review of contractor management plans and processes for compliance with this EMP and regulatory environmental conditions
- At completion of construction to identify and correct any non-conformances
- Yearly as part of the Annual Environmental Review (during Operations)
- Regular site compliance inspections including audits of key Contractors' environmental management plans
- Persons responsible for environmental auditing will be suitably qualified

A progress and compliance report will be prepared following significant audit activities, to document the effectiveness of the environmental management measures that have been implemented. Any non-compliance will be highlighted and addressed. Where audit finds show environmental management actions are not effective, the audit may recommend changes to procedures.

3.8 Compliance reporting

Woodside will undertake reporting in accordance with regulatory and legislative requirements. It is expected that the Solar Power Plant will be a prescribed premises required to operate in accordance with a Part V EP Act licence, which will specify annual environmental and compliance reporting requirements. Woodside will submit an annual compliance report and annual environmental report to the DWER in accordance with the Part V licence requirements.

Woodside will complete the specified reporting for each key environmental factor detailed in Section 4 of this EMP.

4. EMP Provisions

4.1 Flora and Vegetation

4.1.1 EPA factor objective

To protect flora and vegetation so that biological diversity and ecological integrity are maintained (EPA 2016a).

4.1.2 Proposal specific objectives

- Protect priority ecological communities (PECs) and habitat for priority flora species
- Prevent clearing or removal of vegetation outside of approved clearing footprints
- Minimise indirect impacts to vegetation and flora adjacent or downstream of DE

4.1.3 Management provisions

This section outlines management provisions for the identified potential impacts and risks to flora and vegetation. Management actions, management targets, monitoring and reporting requirements are provided in Table 4-1.

Potential indirect impacts to flora and vegetation that relate to ASS, dust, erosion, sedimentation, pollution and environmental flows are addressed through provisions for the following factors:

- Terrestrial Environmental Quality (Table 4-3)
- Inland Waters (Table 4-4)

Table 4-1: Flora and Vegetation – Management based provisions

Management actions	Management targets	Monitoring	Reporting
<p>Construction and Operations – Vegetation Clearing and Access Sensitivity: Medium</p>			
<ul style="list-style-type: none"> All clearing exclusion zones will be clearly marked and checked prior to commencement, during and post clearing activities Vegetation maintenance clearing around operational infrastructure should retain larger tree species (pruning only) and conservation significant species where practicable and safe to do so Where exclusion zones are established for protection of habitat or species e.g. <i>Acacia coriacea</i>/A. <i>xiphophyll</i> or priority flora, this will be clearly demarcated prior to construction commencing that may come within 50m of the area. All vehicles / plant to be restricted to approved clearing areas and designated access tracks Areas of temporary clearing will be appropriately managed prior to and following construction to support vegetation rehabilitation (e.g. stockpiling and respread of topsoil and removal of compaction) Where possible direct return of topsoil material will be undertaken Solar PV Farm to be fenced to exclude stock access and to promote recovery of grasslands Generation infrastructure to not be installed within drainage lines Minimise disturbance to P1 grasslands - clearing of Roebourne Plains coastal 	<ul style="list-style-type: none"> Compliance with pre-defined clearing limits and boundaries described within approval documents 	<ul style="list-style-type: none"> Pre and post-construction visual and photograph monitoring points at all Exclusion Zones within Development Envelope Regular construction area inspections to visually check/review clearing boundaries and assess vegetation clearing, in particular, compliance with statutory approvals 	<ul style="list-style-type: none"> Maintain clearing register to ensure that the measured extent of clearing is regularly updated All incidents (Health, Safety, Environment & Regulatory) are to be recorded and reported

Management actions	Management targets	Monitoring	Reporting
<p>grassland with gilgai microrelief on deep cracking clays not to exceed a total of 40 ha.</p> <ul style="list-style-type: none"> No disturbance to areas mapped as VT34 (VLA 2020). Minimise disturbance to significant populations of <i>Stemodia grossa</i>. 			
<p>Construction – Dust Deposition Sensitivity: Medium</p>			
<ul style="list-style-type: none"> If required, dust suppression (e.g. water cart or dust suppression sprays) will be used during dust generating activities and as required over cleared areas Consider dust reduction fencing to be erected around the Solar PV Farm and SPSI developments during construction, if required Haul loads at risk of dust emissions to be stabilised or covered prior to leaving site All vehicles to stay on clearly designated access tracks and adhere to speed limits <p>Avoid dust generating activities during unfavourable weather conditions (e.g. high wind speed) and unfavourable wind directions, where practicable</p>	<ul style="list-style-type: none"> No loss of PECs or known populations or habitat for priority flora adjacent to construction areas attributable to dust deposition from the Proposal No repetitive / sustained complaints arising due to dust impacts 	<ul style="list-style-type: none"> Weekly inspections of vegetation adjacent to Development Envelope to review effectiveness of current dust mitigation strategies and adjust as required Daily monitoring of weather conditions 	<ul style="list-style-type: none"> Post-construction inspection report, including photographs of surrounding vegetation Prepare and maintain a complaints register
<p>Construction and Operations – Fire Control Sensitivity: Medium</p>			
<ul style="list-style-type: none"> During construction, fire suppression equipment will be available at all work areas Plant or vehicles working in uncleared areas will be fitted with or have ready access to fire suppression equipment 	<ul style="list-style-type: none"> No incidents of fire attributable to construction or operation activities 	<ul style="list-style-type: none"> During construction, ongoing review of local fire danger ratings, and restrictions and subsequent 	<ul style="list-style-type: none"> Implement and maintain Incident Report Register Maintain a vegetation inspection and maintenance register (operations)

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Management actions	Management targets	Monitoring	Reporting
<ul style="list-style-type: none"> • During construction and operations, activities with the potential to generate heat / fire (e.g. hot works) will be appropriately managed under a permit to work system or job safety assessment • During operations regular vegetation clearing maintenance will be undertaken to prevent vegetation interference with or obstruction of infrastructure or assets • During operations, infrastructure or assets will be regularly maintained to reduce the likelihood of faults or incidents that may cause ignition to surrounding vegetation • During operations, roads and access tracks will be regularly maintained to allow timely response to faults or equipment failure • Comply with local council fire prevention measures • Firebreaks and other fire prevention works will be maintained / undertaken during operations, in accordance with the <i>Bush Fires Act 1954</i> 		<ul style="list-style-type: none"> • communication to relevant personnel • Vegetation maintenance inspection/ monitoring of fire breaks and minimum distance clearances surrounding infrastructure and assets 	
<p>Construction and Operations – Weed Management Sensitivity: Medium</p>			
<p>See dedicated Weed Management Plan</p>			

4.2 Terrestrial Fauna

4.2.1 EPA factor and objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained (EPA 2016b)

4.2.2 Proposal specific objectives

- Protect habitat for conservation significant and MNES terrestrial fauna species.
- Prevent clearing or removal of terrestrial fauna habitat outside of approved clearing areas.
- Minimise direct and indirect impacts to terrestrial fauna species and habitat within the Development Envelope.

4.2.3 Management provisions

This section outlines management provisions for potential impacts on terrestrial fauna. The objectives are described above, and management actions, targets and monitoring and reporting requirements are provided in Table 4-2.

Potential indirect impacts to terrestrial fauna that relate to weeds, alteration of fire and hydrological flows, and dust deposition are addressed through provisions for the following factors:

- Flora and Vegetation (Table 4-1)
- Terrestrial Environment Quality (Table 4-3)
- Inland Waters (Table 4-4)

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Table 4-2: Terrestrial Fauna – Management based provisions

Management Actions	Management Targets	Monitoring	Reporting
Construction – Clearing and Ground Disturbance Sensitivity: High (drainage lines), Low/moderate (elsewhere)			
<ul style="list-style-type: none"> Prior to significant clearing or ground disturbing earthworks occurring, fauna trapping and relocation targeting conservation significant fauna will be undertaken by a suitably qualified licensed fauna handler Inductions for all staff and contractors involved in clearing and ground disturbance activities will include information on potential impacts to fauna, management measures, handling and reporting requirements. If injured/sick animals are encountered, a nominated fauna carer listed under the Pilbara Wildlife Carers Association will be called to care for the animal 	<ul style="list-style-type: none"> No incidents of injury or death to conservation significant fauna as a result of construction activities 	<ul style="list-style-type: none"> Active monitoring for conservation significant fauna during clearing to allow for relocation Daily monitoring of clearing areas for conservation significant fauna injuries or deaths 	<ul style="list-style-type: none"> Implement and maintain a Fauna Register (all injuries, deaths & relocations) Report all native fauna incidents resulting in injury or death to conservation significant fauna, to the DBCA/DAWE (as required)
Construction – Excavations and Trenches Sensitivity: High (drainage lines), Low (elsewhere)			
<ul style="list-style-type: none"> All excavations, temporary drains and trenches to be battered to facilitate fauna egress, where practicable All excavations, temporary drains and trenches to be backfilled as soon as practicable All steep sided excavations and trenches to be monitored daily and any trapped fauna assisted to escape, where safe to do so If injured/sick animals are encountered, a nominated fauna carer listed under the Pilbara Wildlife Carers Association will be called to care for the animal 	<ul style="list-style-type: none"> No incidents of conservation significant fauna injury or death from construction activities 	<ul style="list-style-type: none"> Daily monitoring for trapped fauna within steep sided excavations and trenches 	<ul style="list-style-type: none"> Implement and maintain a Fauna Register (all injuries, deaths & relocations) Report all native fauna incidents resulting in injury or death to conservation significant fauna, to the DBCA/DAWE (as required)

Management Actions	Management Targets	Monitoring	Reporting
Construction and Operations – Food Waste Sensitivity: High (drainage lines), Low (elsewhere)			
<ul style="list-style-type: none"> Food wastes and water to be appropriately contained so as not to attract feral or native fauna Food wastes to be collected from construction sites on at least a weekly basis and disposed off-site at licensed waste facilities Outside bins to be secured to prohibit access by animals Sheds/offices etc to be secured from entry by animals Construction sites to be inspected and cleared of food wastes and water containers at completion of work All staff and contractors to be inducted on prohibition of littering and feeding of fauna 	<ul style="list-style-type: none"> No repeated scavenging by feral or conservation significant fauna (> 1 week) 	<ul style="list-style-type: none"> Weekly inspection of construction sites Final inspection of construction sites 	<ul style="list-style-type: none"> Implement and maintain a Fauna Register (all injuries, deaths & relocations)
Construction and Operations – Vehicle & Infrastructure Collisions Sensitivity: High (drainage lines), Low (elsewhere)			
<ul style="list-style-type: none"> All vehicles to stay on clearly designated access tracks and adhere to speed limits Native fauna injuries and deaths will be recorded Infrastructure modified (e.g. bird deterrents installed) if collisions identified as a significant cause of mortality 	<ul style="list-style-type: none"> No incidents of conservation significant fauna injury or death from construction activities 	<ul style="list-style-type: none"> Native fauna injuries and deaths recorded Deceased fauna (e.g. bird) deaths investigated to determine if cause of death related to presence of infrastructure where possible 	<ul style="list-style-type: none"> Implement and maintain a Fauna Register (all injuries, deaths & relocations) Report all native fauna incidents resulting in injury or death to conservation significant fauna, to the DBCA/DAWE (as required)

Woodside Solar Facility Environment Management Plan

Management Actions	Management Targets	Monitoring	Reporting
Construction and Operations – Noise, Heat and Light Sensitivity: Medium			
<ul style="list-style-type: none"> Reduction of light spill to surrounding environment Lighting only used where required and kept to a minimum (e.g. turned off when not required). Noise reduction measures as required i.e. limitations on continuous noise sources Solar PV arrays to be designed around natural drainage lines, breaking the outline of the infrastructure minimising appearance as a false water body. 	<ul style="list-style-type: none"> Minimise light emissions to surrounding natural environment that may impact fauna Minimise construction noise Construction works undertaken in accordance with <i>Environmental Protection (Noise) Regulations 1997</i> 	<ul style="list-style-type: none"> On completion of construction undertake a review of night-time light emissions from the facilities and implement adaptive measures where required 	<ul style="list-style-type: none"> Report non compliances with <i>Environmental Protection (Noise) Regulations 1997</i> (WA)

4.3 Terrestrial Environmental Quality

4.3.1 EPA factor objective

To maintain the quality of land and soils so that environmental values are protected (EPA 2016c).

4.3.2 Proposal specific objectives

- Minimise soil erosion from clearing, earthworks and vehicle / machinery movements.
- Minimise sedimentation of surrounding inland waters
- Prevent contamination to soil or water from the release of hazardous materials or exposure of ASS in or adjacent to the Development Envelope.

4.3.3 Management provisions

This section outlines management provisions for potential impacts on terrestrial environmental quality. The objectives are described above, and management actions, targets and monitoring and reporting requirements are provided in Table 4-3.

Table 4-3: Terrestrial Environmental Quality – Management based provisions

Management Actions	Management Targets	Monitoring	Reporting
<p>Construction – ASS Sensitivity: High (Drainage lines), Low (elsewhere)</p> <ul style="list-style-type: none"> Pre-construction ASS investigation in accordance with Department of Environment Regulation (DER) 2015 ASS guideline - Identification and investigation of acid sulfate soils and acidic landscapes, for all high to medium risk ASS areas If investigation identifies potential ASS may be disturbed, an ASS Management Plan (ASSMP) to be developed in accordance with DER (2015) ASS guideline - Treatment and management of soils and water in acid sulfate soil landscapes Implement ASSMP (if required) 			
	<ul style="list-style-type: none"> ASS investigation and risk assessment completed for all high to medium risk ASS areas ASSMP prepared where recommended by ASS investigation As specified in ASSMP 	<ul style="list-style-type: none"> Audit compliance with ASSMP (where required) 	<ul style="list-style-type: none"> ASS investigation report Validation / closure report, where required by ASSMP
<p>Construction – Soil Erosion, Drainage and Compaction Sensitivity: High (drainage lines), Medium (elsewhere)</p> <ul style="list-style-type: none"> Minimise extent of cleared vegetation to that required for each phase (i.e. not pre-clearing for future/prospective works) Stormwater runoff and drainage management measures (e.g. stormwater infiltration or evaporation basins and controlled stormwater flows) utilised where downstream erosion risk is identified Vehicle / plant movements to be restricted to approved disturbance areas and designated access tracks All disturbed areas to be visually assessed at completion of construction works for risk of compaction or erosion. Any disturbed areas deemed to be at risk of compaction or erosion to be provided with remedial works to reduce impact to soils, (e.g. scraping, ripping, contouring, grading, stabilising) Remedial work areas to be inspected after first wet season from implementing, to check effectiveness, with any eroded areas provided with additional remedial works or reinstatement if required 			
	<ul style="list-style-type: none"> All disturbed areas assessed for risk Remedial works applied for all at risk areas All remedial work areas re-inspected and reinstated / reinstated if required 	<ul style="list-style-type: none"> Post-construction inspection (carried out within 12 months of activity completion) of disturbed areas to identify risk of compaction / erosion Post wet season inspection of remedial works (first wet season following activity completion) 	<ul style="list-style-type: none"> Post-construction inspection report, including mapping of areas at risk of erosion / compaction, record of remedial works

Management Actions	Management Targets	Monitoring	Reporting
<ul style="list-style-type: none"> Vegetation rehabilitation (where required, e.g. for temporary laydown areas no longer required) to be undertaken as soon as practicable Construction works (particularly those within and around surface waterways) are to be suspended or scaled back, in the event of a cyclone warning. Include temporary erosion protection as required to prevent washout of works areas Construction works within surface waterways to be provided with temporary erosion protection as required 			
Operations – Soil Erosion, Drainage and Compaction Sensitivity: High (drainage lines), Medium (elsewhere)			
<ul style="list-style-type: none"> Stormwater drains including diversion drains, culverts and floodways, to be inspected each year to identify where erosion and sediment build up is occurring Stormwater drains to be provided with remedial works to reinstate eroded areas, provide additional erosion protection, and remove sediment built up to ensure that drains convey flows to design specifications Routine vehicles and machinery use is restricted to existing roads and access tracks 	<ul style="list-style-type: none"> Stormwater drains or drainage channels maintained to limit sediment build-up and other obstructions and manage erosion 	<ul style="list-style-type: none"> Annual inspections of stormwater infrastructure prior to wet season 	<ul style="list-style-type: none"> Inspection reports and status reporting as required by operating approvals and licences
Construction – Hazardous Materials and Wastes Sensitivity: High (drainage lines), Medium (elsewhere)			
<ul style="list-style-type: none"> On-site refuelling of machinery and plant to occur on sealed or bunded areas. Scheduled / major maintenance of vehicles / plant to be undertaken off-site Provision of spill response kits at refuelling locations (if applicable – only temporary refuelling equipment planned) No hazardous materials or solid / liquid wastes to be stored within 50 m of drainage lines Hazardous materials to be stored in accordance with relevant Australian Standards and Regulations 	<ul style="list-style-type: none"> Hazardous materials stored in compliance with relevant Australian Standards and Regulations No spills or leaks resulting in contamination of soil, surface water or groundwater 	<ul style="list-style-type: none"> Regular site inspections of hazardous materials and waste storage and handling areas to identify spills / leaks and discharges, and check that storage, handling and signage is appropriate 	<ul style="list-style-type: none"> Post construction inspection report All incidents (Health, Safety, Environment & Regulatory) are to be recorded and reported

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Management Actions	Management Targets	Monitoring	Reporting
<ul style="list-style-type: none"> • Spill management procedures to be developed and key staff responsible for hazardous materials storage/handling trained in spill response • Material Safety Data Sheets (MSDS) and hazardous materials inventory to be retained on site • All soil and materials / equipment contaminated from spills / leaks to be disposed of at a licensed waste facility • Solid waste to be temporarily contained in designated bins prior to disposal off-site at a licensed waste disposal facility • General construction waste material to be appropriately managed and disposed of off-site at an appropriate facility. 	<ul style="list-style-type: none"> • No unauthorised waste disposal 	<ul style="list-style-type: none"> • Post-construction inspection of construction sites to check for signs of soil and surface water contamination, waste litter and debris 	

4.4 Inland Waters

4.4.1 EPA factor objective

To maintain hydrological regimes and quality of groundwater and surface water so that environmental values are protected (EPA 2018).

4.4.2 Proposal specific objective(s)

- Maintain surface hydrological regime.
- Minimise potential for unplanned release to the environment of hazardous materials or waste
- Minimise impacts to the availability of groundwater.
- Minimise indirect impacts to groundwater quality from disturbance of ASS and existing site contamination in or adjacent to the Development Envelope.
- Minimise impacts inland waters from construction activities

4.4.3 Management provisions

This section outlines management provisions for potential impacts on terrestrial environmental quality. The objectives are described above, and management actions, targets and monitoring and reporting requirements are provided in Table 4-4.

Potential impacts to inland waters arising from soil erosion and pollution (ASS, hazardous materials and solid or liquid wastes) are addressed through management provisions for Terrestrial Environmental Quality (Table 4-3).

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Table 4-4: Inland Waters – Management based provisions

Management Actions	Management Targets	Monitoring	Reporting
<p>Construction and Operations – Hydrological Regime Sensitivity: High (drainage lines), Low (elsewhere)</p>			
<ul style="list-style-type: none"> • Access tracks or roads traversing drainage lines to be constructed as to not inhibit water flow • Natural drainage lines/creeks to be retained where possible • Vegetation associated with natural drainage lines to be prioritised for protection through detailed design works • Construction works within surface waterways (e.g. diversion channels, culverts or floodways) should be constructed during the dry season and no-flow periods as far as practicable • Any damage to surface waterway bed and banks caused by major storm events through construction works areas to be remediated • Construction works within surface waterways to be completed and permanent erosion protection / stabilisation provided as soon as practicable • Vehicle movements to be restricted to designated access tracks 	<ul style="list-style-type: none"> • No damage to waterways outside of construction areas, arising from construction works 	<ul style="list-style-type: none"> • Pre and post-construction photo monitoring points on drainage lines downstream of Development Envelope • Visual inspection of temporary erosion protection measures • Visual inspection of downstream areas following major storm events and remediate if required. 	<ul style="list-style-type: none"> • Incident report for major storm event, wash out or downstream impacts
<p>Construction and Operations / Maintenance – Reduction in availability of Groundwater Sensitivity: High (drainage lines), Low (elsewhere)</p>			
<ul style="list-style-type: none"> • Water for use during construction and operations will be brought on site by tanker. No local water will be abstracted. 	<ul style="list-style-type: none"> • No groundwater abstracted for construction purposes • No long term impacts to inland waters (e.g. physical and chemical parameters and vegetation health) 	<ul style="list-style-type: none"> • Site plans indicate groundwater abstraction occurring • no abstraction 	

4.5 Social Surroundings (Amenity)

4.5.1 EPA factor objective

To protect social surroundings from significant harm (EPA 2016d).

4.5.2 Proposal specific objectives

- Minimise impacts to amenity from the physical presence of infrastructure.
- Minimise indirect impacts to amenity from construction and operational activities.

4.5.3 Management provisions

This section provides management measures for potential impacts to Social Surroundings (Amenity). The objectives are described above, and management actions, targets and monitoring and reporting requirements are provided in Table 4-5.

Minimisation of dust emissions arising from clearing, unauthorised access and soil erosion is addressed through management provisions for:

- Flora and Vegetation (Table 4-1)
- Terrestrial Environmental Quality (Table 4-3)

A Social Surrounds (Cultural Heritage) Management Plan has been developed to provide management measures for potential impacts to Cultural Heritage (Woodside 2021b).

Woodside Solar Facility Environment Management Plan

Table 4-5: Social Surroundings – Management based provisions

Management actions	Management targets	Monitoring	Reporting
<p>Construction - Amenity Sensitivity: Low</p> <ul style="list-style-type: none"> Construction works undertaken in accordance with <i>Environmental Protection (Noise) Regulations 1997</i>. Vehicles / plant regularly maintained to ensure noise minimisation Traffic management – Traffic management plan to be implemented during construction. 	<ul style="list-style-type: none"> No incidents of non-compliance with <i>Environmental Protection (Noise) Regulations 1997</i> 	<ul style="list-style-type: none"> Not applicable 	<ul style="list-style-type: none"> Prepare and maintain a complaints register

5. Adaptive Management and Review

The adaptive management approach aims to reduce impacts by embedding a cycle of monitoring, reporting and implementing change (where required). This document applies the principles of adaptive management through monitoring, corrective actions and implementing changes. The EMP is intended to be dynamic and will be updated to reflect changes in management practices and the social and natural environment with time. This will also allow flexibility to respond to new environmental impacts and adopt new technologies / management measures. Adaptive management has been embedded throughout this document, and the key adaptive management processes are described below.

In line with the concept of adaptive management and considering the above, the management actions presented in this EMP shall be monitored, reviewed, evaluated and updated, as required, considering:

- environmental monitoring identifies a non-conformance with the EMP
- outcomes of incident investigations or audits
- outcomes of any technical review of and evaluation of the emissions and ambient air quality monitoring programs
- new and relevant data/information gained as a result of implementing this EMP, or from external sources
- significant changes to industry standard management practices
- changes in State or Commonwealth legislation or policy.

With relevant updates included in a revised EMP. In addition, this EMP may be reviewed:

- based on EPA and decision-making authorities comments during the Project approval process
- if a significant incident occurs related to the protection of Aboriginal heritage
- Traditional Owners request that a review is undertaken due to a relevant concern

Technical review and evaluation of the management actions outlined in this EMP will be conducted every five years³ (if not initiated prior to that time) to ensure the management actions are adequately addressing the key risks and meeting EPA objectives. If, as a result of any review, any significant changes are required to be made to this EMP, a revised EMP will be provided to the EPA for approval (if required).

When the five-yearly review cycle is triggered, or if a significant change to either the facility, activity, or risk is identified, a revised EMP will be submitted to the EPA.

³ Frequency no more than annually.

6. STAKEHOLDER CONSULTATION

This EMP is included as an appendix to the Environmental Referral Supporting Document for the Proposal (Woodside, 2020a) and therefore will be reviewed by the EPA, DAWE and other Designated Management Authorities. Comments on the Environmental Referral Supporting Document have been sought from relevant Traditional Owner groups in the region and their feedback has been incorporated into this document.

Stakeholder consultation and engagement is an integral component of the environmental impact assessment and environmental approvals process. This section describes Woodside's approach to stakeholder consultation broadly and for the Proposal specifically.

Woodside's objectives for stakeholder consultation are to:

- improve stakeholder awareness and understanding of the Proposal
- provide stakeholders with opportunities to obtain information about the Proposal including the physical, ecological, socio-economic and cultural environment that may be affected, the potential impacts that may occur, and the prevention and mitigation measures proposed to avoid or minimise those impacts
- gain feedback from stakeholders on their concerns in regard to the Proposal and, where possible, address stakeholder concerns through further activities, or by implementing additional mitigation measures.

Stakeholder engagement in relation to this Proposal includes engagement with identified stakeholders undertaken specifically in relation to the Proposal including engagement undertaken as part of development of the Woodside Power Project.

7. TERMS

7.1 Defined Terms

Term	Definitions
Proposal	The Proposal comprises two key components: <ul style="list-style-type: none"> Solar PV Farm Solar Plant Supporting Infrastructure (SPSI)
Development Envelopes	The Development Envelopes represent the area within which development of the Proposal is to occur. The two Development Envelopes for this Proposal include: <ul style="list-style-type: none"> Solar PV Farm Solar Plant Supporting Infrastructure
Flora Type 34	<i>Acacia coriacea</i> / <i>A. inaequilatera</i> tall shrubland over mixed scattered <i>Acacia</i> shrubs over mixed tussock grassland (Ref. Vicki Long 2020 - Table 2 Vegetation Code and Description Comparisons for the 2019 dry season and 2020 wet season surveys)
Proposal Components	The Proposal includes two components (Solar PV and Solar Plant Supporting Infrastructure)
Disturbance Footprint	Includes all areas proposed to be disturbed/cleared within the two Development Envelopes
Woodside	Woodside Energy Ltd
Buffer Area	The 2 km 'Industry Buffer Area' surrounding the Maitland Strategic Industrial Area

7.2 Acronyms

Terms	Definitions
ALARP	As low as reasonably practicable
AS	Australian Standard
ASS	Acid Sulfate Soils
ASSMP	Acid Sulfate Soils Management Plan
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DER	Department of Environment Regulation (now known as DWER)
DoEE	Department of the Environment and Energy (now known as DAWE)
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EAR	Environmental Assessment Report
EMP	Environmental Management Plan
EP Act	<i>Environmental Protection Act 1986</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERSR	Environmental Referral Supporting Report

Woodside Solar Facility Environmental Management Plan

Terms	Definitions
HSE	Health, Safety and Environment
HSEQ	Health, Safety, Environment and Quality
LandCorp	Western Australian Land Authority
MSDS	Material Safety Data Sheets
MSIA	Maitland Strategic Industrial Area
NAC	Ngarluma Aboriginal Corporation
PEC	Priority Ecological Community
RFSU	Ready for Start-Up
Solar PV	Solar Photovoltaic
SPSI	Solar Plant Supporting Infrastructure
WA	Western Australia
WMP	Water Management Plan
WoNS	Weeds of National Significance
Woodside	Woodside Energy Ltd

7.3 Units of measure

Units	Definition
ha	Hectare
km	Kilometre
kV	Kilovolt
m	Meter
MW	Megawatt
MWh	Megawatt-hours

8. REFERENCES

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ENVIRONMENT MANAGEMENT PLAN

Head Office

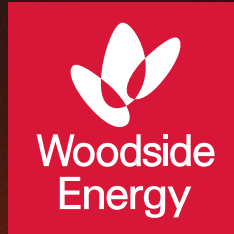
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WOODSIDE SOLAR FACILITY CULTURAL HERITAGE MANAGEMENT PLAN

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1. SUMMARY

This Social Surrounds (Cultural Heritage) Management Plan (CHMP) has been developed to minimise the impacts of the proposed Woodside Power Solar Facility (the Proposal) on Aboriginal cultural heritage. This CHMP details the measures required to manage the potential impacts to Social Surroundings (Cultural Heritage) from the Proposal. This CHMP addresses potential impacts on cultural heritage including through ground disturbance and loss of/restricted Traditional Owner access.

Woodside Power Pty Ltd (Woodside) is proposing to develop a Woodside Solar Facility (the Proposal), approximately 15 kilometres (km) south-west of Karratha, Western Australia (WA).

In summary, the Proposal is to generate electricity from a large-scale solar photovoltaic farm (Solar PV Farm), complemented by energy storage (battery) infrastructure. The energy storage infrastructure is proposed to be located at the Maitland Strategic Industrial Area (MSIA) with the Solar PV Farm located on the adjacent MSIA Industry Buffer Special Control Area (Buffer Area).

Woodside proposes to commence construction of the Proposal in 2022, subject to required approvals being secured, commercial arrangements being finalised and a positive final investment decision.

This CHMP was prepared in accordance with the 'Instructions on how to prepare *Environmental Protection Act 1986* Part IV Environmental Management Plans' published by the Western Australian (WA) Environmental Protection Authority (EPA) (EPA, 2018).

Table 1-1 summarises the information contained in this CHMP.

Table 1-1: CHMP Summary Table

Title of Proposal	Woodside Solar Facility
Proponent Name	Woodside Power Pty Ltd
Purpose of the CHMP	To identify management and mitigation measures that could be implemented over time to reduce potential impacts to heritage features over the Proposal development envelope.
Key Environmental Factor/s and Objective/s	Key Environmental Factor: Social Surroundings (Heritage) EPA Objective: To protect social surroundings from significant harm
Key Provisions in the CHMP	<p>Management of any:</p> <ul style="list-style-type: none"> • Direct, physical disturbance of Aboriginal and municipal heritage features from construction and operational activities • Constraints on access to heritage features or use of land for traditional activities • Disturbance to flora that will result in impacts to species used for cultural purposes <p>Through the implementation of the following key provisions:</p> <ul style="list-style-type: none"> • Conducting pre-construction heritage surveys to define acceptable disturbance zone within the development envelope • Implement a <i>Chance Find Procedure</i> if Aboriginal heritage features are accidentally uncovered during construction. • Ensuring all personnel employed or engaged to undertake work, or otherwise accessing sites in respect to the proposed Woodside Power Project are made aware of their obligations under the <i>Aboriginal Heritage Act 1972 (WA)</i> and this CHMP. • Providing access for Traditional Owners to Aboriginal cultural heritage sites within the Proposal development envelope, subject to safety and operational requirements, when requested • Prior to undertaking clearing activities, provide opportunities for Traditional Owners to collect traditional resources within the planned disturbance zone. • Reporting compliance of this CHMP at the end of construction to ensure management targets have been met.

2. CONTEXT, SCOPE AND RATIONALE

2.1 Introduction

Woodside Power Pty Ltd (Woodside) is proposing to develop a Woodside Solar Facility, approximately 15 kilometres (km) southwest of Karratha, Western Australia (WA). This will generate electricity from a large scale solar photovoltaic farm (Solar PV Farm), complemented by energy storage (battery) infrastructure (the Proposal). The Proposal will supply renewable energy for use by industrial customers, expected to include the Woodside operated Pluto LNG Facility.

Woodside is referring this Proposal to the WA Environmental Protection Authority (EPA) under Part IV (Section 38) of the *Environmental Protection Act 1986* (WA) (EP Act), as a Proposal that has potential to have a significant impact on the environment.

The Proposal is described in its entirety in Section 3 of the Woodside Power Woodside Solar Facility Referral Supporting Document (Woodside, 2021) and is summarised in Section 2.2 of this CHMP.

This Social Surrounds (Cultural Heritage) Management Plan (CHMP) has been prepared to support environmental referrals for the Proposal under the WA *Environmental Protection Act 1986* (EP Act). This CHMP demonstrates to the WA Environmental Protection Authority (EPA) how Woodside plans to manage the potential impacts and risks to Social Surroundings (Heritage) in a way that is consistent with the relevant EPA Factor guideline. The document addresses management provisions relating to both the construction and operational phases of the Proposal.

This CHMP has been prepared in accordance with the EPA 'Instructions on how to prepare EP Act Part IV Environmental Management Plans' (EPA, 2018) and will be implemented following receipt of approval under the EP Act.

2.2 Summary of the Proposal

Woodside proposes to implement the Proposal through a phased approach, expanding the development as additional customer demand arises. Initially, it is expected that the Proposal will consist of the following key elements allowing for the generation of up to 100 MW of renewable energy, through the installation of one or more of the following key infrastructure elements:

- Solar PV Farm: Capable of generating up to 100 MW_{AC} (instantaneous); and
- Battery Storage: Capable of storing up to 400 MWh.

The Proposal is scheduled to commence construction in 2022 and be ready for start-up (RFSU) by approximately 2023, with an intended operating life of approximately 30 years.

As additional customer demand is realised, the Proposal may be expanded, in one or more phases.

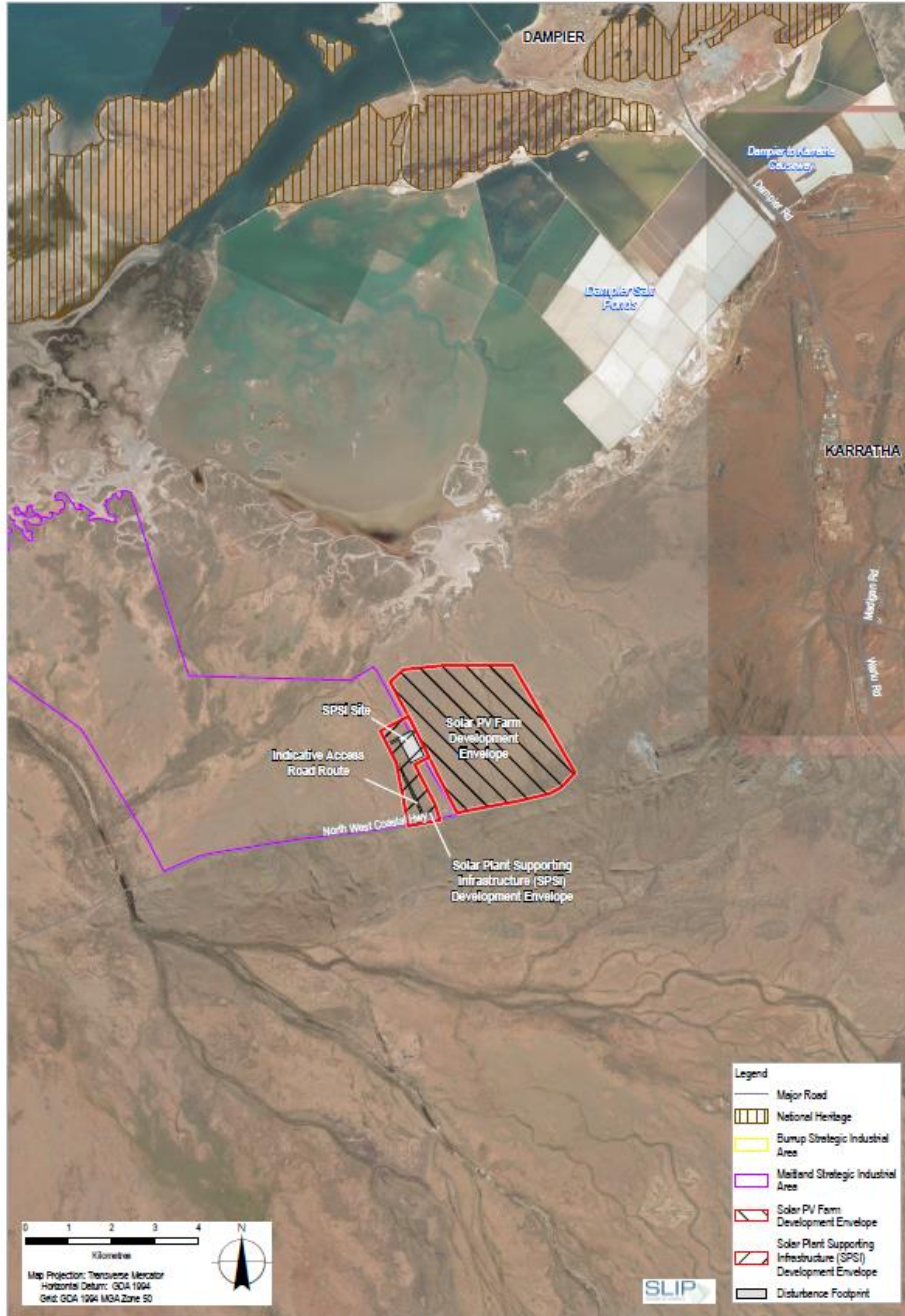
The maximum expansion of the Proposal is expected to be capable of generate up to 500 MW_{AC} of electricity from Solar PV as follows:

- Solar PV Farm: Capable of generating up to 500 MW_{AC} (instantaneous).
- Battery Storage: Battery storage capacity is estimated to be a maximum of 200 MWh for each 50MW_{AC} of solar generation capacity.

Subject to various factors, such as the customer's existing electricity source and demand profile, the initial phase of the Proposal has the potential to reduce up to 100 kt of greenhouse gas emissions per annum. Through future expansions of electricity generation and storage capability, the Proposal provides a potential pathway for further de-carbonisation of customers electricity needs. The Proposal may also lead to reductions in other potentially harmful emissions, such as NO_x and SO_x, which is particularly relevant to potential customers on the Burrup Peninsula.

The project will be developed in close consultation with Traditional Owners and will lead to shared benefits to native title holders. Woodside acknowledges the Ngarluma People, the Traditional Owners of the land on which the Proposal is planned to be developed.

Figure 2-1 Proposal Location



2.3 Overview

2.3.1 Purpose of Management Plan

This Social Surrounds (Cultural Heritage) Management Plan (CHMP) has been developed to assist with the management of cultural heritage values associated with the construction and operation of the Woodside Power Woodside Solar Facility Proposal, as described in **Section 2.1**.

This CHMP has been prepared to ensure construction and operation of the Woodside Solar Facility does not compromise the social values of the area and to manage potential impacts of the Proposal on cultural heritage. The approach to managing the Proposal in a way that achieves the objective of avoiding significant harm to social surroundings is based on a combination of impact assessment (refer to **Section 8** in the Woodside Solar Facility - Environmental Referral Supporting Document (Woodside, 2021), early response indicators and adaptive management.

This CHMP outlines how aspects of the Proposal that have the potential to impact heritage places and objects (referred herein as heritage features) will be monitored and managed so that the relevant environmental values are protected. The provisions of this CHMP manage the potential impacts of the activities from the Proposal that are not otherwise managed under other regulatory instruments, including other Proposal management plans.

2.3.2 Scope of Management Plan

This CHMP applies to both construction and operational activities of the Proposal that have the potential to impact cultural heritage features within and adjacent to the Proposal development envelope (DE), as defined in **Figure 2-1**. The Woodside Solar Facility – Environmental Referral Supporting Document (Woodside, 2021) assesses the potential impacts and risks to the social surroundings (Heritage) from the following activities:

- clearing of native vegetation, earthworks and installation of infrastructure
- presence and activity of people, vehicles, and equipment

Therefore, the scope of this CHMP addresses the following:

- Direct, physical disturbance of heritage features from construction and operational activities
- Disturbance to flora and vegetation that will result in impacts to species used for cultural purposes
- Constraints on access to heritage features or use of land for traditional activities

The potential impacts of the Proposal to the visual amenity of heritage places are outside the scope of this CHMP.

3. EXISTING ENVIRONMENT

3.1 Maitland Strategic Industrial Area and Karratha Station

The Maitland Strategic Industrial Area (MSIA) is located approximately 15 km south west of Karratha and comprises of approximately 2,500 ha of land strategically located to promote and facilitate processing of the Pilbara region's resources. The MSIA has a substantial buffer to sensitive land uses being over 14 km west of Karratha town, over 16 km south of Dampier town and over 16 km south-west of Murujuga National Park. Under the City of Karratha Local Planning Scheme No. 8, the MSIA is provided with a 2 km Industry Buffer Special Control Area, which restricts development of sensitive land uses.

Approximately 1,100 ha of the MSIA and adjacent Industrial Buffer Area is proposed to be utilised for the Solar PV Farm. This area is connected to the North West Coastal Highway with close access to the Dampier and Bunbury Natural Gas Pipeline and major road connections to Dampier Port.

The MSIA is subject to non-exclusive Native Title rights of the Ngarluma people which were recognised under the Native Title Claim WCD2005/001. The Ngarluma Aboriginal Corporation RNTBC (NAC) is the relevant Registered Native Title Body Corporate.

Karratha Station pastoral lease surrounds [and currently includes part of] the MSIA and is leased by Rio Tinto and sub-leased and operated by NAC. The station extends north from the MSIA to the Dampier Salt Ponds, which were established in the 1960s. The portion of Karratha Station between the MSIA and Dampier Island causeway is traversed by gas, power and transport infrastructure, including Rio Tinto's 220 kV transmission lines and freight railway linking the Port of Dampier with iron ore mines in the Pilbara region. Karratha Station has been subject to historical grazing by stock animals.

The MSIA and Karratha Station sits within the Roebourne Interim Biogeographic Regionalisation for Australia (IBRA) subregion of the Pilbara IBRA region. This landscape consists primarily of Quaternary coastal and sub-coastal plains divided by active floodplains from larger river systems with igneous extrusions and ranges and metamorphosed sedimentary rock hills. This landscape provides a range of source materials for stone tools including banded ironstones (or BIF), BIF derived cherts and shales, diagenetic (chalcedonic) cherts, igneous basalts, dolerites, rhyolites, dacites, stratified tuffs, siltstones, mudstones, and agglomerates.

The vegetation of the Roebourne subregion falls within Beard's Fortescue Botanical District (1979 & 1990). A basic spatial analysis query of Beard's Vegetation Classification (WA) and the Ngarluma portion of the subregion establishes that there are four different vegetation systems within the subregion. The major vegetation classification of the subregion consists of Mixed shrubland; Mosaic: Bunch-grass-spinifex. This vegetation unit is principally associated with the coastal and sub-coastal plains.

A flora and vegetation survey conducted by Vicki Long (2019) over the Proposal DE describes the vegetation within Karratha Station and the MSIA as predominately grassland areas with mostly annual species. The area is characterised by areas of hummock grassland, areas of sandy surfaced alluvial soils and tussock grasslands over weakly gilgaied clays, intersected by both shallow grassy and deeper incised wooded drainage lines.

Sporadic heritage surveys have been conducted over parts of Karratha Station and MSIA since at least 1979. One of the earlier surveys highlighted some mound middens and a historic pearling camp. The Department of Resources Development and Landcorp commissioned heritage surveys of the proposed MSIA, and island areas affected by the proposals.

In 2019, Woodside commissioned new surveys over a portion of the Proposal DE to identify any heritage values that may be impacted by the Proposal. These surveys included flora and fauna surveys to identify natural resources of importance to Traditional Owners as well as archaeological and ethnographic site-avoidance surveys. All surveys were conducted with the input of Ngarluma

participants. A supplementary vegetation survey was conducted in 2020 to capture differences present in post-rain conditions.

The archaeological surveys to date have identified three sites across the MSIA and Industrial Buffer Area likely to be protected under the *WA Aboriginal Heritage Act 1972* (AH Act) and a further four other “places” unlikely to meet the standards of a site under Section 5 of the AH Act but which will be avoided at the request of NAC. These sites and places included a combination of stone tools, grinding patches, plant resources, quarries and middens. Further surveys are required to complete coverage of the development entire envelope.

Review of the archaeological information undertaken as part of the archaeological surveys and assessment places the inhabitation of the MSIA and Karratha Station in the broader context of Pilbara occupation dating back to the Pleistocene at least 45,000 - 50,000 years ago, with a possible sudden population increase and introduction of new tool types in the Holocene.

The ethnographic survey sought the input of Traditional Owners on the broader landscape for heritage values but did not identify any new sites in the landscape. The survey also conducted specific ethnographic assessments of all archaeological places known in the Proposal DE, including those discovered in Woodside-commissioned surveys.

The environmental review of Ngarluma Country presented here was concluded to demonstrate that past Indigenous people who utilised the local landscape had sufficient supplies of raw materials for the production of stone tools, reasonable supplies of water in the major river catchments after seasonal rains and natural springs and gorges to rely on in drier times. The vegetation species noted in the local landscape also could provide wood for implements, and seeds and fruits for food. The grassland environments would also support both small and large game.

3.2 Historical Heritage

There are no sites in the vicinity of the Proposal DE that have statutory heritage listings or protection under the *Heritage Act 2018* (WA). The closest State Heritage sites are located in the vicinity of Roebourne and Cossack, to the east of Karratha.

The Proposal DE lies in proximity to two Municipal Inventory heritage sites:

- De-Grey – Mullewa Stock Route No. 9701 (Place No. 05113, City of Greater Geraldton, Category 3). This is a historic stock route and wells extending from the Midwest Region, east of Geraldton, to the Pilbara, terminating west of Pardoo.
- Old Stock Route Wells (Place No. 25267, City of Karratha Category B/D). These are isolated sites in various condition that may contain water tanks, troughs, fences and camping areas.

3.3 Key Environmental Factors

This CHMP relates to the ‘Social Surroundings’, specifically Aboriginal heritage and culture, a Key Environment Factor identified within the Woodside Solar Facility referral Supporting Documentation. The EPA objective for this environmental factor is:

To protect social surroundings from significant harm

This objective is intended to ensure that social surroundings are not significantly affected by a proposal.

The Environmental Factor Guideline – Social Surroundings (EPA, 2016) acknowledges that social surroundings include: Aboriginal heritage and culture; natural and historical heritage; amenity; and economic surroundings. For the purpose of this CHMP, the only aspect of the social surroundings environmental factor that is relevant to the Proposal is Aboriginal heritage and culture.

As part of the social surroundings environmental factor and specifically in relation to Aboriginal heritage and culture, the EPA states that the EP Act complements the *Aboriginal Heritage Act 1972*

(WA) to preserve Aboriginal heritage sites, particularly when 'actual physical protection of the environment is required to protect sites of heritage significance' (EPA, 2016).

EPA guidance also states that in addition to Aboriginal heritage, 'matters of Aboriginal cultural associations, including traditional Aboriginal customs, directly linked to the physical or biological aspects of the environment, may also be considered significant.'

3.3.1 Proposal Activities Potentially Affecting Key Environmental Factors

3.3.1.1 Clearing of Vegetation, Earthworks and Installation of Infrastructure

Direct, Physical Disturbance of Heritage Sites

The Proposal DE lies within the vicinity of Aboriginal heritage sites registered and lodged with the Registrar of Aboriginal Sites under the *Aboriginal Heritage Act 1972* (AH Act). A search of the Aboriginal Heritage Inquiry System (AHIS) was conducted for the Proposal DE in November 2019. In summary, there were no registered heritage sites listed and 7 lodged heritage places were identified as within the Proposal DE (**Table 3-1**) (BWA, 2019 and DB-Consulting, 2019).

Table 3-1: Summary of Aboriginal Heritage Registered and Lodged Sites

Proposal Component	Registered Sites	Lodged Sites	Type of Sites
Solar PV Farm	0	4	Artefacts/Scatters, Grinding Patches/Grooves, Quarries
Solar PV Farm - Ancillary and Supporting Infrastructure	0	3	Artefacts/Scatters, Grinding Patches/Grooves, Shell Middens
Total	0	7	

Physical disturbance of heritage sites may occur from any clearing or ground disturbance activities which have the potential to unearth objects and/or move them across the landscape. Uncontrolled vehicle movement, for example where tracks are not already in place, can have similar impacts. In addition to potentially impacting the spiritual values of the heritage (Traditional Owners often caution against disturbing some objects in case spirits or other entities follow people home), this can impact the scientific and academic values of these places by removing them from their original context. Even minimal movement of artefacts may completely disrupt the ability to distinguish a site from a background scatter or the natural environment, erasing sites from the landscape and their historic, archaeological or anthropological significance as evidence of past human behaviour.

These activities also have the potential to damage some objects such as shells and fragile stone artefacts causing disruption to heritage values of a similar nature to that outlined above but of a greater magnitude.

Woodside has conducted Aboriginal ethnographic and archaeological surveys with full support and participation from NAC. Extrapolating from the surveys to date these surveys have targeted proposed disturbance sites associated with initial phases of the Proposal (approximately 100MW) within the DE. Based on the heritage surveys, Woodside have undertaken design and construction planning to avoid all identified heritage sites within the surveyed portion of the DE. This will ensure that direct impacts are avoided and the maintenance of 50 m working buffers from sites will minimise the risk of indirect impacts occurring during construction. The surveys cover, approximately 62% of the Solar Plant Supporting Infrastructure (SPSI), and approximately 100ha (~10%) of the Solar PV Farm.

Woodside will work with NAC to conduct surveys of all remaining unsurveyed impact footprints to identify any un-recorded Aboriginal Heritage sites and undertake appropriate design and construction planning to avoid any identified sites. Based on the surveys undertaken to date, it is expected that unsurveyed portions of the Proposal DE on the Roebourne Plains will have limited occurrence of

heritage sites and there will be ample opportunity to adjust the Solar PV Farm layout as required to avoid sites.

The Proposal is not expected to result in impacts to European heritage sites listed on Municipal Inventories. There is potential for isolated structures (e.g. water tanks, troughs, fences) associated with Old Stock Route Wells to be present in the stock route to the north of the SPSI and Solar PV Farm DEs, which are not expected to be subject to indirect impacts from construction or operation of the SPSI or Solar PV Farm.

Disturbance to flora and vegetation that will result in impacts to species used for cultural purposes

Some native plants found in the DE are used by Aboriginal people, including *Acacia coriacea*, *A. pyrifolia*, *Avicennia marina*, *Ficus brachypoda* and various *Solanum* species (City of Karratha 2013). The Murujuga Cultural Management Plan (MAC 2016) identifies heritage values of vegetation on the Burrup Peninsula (which may also occur within the DE) including tree species that provide medicine for colds and flus, shade for shelter, and ceremonial tools; use of mangroves for fishing; and use of spinifex seeds for damper.

Clearance of vegetation has the potential to remove these plants from the area, or at least those examples most easily accessible to Traditional Owners.

3.3.1.2 Physical Presence of Infrastructure, Vehicles and Equipment in the Development Envelope

Constraints on access to or use of land for traditional activities

Infrastructure proposed to be constructed on the MSIA and adjacent Buffer Area requires that some areas be closed to the public for safety reasons. This includes the Solar PV Farm and any ancillary infrastructure, which will be fenced. Although fencing will be limited, there is the potential that this may create physical barriers to Traditional Owners seeking to access traditional areas or places favourable for hunting or gathering bush tucker.

Traditional Owners have advised that the Solar PV Farm location, in particular, may limit land used for grazing cattle under NAC's current sub-lease of the Karratha Station pastoral lease.

4. REGULATORY MECHANISMS

4.1 Internal Management Mechanisms Relevant to this CHMP

4.1.1 Woodside Management System

The Woodside Management System (WMS) defines how Woodside delivers its business objectives and the boundaries within which all Woodside employees and contractors are expected to work. Environmental and cultural heritage management are components of the overall WMS.

The overall direction for management of Aboriginal heritage is set through Woodside's corporate Indigenous Communities Policy. The policy provides a public statement of Woodside's commitment to building long-lasting relationships with Indigenous communities in which Woodside operates and to demonstrate respect and act with integrity as we generate positive economic, social and cultural outcomes. It sets out the principles for achieving the objectives and how these are to be applied. The policy is applied to all Woodside activities, and employees, contractors and Joint Venture partners engaging in activities under Woodside's operational control.

4.1.2 Cultural Heritage Management Procedure

Woodside's Cultural Heritage Management Procedure (Woodside ID WM0000PG10178231) defines:

- requirements to meet statutory obligations and commitments for cultural heritage
- requirements for stakeholder engagement, cultural heritage assessment and cultural heritage management
- accountabilities for reputation, cultural risk assessments, cultural heritage assessments and cultural heritage management
- processes for escalating and reporting non-compliance with the requirements.

4.1.3 Incident Reporting

An incident is defined as any event that breaches or threatens the ability of any person or company to meet the objectives or management actions listed in this CHMP.

Specifically, an incident is defined as one or a combination of the following:

- Non-compliance with this CHMP
- Unexpected damage or loss to any heritage site or item within the DE
- Discovery of a new heritage site within the DE
- Discovery of skeletal remains within the DE
- Any trespass outside of the operational area of the DE without appropriate authorisation.

Incidents are reported to Woodside's Senior Heritage Adviser or equivalent corporate heritage representative and in accordance with the Health Safety and Environment Event Reporting and Investigation Procedure (Woodside ID WM0000PG9905421). Community grievances are handled through Woodside's Community Grievance Mechanism Procedure (Woodside ID WM0000PG9539696). Non-compliances with this CHMP will be reported as outlined in **Section 5.1**.

4.2 Regulatory Management Mechanisms Relevant to this CHMP

The following pieces of Commonwealth and State (WA) legislation contain provisions for the protection of Aboriginal heritage.

4.2.1 Commonwealth Legislation

Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)

The *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSIHP Act) provides a mechanism for the Commonwealth Environment Minister to make declarations regarding the protection of an Aboriginal site when the Minister is satisfied that, under State or Territory law, there is ineffective protection of the area from a threat of injury or desecration. Declarations made under this Act may involve restricting activities and/or access to an Aboriginal site.

If the requirements of the *Aboriginal Heritage Act 1972 (WA)* are adhered to, the ATSIHP Act is unlikely to have relevance for Aboriginal sites found to exist within the DE.

Native Title Act 1983 (Cth)

The Native Title Act 1993 (NT Act) adopts the common law definition of native title, defined as the rights and interests that are possessed under the traditional laws and customs of Aboriginal people in land and waters, and that are recognised by the common law. These rights may exist over Crown Land but do not exist over land held as freehold title.

The NT Act recognises the existence of an Indigenous land ownership tradition where connections to country have been maintained and where acts of government have not extinguished this connection.

4.2.2 State Legislation

Aboriginal Heritage Act 1972 (WA)

The *Aboriginal Heritage Act 1972 (WA)* (AH Act) is the principle legislation for providing protection and preservation of all Aboriginal cultural heritage places and objects within WA. This Act is currently administered by the WA Department of Planning, Lands, and Heritage (DPLH). Under Section 17 of the AH Act it is an offence to excavate, destroy, damage, conceal, or in any way alter any Aboriginal site or artefact, unless conducted with the authorisation of the Registrar of Aboriginal Sites under Section 16 or with the consent of the Minister for Aboriginal Affairs under Section 18 of the AH Act.

The AH Act is the most relevant piece of Aboriginal heritage legislation to consider when planning ground disturbance activities. Aboriginal heritage features are protected regardless of whether they have been previously identified and recorded or not. Archaeological and ethnographic field surveys will record all visible Aboriginal heritage features within a proposed disturbance area and any unplanned discovery of unrecorded (buried/obscured) features are covered by the legal mechanisms of the AH Act.

5. MANAGEMENT PROVISIONS

This section describes the provisions of this CHMP which, when implemented, achieve the objective of the Social Surroundings (Heritage) environment factor and the objective of the CHMP, to uphold the relevant environmental values and avoid potential impact to heritage values from the Proposal.

Table 5-1 lists the management-based provisions that will be implemented with the Proposal. These are based on the rationale and approach described in **Section 5.2**.

5.1 Management Based Provisions Summary

Table 5-1: Management-based Provisions

Management Actions	Targets	Monitoring	Reporting
MA 1: Conduct pre-design heritage surveys in collaboration with Traditional Owners, to define non-disturbance zones.	<p>All infrastructure will be designed to have no planned impact to any known Aboriginal heritage sites.</p> <p>Surveys of all planned disturbance areas will be conducted in association with nominated Traditional Owners from Ngarluma Aboriginal Corporation, to identify potential Aboriginal Heritage Sites or other non-disturbance zones.</p>	Heritage survey reports and resulting maps of Proposal infrastructure demonstrate no direct impacts to known heritage features as far as practicable and subject to the AH Act and all other relevant regulatory requirements.	Pre-design heritage surveys used to prepare and maintain a register of non-disturbance zones within the DE.
MA 2 All construction and operational activities to be contained within defined disturbance zones unless specifically authorised, to avoid direct, physical disturbance to identified Aboriginal heritage features.	<p>No disturbance to Aboriginal heritage features.</p> <p>No unauthorised disturbance zone boundary transgression.</p>	<p>To be supervised by project manager and/or Senior Heritage Adviser or their delegate(s).</p> <p>Heritage monitors authorised by NAC to be invited to be present during all ground disturbing works.</p>	<p>Sites to be re-inspected after construction to confirm no impacts have occurred subject to all relevant regulatory requirements.</p> <p>Transgression of disturbance zone boundary to be reported through Woodside's Health, Safety and Environment Event Reporting and Investigation Procedure.</p> <p>Post construction compliance report to be issued to relevant regulating agencies.</p>

Management Actions	Targets	Monitoring	Reporting
MA 3: Implement Chance Find Procedure agreed with NAC if Aboriginal heritage features are accidentally uncovered during construction or operational activities	No accidental disturbance to heritage features.	Heritage monitors authorised by NAC to be invited to be present during all ground disturbing works.	Report any Aboriginal heritage features identified during construction activities to the DPLH and in accordance with Section 15 of the AH Act.
MA 4: All persons employed or engaged to undertake work or otherwise accessing Woodside Power sites shall be made aware of their obligations under the Aboriginal Heritage Act 1972 and this CHMP	100% compliance with legal obligations and this CHMP. All personnel entering the Project facilities attend relevant inductions.	Induction attendance is recorded and confirmation that all personnel have attended as required. Senior Heritage Advisor to undertake review of compliance with this CHMP at conclusion of construction.	Post construction compliance report to be issued to relevant regulating agencies. Records of induction attendance.
MA 5: Prior to undertaking clearing activities, provide opportunities for Traditional Owners to collect traditional resources within the planned disturbance zone.	Traditional Owners provided opportunity to collect traditional resources from DE prior to any clearing or construction.	Requests for access and outcomes to be recorded in a register and monitored for unaddressed/unmet requests.	Record of instances of Traditional Owners requests for access and outcomes of those requests reported in post-construction CHMP compliance report.
MA 6: Provide access for Traditional Owners to traditional areas within the developed site, subject to safety and operational requirements, when requested	Access provided to the Woodside Power Project Area to Traditional Owners when requested. TO's will be able to access non-restricted areas within the DE at any time.	Requests for access and outcomes to be recorded in a register and monitored for unaddressed/unmet requests.	Record of instances of Traditional Owners requests for access and outcomes of those requests are maintained and reported in post-construction CHMP compliance report.

Management Actions	Targets	Monitoring	Reporting
<p>MA 7: Establish a commitments register for this CHMP to ensure compliance against management targets during construction and operations.</p>	<p>100% compliance with this plan.</p>	<p>Senior Heritage Advisor to undertake reviews of compliance with this plan after construction and regularly during operations, and record findings in commitments register.</p>	<p>Post construction compliance report to be issued to relevant regulating agencies.</p>

5.2 Management Actions

5.2.1 MA1 – Conduct pre-design heritage surveys in collaboration with Traditional Owners, to define non-disturbance zones.

In WA, Aboriginal Objects and Places are protected under the AH Act. It is an offence under Section 17 of the AH Act to excavate, destroy, damage, conceal or in any way alter any Aboriginal site without the authorisation of the Registrar of Aboriginal Sites under Section 16 of the AH Act or the consent of the Minister of Aboriginal Affairs under Section 18 of the AH Act.

The location of all infrastructure associated with the initial phase of the Proposal will be designed to avoid any sites identified as requiring protection during extensive cultural heritage surveys conducted across the DE, incorporating Traditional Owner advice and requests. The Proposal's final disturbance zone will not interfere with any Aboriginal Objects or Places protected under the AH Act. Areas outside of this area that require particular care, (i.e. as they are in close proximity to construction or operational areas) may be permanently or temporarily cordoned off, as addressed in **MA2** (See **Section 5.2.2**).

To avoid these sites, cultural heritage surveys have been conducted across the locations within the Proposal DE that are expected to be disturbed through construction works associated with the initial phase of the Proposal. These surveys included both archaeological (BWA 2019) and ethnographic (DB-Consulting 2019) components. An overview of the locations in which heritage surveys have been completed to date are outlined in **Figure 5-1**. Further details of areas to be identified is within the survey reports, that are not provided attached to this plan to protect sensitive locations but have been provided to the EPA with submission of this plan for verification.

Archaeological surveys of the Solar Farm DEs were conducted by the Ngarluma Aboriginal Corporation's preferred consultants and Ngarluma participants through pedestrian transect and in-field recording to a 'site identification' level. This involved a determination of any site boundaries and sufficient information to make assessments of significance and management recommendations. Ethnographic survey over these areas involved on-country discussions regarding the landscape generally as well as seeking comment on any archaeological sites or landscape features identified as important by the participants.

Reports for the heritage surveys were produced by the heritage consultants and approved by NAC prior to being provided to Woodside. The cultural heritage information collected remains the intellectual property of the Ngarluma participants, and the reports provided to Woodside are stored in the company's secure document management system at the 'Confidential' level with access available only to Woodside's Indigenous Affairs and Heritage, Environment, Senior Project Management, Corporate Affairs and Project Design staff. They are not included as appendices to this management plan.

Should disturbance to an object or place be identified as being unavoidable as a result of heritage surveys or further engineering design work, the disturbance will be planned and executed in accordance with the AH Act and this management plan will be updated to describe the planned disturbance and management process. No such disturbance has been identified as being necessary at the time of preparation of this plan. Woodside will not submit any applications under S18 of the AH Act, without the consent of NAC.

Prior to any further expansion of the Solar PV farm beyond the initial phase, any areas in which disturbance is planned will be subject to heritage surveys, which will be performed in collaboration with NAC. Any non-disturbance zones will then be avoided, as managed through MA 2.

5.2.2 MA2 – All construction and operational activities to be contained within defined disturbance zones unless specifically authorised, to avoid direct, physical disturbance to identified Aboriginal heritage features.

Woodside has developed a spatial register of all identified cultural heritage sites within the Proposal DE informed by cultural heritage surveys, including the disturbance zones agreed with Traditional Owners. All construction activities will be planned to not intersect with cultural heritage sites or to occur outside of disturbance zones. Any location within the DE which has not yet been subject to a heritage survey will be considered a non-disturbance zone until surveys (as per MA 1) have been completed.

Before any construction activities begin in close proximity to a cultural heritage site, the site will be visually marked and construction personnel will be informed. Ensuring protection of a cultural heritage site during construction may include erecting temporary barriers or fences beyond a designated buffer zone. All activities must remain within the designated disturbance zones unless a heritage permit has been provided.

A Heritage Permit must be obtained before any deployment of personnel or issue of a 'Contractor Direction' (CD) notice to access areas outside of a designated disturbance zone. To obtain a Heritage Permit, the proponent of the proposed access must provide a completed Heritage Permit Application Form (Woodside ID 1401317357) to Woodside's Senior Heritage Adviser with the following information:

- a description or map indicating the area for which access is requested;
- the start and end dates for access;
- the names and contact details of the Woodside or contractor employee responsible for the works; and
- confirmation that access is required for a Woodside Power site or, if access is required for a third-party lease, the name of the lessee and contact within the lessee's organisation.

After receiving the above information and before issuing a Heritage Permit, the Senior Heritage Adviser must:

- assess the potential or impact to heritage values from the execution of the proposed activity;
- document the Heritage Permit conditions required to prevent disturbance to heritage values;
- ensure compliance with government issued heritage approvals (including heritage consents and environmental approval conditions where relevant/applicable);
- ensure that access to gender restricted areas is managed; and
- update the register of heritage permits.

A Heritage Permit will take the form of a permit signed by the Senior Heritage Adviser, Woodside's on-site contact, VP Technology and the proponent undertaking the activity.

The Heritage Permit shall require the proponent to provide a log of their activities outside of the designated disturbance zone to the Senior Heritage Adviser on a weekly basis (time in and out, location of activities outside of the disturbance zone boundary).

The Senior Heritage Adviser must be notified when the activity has been completed in order to formally close the Heritage Permit and confirm that all conditions of the Heritage Permit have been met.

5.2.3 MA3 – Implement Chance Find Procedure agreed with NAC if Aboriginal heritage features are accidentally uncovered during construction or operational activities.

Although pre-construction heritage surveys have been conducted to identify cultural heritage features within the DE, there is always the possibility that previously unrecorded or unidentified features may be discovered during construction work.

In the event there is a discovery of heritage features during construction works, the following relevant procedures must be followed.

5.2.3.1 Procedure if Skeletal Remains are discovered

In the unlikely event that human remains are discovered during any stage of the works, the following steps must be followed:

1. Personnel must cease all works in the vicinity immediately. Best efforts should be made to preserve any human remains in situ and to cordon off the area from other works. No photographs of the remains may be taken except under the instruction of the Western Australian Police Service or (in connection with a suspected traditional burial) with the permission of Traditional Owners (e.g. to provide to a consultant archaeologist for advice).
2. The work supervisor must inform the Western Australian Police Service and Woodside's Senior Heritage Adviser, who must notify the Traditional Owners, the Registrar of Aboriginal Sites and a qualified archaeologist if not already present. When informing Police of a suspected traditional burial, indicate that the remains are likely to be of Aboriginal origin and that an archaeologist and Traditional Owner representatives should be present during any handling of the remains. All Woodside personnel and contractors must comply with any reasonable instruction from the Western Australian Police Service. Notification must also be given to the Minister responsible for the Aboriginal and Torres Strait Islander Heritage Protection Act 1984. At present this is the Minister for Environment.
3. Where the Western Australian Police Service is satisfied that the remains do not constitute a crime scene, the qualified archaeologist must record the find (if still in situ). Traditional Owners, the archaeologist and Woodside's Senior Heritage Adviser must meet and discuss the find and the management measures required.
4. Work must not recommence in the area until approved by Woodside's Senior Heritage Adviser on the advice of Traditional Owners, the Registrar of Aboriginal Sites (in writing) and the qualified archaeologist.

5.2.3.2 Procedure if a new heritage feature is located

In the event of the discovery of archaeological materials (e.g. intact subsurface deposits including midden lenses, sacred items, buried/covered petroglyphs etc.) within a designated disturbance zone during any stage of works, the following steps must be followed:

1. Personnel must cease all works in the vicinity immediately. Where practicable, the work area must be cordoned off from other works.
2. The work supervisor must inform Woodside's Senior Heritage Adviser, who must notify Traditional Owners, the Registrar of Aboriginal Sites and a qualified archaeologist.
3. A qualified archaeologist must record the find and Traditional Owners, the archaeologist and Woodside's Senior Heritage Adviser must meet and discuss the find and the management measures required.

4. Work must not recommence in the area until approved by Woodside's Senior Heritage Adviser on the advice of Traditional Owners, the Registrar of Aboriginal Sites (in writing) and the qualified archaeologist.

5.2.3.3 Incident Management

Heritage incidents, including near misses, must be reported to the Indigenous Affairs team through Woodside's Health Safety and Environment Event Reporting and Investigation Procedure. The Indigenous Affairs team will inform the Traditional Owners of any actual impacts on heritage sites or values and organise an inspection with Traditional Owners and a qualified heritage consultant to:

- Ascertain the extent of any damage;
- Determine what cultural procedures, if any, are required; and
- Establish what steps, if any, must be taken to rehabilitate the area.

A heritage incident is defined as any event that breaches or interferes with compliance with this CHMP. An 'incident' may include any of the following:

- Non-compliance with this CHMP,
- Unexpected damage or loss to any heritage site, object or values,
- Discovery of a new heritage site or object,
- Discovery of human remains,
- Any trespass outside of the disturbance zone without a signed permit, or
- A 'near miss' that threatened to cause any of the above.

5.2.4 MA4 – All persons employed or engaged to undertake work, or otherwise accessing Woodside Power sites shall be made aware of their obligations under the *Aboriginal Heritage Act 1972 (WA)* and this CHMP.

All personnel, including third party contractors and visitors are required to undertake cultural awareness and heritage induction training. The induction must inform personnel of the values, sensitivity and appearance of the cultural heritage features within the Proposal DE and their obligations under this CHMP and the AH Act.

Induction attendance is to be recorded and confirmation that all personnel have attended is required prior to accessing any of the Woodside Power sites.

5.2.5 MA5 – Prior to clearing for construction, provide opportunities for Traditional Owners to collect traditional resources within the planned disturbance zone.

Traditional Owners have requested that Woodside provides opportunity for the harvesting of traditional resources within the planned disturbance zone prior to any native vegetation clearing. Woodside supports this request and agrees to facilitate access subject to site access protocols, operational and HSE considerations. Harvesting of traditional resources such as seeds and plants will only be permitted within the approved disturbance zone where Woodside are legally authorised to undertake native vegetation clearing.

To ensure this request is met, Woodside will issue notifications detailing when and where clearing will take place no less than one month prior to any work starting. Woodside will provide administrative support where possible to facilitate site access.

To arrange access, Traditional Owners may contact Woodside's Karratha or Roebourne offices. Woodside endeavours to meet each request, noting that on-site activities may influence the timing, number of visitors and/or duration of any visit.

Requests by Traditional Owners to access the planned disturbance zone for harvesting traditional resources should be communicated to Woodside's Senior Heritage Adviser. Access must be facilitated by the Senior Heritage Adviser (or nominee) who must:

- confirm the area to be visited, duration of the visit and the names of people attending,
- develop a Job Hazard Analysis prior to the visit in accordance with Woodside's Golden Safety Rules, WMS and take appropriate steps to manage gender restrictions using archaeological and ethnographic survey reports, and
- be present during the visit as safety focal point but must comply with any request from the Traditional Owners not to enter a heritage area or that they be allowed to discuss any heritage matter in private. However, the Senior Heritage Adviser or nominee is to stay in visual contact with the visiting party to ensure safety obligations are met and an immediate response can be enacted in the case of an emergency.

5.2.6 MA6 – Provide access for Traditional Owners areas within the Proposal facilities.

Infrastructure proposed to be constructed on the MSIA and adjacent Buffer Area, requires that some areas be closed to the public for safety reasons, but way of a fence or secure gates. Although fencing will be limited, there is the potential that this may create physical barriers to Traditional Owners and Custodians seeking to access traditional areas or places favourable for hunting or gathering bush tucker.

Only areas within the DE that have been required for facility infrastructure (and a reasonable buffer) will be fenced. Traditional Owners have requested ongoing access to fenced areas within the DE, to visit heritage sites and other areas of cultural significance. Woodside supports this request and agrees to facilitate access subject to site access protocols, operational, security and Health, Safety and Environment considerations.

To arrange access, Traditional Owners may contact Woodside's Karratha or Roebourne offices. Woodside endeavours to meet each request, noting that on-site activities may dictate the timing, number of visitors and/or duration of any visit.

Requests by Traditional Owners to access any heritage place should be communicated to Woodside's Senior Heritage Adviser. Access must be facilitated by the Senior Heritage Adviser (or nominee) who must:

- confirm the area to be visited, duration of the visit and the names of people attending,
- develop a Job Hazard Analysis prior to the visit in accordance with Woodside's Management System and take appropriate steps to manage gender restrictions using archaeological and ethnographic survey reports, and
- be present during the visit as safety focal point but not attend cultural areas unless permitted by the Traditional Owners. However, the Senior Heritage Adviser or nominee is to stay in visual contact with the visiting party to ensure safety obligations are met and an immediate response can be enacted in the case of an emergency.

5.2.7 MA7 – Establish a commitments register for this CHMP to ensure compliance against management targets during construction

Woodside's Senior Heritage Adviser or equivalent corporate heritage representative will conduct annual reviews of compliance with this CHMP throughout the construction phase of the Proposal. Once construction has been completed, Woodside will prepare a report detailing compliance against the management provisions outlined in this plan. Any incidents impacting on heritage prior to the completion of the construction phase will be reported to relevant authorities and stakeholders.

Incidents defined as a non-compliance with this CHMP include;

- Unplanned/unauthorised damage or loss to any heritage feature within the DE
- Lasting negative impact on intangible heritage values reported by stakeholders
- Discovery of a new heritage feature within the DE
- Discovery of skeletal remains within the DE
- Any trespass outside of the operational area of the DE without appropriate authorisation
- A “near miss” or activity that threatens the occurrence of an incident listed above.

6. Adaptive Management and Review of the CHMP

In line with the concept of adaptive management, the management actions presented in this CHMP shall be monitored, reviewed, evaluated and updated, as required, considering:

- new and relevant data/information gained as a result of implementing this CHMP, or from external sources.
- changes in State or Commonwealth legislation or policy.

Relevant updates will be included in a revised CHMP.

In addition, this CHMP may be reviewed:

- based on EPA requirements identified during assessment of the project in accordance with the EP Act.
- if a significant incident occurs related to the protection of Aboriginal heritage.
- if Traditional Owners reasonably request that a review is undertaken.
- if relevant legislative requirements are updated or amended in relation to Aboriginal heritage.

Technical review and evaluation of the management actions outlined in this CHMP will be conducted at least every five years (if not initiated prior to that time) to ensure the management actions are adequately addressing the key risks and meeting EPA objectives. If, as a result of any review, significant changes are required to be made to this CHMP, a revised CHMP will be provided to the EPA for approval.

When the five-yearly review cycle is triggered, or if a significant change to either the facility, activity, or risk is identified, a revised CHMP will be submitted to the EPA. When approved, the revised plan will be made publicly available.

7. Stakeholder Consultation

This CHMP is included as an appendix to the referral for the Proposal (Woodside, 2021) and therefore will be reviewed by the EPA and other designated stakeholders at the request of EPA. Prior to referral, comments on the CHMP have been sought from the Ngarluma Aboriginal Corporation. Their feedback has been incorporated into this document.

Stakeholder consultation and engagement is an integral component of the environmental impact assessment and environmental approvals process. This section describes Woodside's approach to stakeholder consultation broadly and for the Proposal specifically.

Woodside's objectives for stakeholder consultation are to:

- improve stakeholder awareness and understanding of the Proposal
- provide stakeholders with opportunities to obtain information about the Proposal including the physical, ecological, socio-economic and cultural environment that may be affected, the potential impacts that may occur, and the prevention and mitigation measures proposed to avoid or minimise those impacts
- gain feedback from stakeholders on their concerns in regard to the Proposal and, where possible, address stakeholder concerns through further activities, or by implementing additional mitigation measures.

Stakeholder engagement in relation to this Proposal includes engagement with identified stakeholders undertaken specifically in relation to the Proposal including engagement undertaken as part of development of the Woodside Power Project Social Surrounds (Cultural Heritage) Management Plan.

8. References

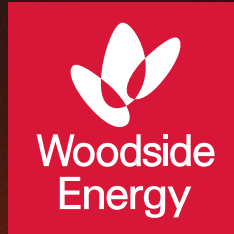
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9. TERMS

Terms	Definitions
AER	Annual Environment Report
AH Act	<i>Aboriginal Heritage Act 1972 (WA)</i>
AHIS	Australian Heritage Inquiry System
ATSIHP Act	<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)</i>
Buffer Area	The 2 km 'Industry Buffer Area' surrounding the Maitland Strategic Industrial Area
CALM Act	<i>Conservation and Land Management Act 1984 (WA)</i>
CHMP	Cultural Heritage Management Plan
DBCA	Western Australian Department of Biodiversity, Conservation and Attractions
Development Envelopes (DE)	The Development Envelopes represent the area within which development of the Proposal is to occur. The two Development Envelopes for this Proposal include: <ul style="list-style-type: none"> Solar PV Farm Solar Plant Supporting Infrastructure (SPSI)
DMA	Decision-making Authority
DPLH	Western Australian Department of Planning, Lands and Heritage
DWER	Western Australian Department of Water and Environmental Regulation
EMP	Environmental Management Plan
EP Act	<i>WA Environmental Protection Act 1986 (EP Act)</i>
EPA	Western Australia Environmental Protection Authority
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EQMF	Environmental Quality Management Framework
ha	Hectares
km	Kilometre
kV	Kilovolt
MA	Management Action
MAC	Murujuga Aboriginal Corporation
MSIA	Maitland Strategic Industrial Area
Murujuga	Traditional name for the Burrup Peninsula and surrounding islands of the Dampier Archipelago
MW	Megawatt
NAC	Ngarluma Aboriginal Corporation
National Heritage Place	National Heritage Place – Dampier Archipelago (including Burrup Peninsula)
NEPM	Commonwealth <i>National Environmental Protection (Ambient Air Quality) Measure 2016</i>
NT Act	<i>Native Title Act 1983 (Cth)</i>
RNTBC	Registered Native Title Body Corporate

Woodside Solar Facility Social Surrounds (Cultural Heritage) Management Plan

Terms	Definitions
WA	Western Australia
WMS	Woodside Management System
Woodside	Woodside Power Pty Ltd



WOODSIDE SOLAR FACILITY FLORA AND VEGETATION SURVEY



**WOODSIDE POWER PROJECT
DETAILED WET SEASON VEGETATION SURVEYS WITHIN THE SOLAR PV AND
POWER PLANT FOOTPRINT**

SEPTEMBER 2020

**AN ADDENDUM TO 'FLORA AND VEGETATION SURVEYS AND DESKTOP ASSESSMENT
REPORT' JULY 2019**

Prepared for Woodside Power Pty Ltd

vicki long & associates

Living in the Pilbara

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Woodside Power Pty Ltd
 Power Project –Solar PV and Power Plant Wet Season Survey, September 2020

**WOODSIDE POWER PROJECT
 DETAILED WET SEASON VEGETATION SURVEYS WITHIN THE SOLAR pv
 AND POWER PLANT FOOTPRINT**

Prepared for:
 Woodside Power

Job No: VLA-056/20B

Reference No: vla56_20Brv01_Rev2_220921

Revision Status

Rev	Date	Description	Author(s)	Reviewer
A	07/09/2020	Draft Issued for Internal Review	P Aylmore	V Long
B	09/09/2020	Draft Issued for Client Review	P. Aylmore / V. Long / S. Chalwell	J. Collins
0	15/09/2020	Final issued to Client	P. Aylmore / V. Long / S. Chalwell	H. Morgan
1	09/11/2020	Final issued to Client (with amendments)	P. Aylmore / V. Long / S. Chalwell	
2	22/09/2021	Final issued to Client (removal of ref. to Transmission Corridor and updated boundary)	P. Aylmore / V. Long / S. Chalwell	

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Abbreviation	Definition
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
BoM	Bureau of Meteorology
°C	Degrees Celsius
DBCA	Department of Biodiversity, Conservation and Attractions
DBNGP	Dampier Bunbury Natural Gas Pipeline
DoEE	Department of the Environment and Energy
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
m	Meters
mm	Millimeters
NOx	Nitrous Oxide Emissions
P	Priority
PEC	Priority Ecological Community
PP	Power Plant
Solar PV	Solar Photovoltaic Farm
sp.	Species (singular)
VLA	Vicki Long and Associates
WoNS	Weeds of National Significance

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- Appendix A: Field Data Sheets and Mapping Notes
- Appendix B: Vegetation Type Codes and Vegetation Type Figure
- Appendix C: Flora List

1. INTRODUCTION

1.1 Project Background

Woodside Power Pty Ltd (Woodside) is proposing to establish a Hybrid Renewable Power Plant (the Proposal), located approximately 15 km south-west of Karratha, Western Australia (WA) (Figure 1). The Proposal will generate and supply power to third party industrial customers on the Burrup Peninsula, such as the North-West Shelf Project. The Proposal will reduce the total air pollutant emissions on the Burrup Peninsula and is also expected to realise up to a 5% reduction in CO₂ emissions and 50% reduction in NO_x emissions.

This report is an Addendum to the Flora and Vegetation report prepared by Vicki Long and Associates (VLA) (2019) in which full details of the proposal are discussed.

VLA was engaged by GHD on behalf of Woodside in 2019, to undertake a flora desktop assessment and a single season, reconnaissance (previously known as Level 1) flora and vegetation survey of the Development Envelope (Power Plant and Solar PV leases).

The entire area of the proposed PP and Solar PV leases consisted of the Roebourne plains grassland, which, depending on associated species present and soil type, contains both Priority 1 and Priority 3 Ecological Communities (PECs). Due to below average rainfall for two years preceding the 2019 survey, identification of many flora species and vegetation types (including any Priority flora species or PECs) over much of the southern survey area was difficult due to the dormancy of grasses, annual and weed species.

The initial 2019 survey included the entire PP and Solar PV proposed lease areas. Due to the dry conditions, it was recommended that a wet season survey would need to be undertaken following adequate rainfall to confirm the presence of PECs and Priority flora within the Southern Development Envelope (Figure 1), to assist with development of future stages of the Solar PV area. The wet season survey focused on the Phase 1 development footprint of the Solar PV and PP areas together with a surrounding 200 m buffer.

1.2 Scope and Objectives

The scope of work for the wet season survey was to undertake a:

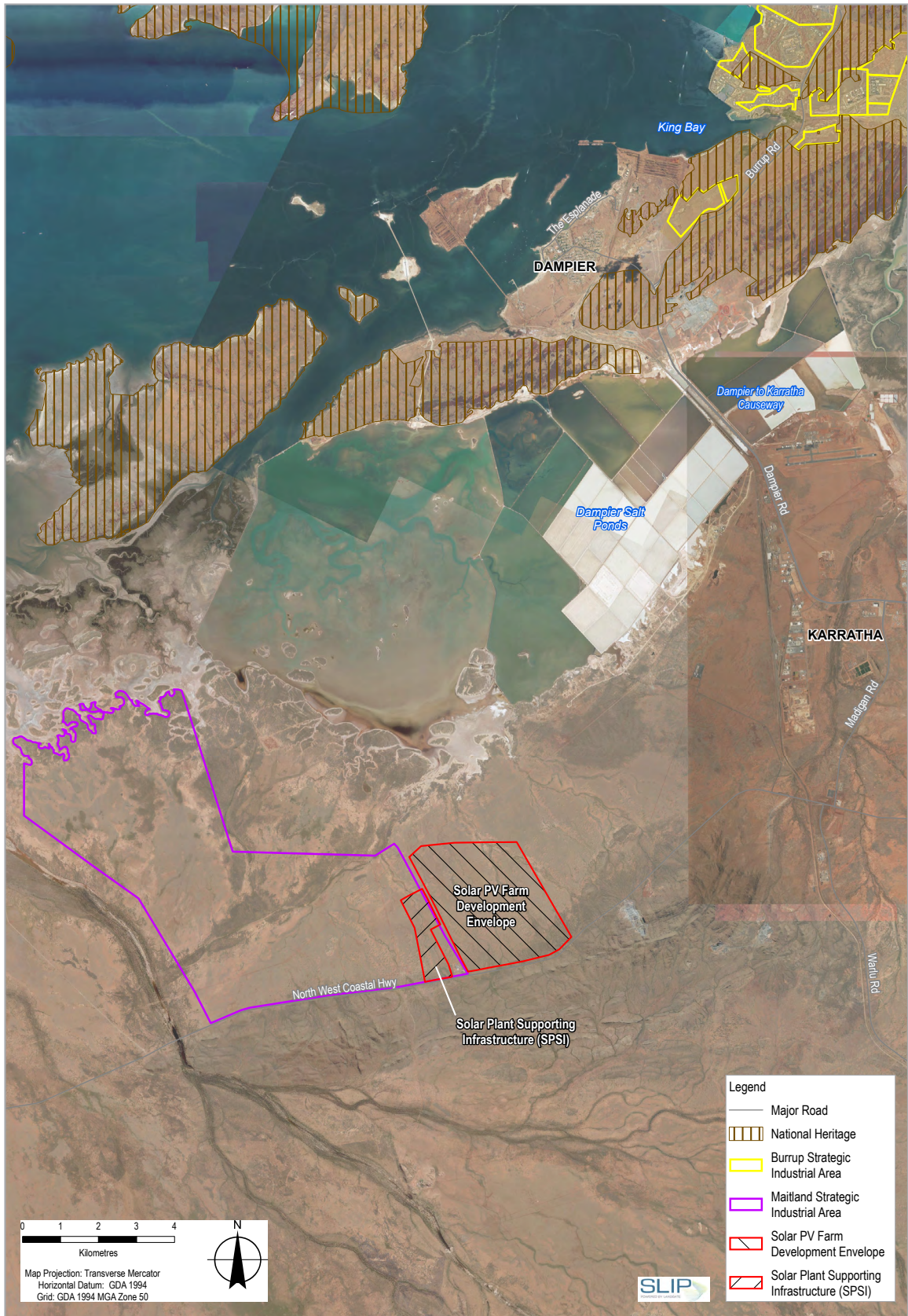
- a detailed survey of vegetation types assigned as PECs during the 2019 survey (VLA 2019) within the Solar PV and PP footprint areas (and buffer) to confirm PEC status, to confirm continuation of the PEC outside the survey area and to search for any potential flora of conservation significance that may occur;

The information obtained from this wet season survey will support the EPA referral application.

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Figure 1. Location of the Southern Development Envelope



G:\6112554973\GIS\Mapel\Working\12554973\12554973.aprx
 Print date: 22 Sep 2021 - 14:39
 Data source: GHDI: Solar PV Farm Development Envelope, Solar Plant Ancillary and Supporting Infrastructure - 20210824; JTSI: Burrup Strategic Industrial Area - 20190705; Woodside: Maitland Strategic Industrial Area; DoEE: National Heritage - 20181218; Landgate: Roads - 20210302; Imagery - accessed: 20210302. Created by: mczakaj

2. PREVIOUSLY RECORDED VEGETATION AND FLORA OF CONSERVATION SIGNIFICANCE WITHIN THE SURVEY AREA

The majority of the southern survey area consists of Roebourne plains grassland, which, depending on associated species present and gilgai type, contains both Priority 1 and Priority 3 Ecological Communities (PECs) (Department of Biodiversity, Conservation and Attractions (DBCA) 2020) as described below:

- Roebourne Plains coastal grasslands with gilgai microrelief on deep cracking clays (P1)
- Horseflat land system of the Roebourne plains (P3) (northern section of the Power Plant / Solar PV survey area and/or surrounds)

Identification of these PECs relies on live, identifiable component grass and annual species, other than the persisting perennial *Eragrostis xerophila* (Roebourne Plains grass). More detailed descriptions of these PECs are given in the survey report prepared by VLA (2019).

From the database searches undertaken for Priority Flora in the VLA (2019) survey report, three P3 species were recorded as occurring within 5 km of the PP and Solar PV areas. These species are listed below:

- *Themeda* sp, Hamersley Station (ME Trudgen 11431) – P3
- *Stackhousia clementii* – P3
- *Oldenlandia* sp. Hamersley Station (AA Mitchell PRP 1479) – P3

The National Vegetation Information System (NVIS) (ESCAVI 2003) is the nationally adopted classification system used for vegetation description for EIA in Western Australia.

Broadly, the vegetation classification uses vegetation structure and dominant species to describe differences between vegetation units. Structural vegetation classification provides information on height of strata, foliar cover and dominant species.

3. METHODS

3.1 Field Survey

The detailed wet season vegetation surveys to determine the presence of PECs were undertaken within the southern survey area in the Power Plant and Solar PV areas in April 2020. These surveys were conducted by VLA's Principal Botanist Vicki Long. Vicki has considerable experience in identifying both flora and vegetation and introduced flora of the Eremaean Zone. The surveys were undertaken in accordance with the requirements of the Scope of Works as outlined in Section 1.2.

Information from these surveys will be used to identify areas containing conservation significant flora or vegetation.

The methods adopted for the flora and vegetation survey were formulated, as far as practicable, in context with the EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (Environmental Protection Authority 2016).

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Information acquired during the desktop and 2019 field assessment (VLA 2019), assisted in the design of the field surveys. The survey locations were clearly delineated on aerial imagery, produced both as hard paper copies and on a field Trimble. Previously recorded conservation significant flora and PECs together with habitat preference information, assisted in identifying vegetation types and habitats within the survey locations that have the potential to support conservation significant flora and vegetation.

A total of 16 quadrats were surveyed, 12 of these relating to PECs within the PP and Solar PV areas and 4 to areas of interest within the survey area. The site data was further supported by field data collected for the borehole survey and results from this survey are documented in a report prepared by VLA (2020).

At each data collection site, a 50 m x 50 m quadrat was established. Where a detailed survey was being undertaken (in areas of PECs) the following details were recorded:

- Site number
- GPS co-ordinates
- Vegetation description
- Condition
- All species present
- Percent Foliar Cover (PFC) of all species present
- Location of any Priority flora present
- Photo

Species were identified in the field by Principal botanist Vicki Long. Any species not able to be identified in the field were collected, labelled and pressed for later identification by Vicki Long (utilising the Pilbara Regional Herbarium) or sent to the WA Herbarium. Priority species identified in the field or any suspected Priority species were located with GPS, photographed and collected for confirmation / identification by the WA Herbarium.

3.1.1 Statistical Analyses of Field Data

The quadrat data were analysed using hierarchical agglomerative clustering of the floristic data. The foliage cover scores for each species at each plot were transformed to an ordinal scale using a modified arcsine-square root transformation where 1 = <2% foliage cover; 2 = 2-5%; 3 = 6-25%; 4 = 26-50%; 5 = 51-75%; 6 = 76-95%; 7 = 96 – 99%; and 8 = >99% (McCune & Grace 2002). Similarity (or rather dissimilarity) between sites was analysed using the Bray-Curtis distance measure (function *vegdist* in the vegan R package; Oksanen et al. 2019). Clustering of vegetation groups utilised the flexible beta linkage method ($\beta = -0.25$) (function *agnes* in the cluster R package; Maechler et al. 2019) and the results visualised in a dendrogram (dendextend R package; Galil 2015). A check for misclassification of quadrats was conducted using function *optsil* in the optart R package (Roberts 2020).

The presence of indicator species for each vegetation type was analysed using the *indval* function in the labdsv R package (Roberts 2019), and the combination of indicator species was analysed with the indicpecies R package (de Caires & Legendre 2009). Indicator values for a species are derived from a combination of the faithfulness or fidelity of a species to a vegetation type and the constancy (or frequency of occurrence) of that species within a vegetation type. The importance (or mean

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abundance) of a species within a vegetation type was calculated using the function *importance* in the *labdsv* R package (Roberts 2019).

3.1.2 Limitations of Field Survey

A review of any limitations that may have affected a complete assessment of the data collected from the field surveys is presented in Table 1. The limitations listed are based on those suggested as considerations in EPA's Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016).

Table 1. Statement of limitations for Field Survey

Potential limitation	Statement regarding potential limitations	Constraint
<p>(i) Sources of information and availability of contextual information Is the region well documented?</p>	<p>Previous biological surveys have been conducted in the broader regional area, and broad-scale information is available from Beard (1975) and van Vreeswyk 2004. The southern survey area was also surveyed and well documented for the establishment of the Maitland Heavy Industrial Estate (AGC Woodward-Clyde 1994, Mattiske, 1994) and later Astron Environmental (2002). Therefore, contextual information for this project is not a limiting factor for this survey. The VLA (2019) survey was used as a basis for determining the areas to be surveyed in detail.</p>	<p>Nil</p>
<p>(ii) Scope The level of survey and detail required to undertake the survey. Was there adequate time to complete the survey to the desired standard?</p>	<p>There was adequate time to complete the detailed vegetation surveys as indicated in the Scope to provide supplementary information to support the EPA referral. Over the southern survey area, PECs and Priority species were recorded within quadrats or relevés at each location throughout the Power Plant and Solar PV areas.</p>	<p>Nil</p>
<p>(iii) Proportion of flora and fauna identified, recorded and/or collected Was the survey sampling, timing and intensity considered adequate? Was the survey conducted at what was considered an appropriate time of the year for plant identification? Were any taxonomic groups considered to be under-represented?</p>	<p>Summer rainfall was above average (Section 3.3.1), due to a 235mm rainfall event associated with Tropical Cyclone Damien in early February. The first survey conducted for the detailed wet season survey (7th, 8th, 9th and 11th April) was conducted in the PP and Solar PV areas approximately 8 weeks following rainfall, giving the grasslands sufficient time to recover. Rainfall had occurred in March and May 2020 and timing was still considered appropriate for survey of the Roebourne Plains grassland. Although a number of grasses had started to dry off, species associated with the Roebourne Plains grassland PECs were still identifiable.</p>	<p>Nil</p>
<p>(iv) Completeness Is there further work which may be required i.e. was the relevant area fully surveyed?</p>	<p>The southern survey area was considered adequately surveyed to confirm the presence of previously identified potential grassland PECs within the Solar PV and PP areas. The information recorded during the surveys is appropriate for management decisions.</p>	<p>Nil</p>

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Potential limitation	Statement regarding potential limitations	Constraint
<p>(v) Mapping reliability Were the aerial photographs, satellite images and site maps available considered adequate to fully understand the area surveyed? Was the mapping generated considered to have a high degree of reliability?</p>	<p>Colour aerial photography at a scale of 1:5,000 was used to locate the previously identified potential PECs and to assist in navigation and delineation of these PEC boundaries. The aerial photography was of good resolution and, in general, accurately represented ground conditions. As such mapping reliability was not considered a limiting factor.</p>	<p>Nil</p>
<p>(vi) Timing When was the survey conducted in terms of season, rainfall, severe weather events etc. Was the survey conducted at an appropriate time for access, observation of the optimal suite of species and for identification of flowering and fruiting species?</p>	<p>The survey was conducted following decent summer rainfall, enabling the identification of PECs.</p>	<p>Nil</p>
<p>(vii) Disturbance Had the survey area been impacted by any disturbance which may have limited the survey, i.e. fire, flood, accidental human intervention etc.?</p>	<p>The larger Power Plant and Solar PV proposed lease areas are not significantly impacted by the DBNGP, but the areas have been subject to heavy grazing in the past. Neither of these were considered a limitation to the survey.</p>	<p>Nil</p>
<p>(viii) Intensity In retrospect, was the intensity considered to be adequate?</p>	<p>The intensity of the survey was considered adequate to identify the PEC grasslands.</p>	<p>Nil</p>

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Potential limitation	Statement regarding potential limitations	Constraint
(ix) Resources Were the appropriate tools and materials available to complete the task effectively?	Resources were adequate to complete the survey and all appropriate tools and materials required to complete the task were available. Resources were not considered a limiting factor.	Nil
(x) Access Were there any factors limiting access to the survey area?	The southern section included the large areas of the Power Plant and Solar PV neither of which could, for most of the area, be accessed easily from existing tracks. Areas of apparently different vegetation were assessed from aerial photographs and each was walked into and surveyed at various points. The lack of access was not a limiting factor.	Nil
(xi) Experience Were personnel undertaking the field survey and plant identification trained and/or experienced in undertaking the required tasks?	The botanist responsible for undertaking the field survey has considerable experience (35 years) in conducting vegetation and flora surveys in the local Karatha area. The identification of specimens brought back from the field was conducted by the lead field botanist. Personnel experience was not considered a limiting factor.	Nil

vicki long & associates

4. RESULTS AND DISCUSSION

4.1 Weather

Daily weather observations recorded from the Bureau of Meteorology (BoM) Karratha Aero weather station (004083) which is located approximately 12 km south of the southern survey area were used to describe local rainfall and temperatures in the 6 months preceding the survey (Figure 2) (BoM 2020). In the 6 months preceding the survey, a total of 364 mm of rainfall was recorded which is 70mm above the long term average. A significant rainfall event (235 mm) was recorded in February 2020 associated with Cyclone Damien. The average maximum temperature during the survey was between 27°C and 35°C (BoM 2020).

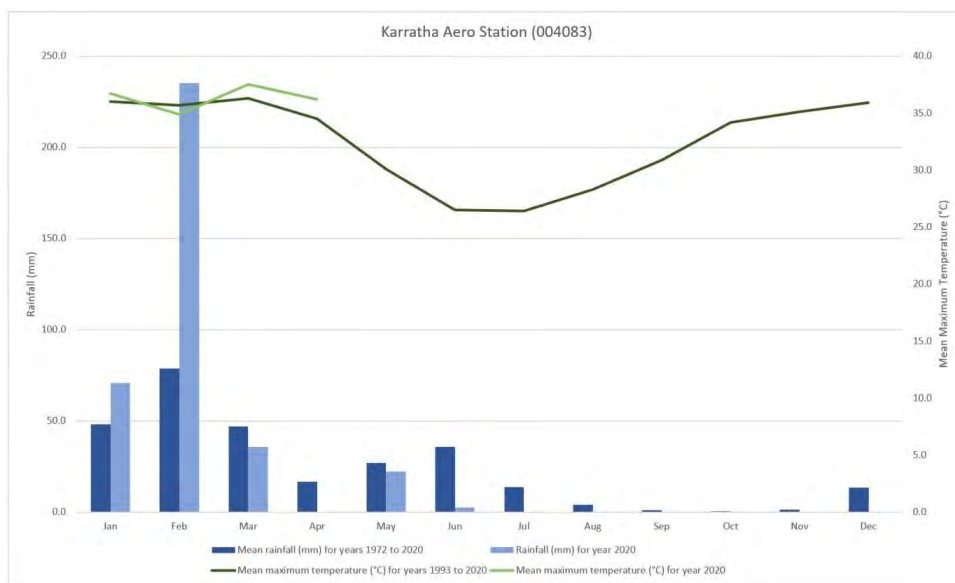


Figure 2. Mean and actual monthly rainfall and temperature data (2020) for Karratha Aero weather station (004083)

The rainfall received in February and March meant the conditions for survey were good. The grasslands responded rapidly to the February and March rainfall, with April being a suitable time to survey.

4.2 Vegetation

4.2.1 Vegetation Types

During the April 2020 survey, quadrats were established at five sites within each of the PP and Solar PV footprint areas to confirm the presence of the P1 and P3 grassland PECs which were assigned during the dry season survey undertaken in July 2019. Adequate rainfall in February and March 2020, supported the germination and growth of component grass species (other than the persisting perennial *Eragrostis xerophila*) and associated annual species, which were used to identify the PECs. An additional quadrat outside of the project area was monitored to confirm the extent of a P1 PEC. Twenty seven mapping notes were made within the Solar PV and PP areas to support the quadrat data

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recorded in these areas. The P3 PEC grassland is locally extensive and has been surveyed by the field botanist extensively between 40 Mile Beach and Whim Creek (AES 2007; VLA 2019a).



The vegetation types (VT) recorded in the 2020 survey following reasonable rainfall, are summarised in Table 2 and compared with those identified for the same areas in the 2019 survey.

Field data sheets and mapping notes for the Solar PV, PP and PEC mapping extent areas are given in Appendix A. A figure showing the mapped vegetation types for the southern survey area are presented in Appendix B. A table summarising the VT codes used in the 2019 and 2020 surveys and cross referencing them with the final VT codes used in this report is given in Table B.1, Appendix B.



The PEC grasslands were much more readily identified during the wet season survey and the P1 PEC (VT 41) was found to be more extensive in the Solar PV area, than was recorded during the dry season survey. The more extensive P3 PEC (VT 42) was obvious. It was also noted that there were areas of very degraded P3 PEC (VT 42), resulting from historical overgrazing, which are unlikely to recover and are now considered by the botanist to be remnant PECs.

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Table 2. Vegetation Code and Description Comparisons for the 2019 dry season and 2020 wet season surveys




Vegetation Code and Description 2019	Wet Season 2020	Vegetation Condition	Representative Photograph
<p><i>Acacia bivenosa</i> mixed shrubland over mixed <i>Triodia</i> grassland</p> <p>AbTw <i>Acacia bivenosa</i> shrubland to open shrubland with scattered <i>A. inaequilatera</i>, <i>A. coriacea</i>, <i>A. ancistrocarpa</i>, <i>Eremophila longifolia</i>, over <i>Triodia wiseana</i> hummock grassland. There can be patchy <i>T. epactia</i> and patches of *<i>Cenchrus ciliaris</i> on some scald areas.</p>	<p>VT 25 AbAaTw <i>Acacia bivenosa</i>, <i>Acacia ancistrocarpa</i> tall shrubland or open tall shrubland over <i>Corchorus walcottii</i> open low grassland with occasional <i>Sorghum plumosum</i>, <i>Eragrostis xerophilatus</i> tussocks.</p>	Very Good to Good	
<p><i>Acacia inaequilatera</i> <i>A. coriacea</i> tall shrubland over mixed tussock grassland.</p> <p>AIAc?Eb <i>Acacia inaequilatera</i>, <i>A. coriacea</i> tall shrubland, sometimes open shrubland over ?<i>Eriachne benthamii</i>, <i>Chrysopogon fallax</i> patchy *<i>Cenchrus ciliaris</i> tussock grassland.</p>	<p>Now VT28 ACAISpEb <i>Acacia coriacea</i> / <i>A. inaequilatera</i>, tall mixed shrubland over *<i>Vachellia farnesiana</i> open shrubs over <i>Sorghum plumosum</i>, <i>Eriachne benthamii</i>, *<i>Cenchrus ciliaris</i> tussock grassland and scattered <i>Triodia wiseana</i> hummocks. (Targeted for Priority <i>Themeda</i> sp Hamersley Station (ME Trudgen 11431)</p>	Very Good	

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Vegetation Code and Description 2019	Wet Season 2020	Vegetation Condition	Representative Photograph
<p><i>Acacia inaequilatera</i> tall open shrubland, or tall open shrubland, or scattered shrubs occasional <i>A. synchronicia</i>, <i>A. coriacea</i>, <i>Hakea lorea</i> sometimes over <i>Acacia bivenosa</i> open shrubs over <i>Triodia wiseana</i> hummock grassland.</p>	<p>Acacia <i>inaequilatera</i> tall open mixed shrubland over <i>Triodia wiseana</i> hummock grassland.</p> <p>VT 29 AITW Same as 2019 <i>Acacia inaequilatera</i> tall open shrubland, or scattered shrubs occasional <i>A. synchronicia</i>, <i>A. coriacea</i>, <i>Hakea lorea</i> sometimes over <i>Acacia bivenosa</i> open shrubs over <i>Triodia wiseana</i> hummock grassland</p>	<p>Very Good to Excellent</p>	
<p><i>Acacia coriacea</i> / <i>A. inaequilatera</i> / <i>Acacia coriacea</i> / <i>A. inaequilatera</i>, tall mixed shrubland over *<i>Vachellia farnesiana</i> open shrubs over mixed open tussock grassland (too dead to id) and scattered <i>Triodia wiseana</i> hummocks</p>	<p><i>Acacia inaequilatera</i> tall shrubland over mixed scattered <i>Acacia</i> shrubs over mixed tussock grassland</p> <p>Now VT28 AcAiSpEb <i>Acacia coriacea</i> / <i>A. inaequilatera</i>, tall mixed shrubland over *<i>Vachellia farnesiana</i> open shrubs over <i>Sorghum plumosum</i>, <i>Eriachne benthamii</i>, *<i>Cenchrus ciliaris</i> tussock grassland and scattered <i>Triodia wiseana</i> hummocks. (Targeted for Priority Themed sp Hamersley Station (ME Trudgen 11431))</p>	<p>Good</p>	


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Vegetation Code and Description 2019	Wet Season 2020	Vegetation Condition	Representative Photograph
<p>AcAxTt <i>Acacia coriacea</i> with <i>A. xiphophylla</i> low (old) woodland over scattered *<i>Vachellia farnesiana</i> shrubs over <i>Themeda triandra</i> and *<i>Cenchrus ciliaris</i> tussock grassland.</p>	<p>VT34 AcAxTt <i>Acacia coriacea</i> with <i>A. xiphophylla</i> low (old) woodland over scattered *<i>Vachellia farnesiana</i> shrubs over <i>Themeda triandra</i> and *<i>Cenchrus ciliaris</i> tussock</p>	<p>Very Good</p>	
<p>*<i>Vachellia farnesiana</i> shrubland over</p>	<p>*<i>Cenchrus ciliaris</i> tussock grassland</p>	<p>Poor</p>	
<p>VfCc *<i>Vachellia farnesiana</i> shrubland to closed shrubland over *<i>Cenchrus ciliaris</i> tussock grassland</p>	<p>VT35 VfCc *<i>Vachellia farnesiana</i> shrubland to closed shrubland over *<i>Cenchrus ciliaris</i> tussock grassland Small area of disturbed drainage line</p>	<p>Poor</p>	



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Vegetation Code and Description 2019	Wet Season 2020	Vegetation Condition	Representative Photograph
<p><i>Acacia xiphophylla</i> open shrubland over <i>Eragrostis xerophila</i> tussock grassland</p> <p>AXEx <i>Acacia xiphophylla</i> scattered to open shrubland over <i>Eragrostis xerophila</i> open tussock grassland</p>	<p>VT37 Wider original solar area Same for 2019</p> <p>AXEx <i>Acacia xiphophylla</i> scattered to open shrubland over <i>Eragrostis xerophila</i> open tussock grassland</p>	<p>Good</p>	
<p><i>Corymbia hamersleyana</i> open low woodland over <i>Acacia coriacea</i>/ *<i>Vachellia farnesiana</i> open shrubland over mixed hummock and tussock grassland</p> <p>ChActa <i>Corymbia hamersleyana</i> scattered to open low woodland over <i>Acacia coriacea</i>, *<i>Vachellia farnesiana</i> open shrubland to <i>Triodia angusta</i>/ <i>T. epactia</i>/*<i>Cenchrus ciliaris</i> mixed grassland.</p>	<p>VT38 Wider original solar area – Same as for 2019</p> <p>ChActa <i>Corymbia hamersleyana</i> scattered to open low woodland over <i>Acacia coriacea</i>, *<i>Vachellia farnesiana</i> open shrubland over <i>Triodia angusta</i>/<i>T. epactia</i>/*<i>Cenchrus ciliaris</i> mixed grassland</p>	<p>Poor to Very Good</p>	


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Vegetation Code and Description 2019	Wet Season 2020	Vegetation Condition	Representative Photograph
<p><i>Triodia wiseana</i> hummock grassland</p> <p>Tw <i>Triodia wiseana</i> hummock grassland. Sometimes scattered <i>Acacia inaequilatera</i>, <i>A. coriacea</i>, <i>A. pyrifolia</i>, <i>A. bivenosa</i>.</p>	<p>VT40 Tw Same as 2019 Survey Site: Alp-05</p>	Excellent	
<p><i>Eriachne benthamii</i> tussock grassland</p> <p>Eb?Ct ?<i>Eriachne benthamii</i>, ?<i>Chrysopogon fallax</i> tussock grassland with other annual grass species (all too dead/dormant to identify). There can be scattered *<i>Yachellia farnesiana</i>, <i>Acacia coriacea</i> shrubs</p>	<p>VT41 SpExEb (P1 PEC) <i>Sorghum plumosum</i> with <i>Eragrostis xerophila</i>, <i>Eriachne benthamii</i>, <i>Panicum decompositum</i>, <i>Astrelba pectinata</i> mixed tussock grassland with annual herbland. See Detailed survey sites (Targeted for <i>Oldenlandia</i> sp. Hamersley Station (AA Mitchell PRP 1479)).</p>	Good	

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Vegetation Code and Description 2019	Wet Season 2020	Vegetation Condition	Representative Photograph
<p><i>Eragrostis xerophila</i> tussock grassland (with associated dry season remnant grasses)</p> <p>Ex spp <i>Eragrostis xerophila</i> tussock grassland. (has apparent <i>Sorghum plumosum</i>, <i>Panicum sp.</i>, <i>Aristida sp</i> – determine following wet season) with intrusions of <i>?Eriachne benthamii</i> on low areas.</p>	<p>VT 42 Ex (P3 PEC) <i>Eragrostis xerophila</i> tussock grassland, sometimes with scattered to open <i>Sorghum plumosum</i>, <i>Panicum decompositum</i>, <i>Aristida species</i> over annual herbland. See Detailed survey sites. (Targeted for <i>Oldenlandia</i> sp. Hamersley Station (AA Mitchell PRP 1479)).</p> <p>VT 42 - Areas of degraded (now remnant) P3 PEC</p>	<p>Good to Very Good</p>	
<p><i>Eragrostis xerophila</i> tussock grassland (associated species not evident this survey)</p> <p>Ex <i>Eragrostis xerophila</i> tussock grassland. Sometimes scattered <i>*Vachellia farnesiana</i> shrubs.</p>	<p>VT 42 Ex (P3 PEC) <i>Eragrostis xerophila</i> tussock grassland, sometimes with scattered to open <i>Sorghum plumosum</i>, <i>Panicum decompositum</i>, <i>Aristida species</i> over annual herbland.</p>	<p>Good</p>	<p>As above</p>

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4.2.2 Vegetation of Conservation Significance (State Listed PECs)

4.2.2.1 Statistical Analyses of Vegetation Types

Statistical analyses undertaken on the quadrat data from the Solar PV and PP areas identified two main groups from the hierarchical clustering (Figure 3).

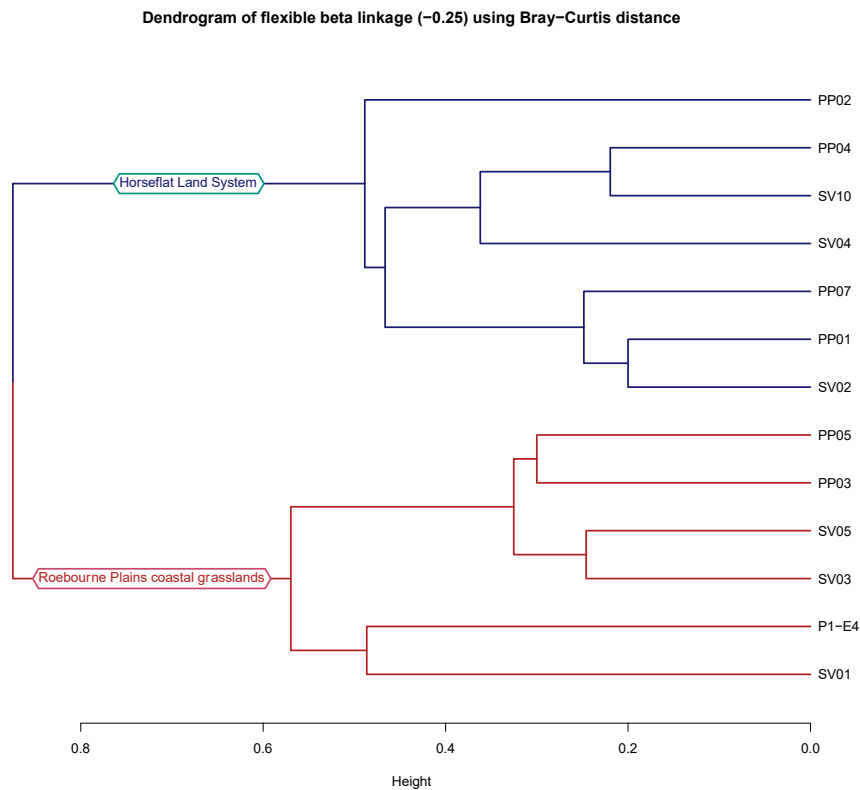


Figure 3. Dendrogram of the hierarchical clustering results showing two main vegetation types.

The first group comprised six plots, and an assessment of the indicator species for each type indicates that this group is part of the Priority 1 ‘Roebourne Plains coastal grasslands’. The significant indicators for this group include *Panicum decompositum*, *Eriachne benthamii* and *Sorghum plumosum* (Table 3). These species are cited in the description published by the DBCA as typically being dominant or co-dominant within the community. . The vegetation type representing this P1 PEC is ‘SpExEb’ which is described as *Sorghum plumosum* with *Eragrostis xerophila*, *Eriachne benthamii*, *Panicum decompositum*, *Astrebla pectinata* mixed tussock grassland with annual herbland.

The second group comprised the remaining seven plots and is likely part of the Priority 3 ‘Horseflat land system of the Roebourne Plains’. The description for this community states that *Eragrostis xerophila* is a dominant grass, and that the community differs from the ‘Roebourne Plains coastal grasslands’. The data from this survey is consistent with this description, which shows that *Eragrostis xerophila* is present and abundant at all sites, and different indicator species can also be identified.

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The vegetation type representing this P3 PEC is ‘Ex’ which is described as *Eragrostis xerophila* tussock grassland, sometimes with scattered to open *Sorghum plumosum*, *Panicum decompositum*, *Aristida species* over annual herbland.

The ‘Roebourne Plains coastal grasslands’ contains a suite of species not present in the ‘Horseflat land system of the Roebourne Plains’, supporting the presence of two vegetation types in the dataset.

Table 3. Indicator species for each identified vegetation type.

Taxon	Vegetation Type	Indicator value	p value
<i>Operculina aequisejala</i>	Roebourne Plains	0.8652	0.007
<i>Arivela viscosa</i>	Roebourne Plains	0.7292	0.035
<i>Neptunia dimorphantha</i>	Roebourne Plains	0.7292	0.025
<i>Eriachne benthamii</i>	Roebourne Plains	0.6667	0.02
<i>Panicum decompositum</i>	Roebourne Plains	0.6667	0.029
<i>Sorghum plumosum</i>	Roebourne Plains	0.6408	0.006
<i>Sida fibulifera</i>	Horseflat	0.7941	0.024
<i>Portulaca oleracea</i>	Horseflat	0.7143	0.023
<i>Eragrostis xerophila</i>	Horseflat	0.5581	0.003

Portulaca oleracea and *Sida fibulifera* are both significant indicators for the Priority 3 PEC ‘Horseflat land system of the Roebourne Plains’ from this dataset, and both are uncommon in the plots from the ‘Roebourne Plains coastal grasslands’ (Table 4). Alternatively, *Operculina aequisejala*, *Arivela viscosa* and *Neptunia dimorphantha* are significant indicators ($p < 0.05$) for the Priority 1 PEC ‘Roebourne Plains coastal grasslands’ and are absent from, or infrequent in, the plots on the P3 PEC ‘Horseflat land system of the Roebourne Plains’. In addition, the co-occurrence of *Eragrostis xerophila*, *Operculina aequisejala* and *Sorghum plumosum* was a significant indicator for the P1 PEC ‘Roebourne Plains coastal grasslands’, while the combination of *Eragrostis xerophila*, *Heliotropium cunninghamii* and *Sida fibulifera* defined the presence of the P3 PEC ‘Horseflat land system of the Roebourne Plains’ ($p < 0.05$).

Table 4. Frequency of occurrence of selected species within each vegetation type (only species with occurrence >0.3 within a vegetation type shown).

Taxon	P1 PEC Roebourne Plains	P3 PEC Horseflat
* <i>Cenchrus ciliaris</i>	0.5	.
* <i>Tribulus terrestris</i>	0.33	0.43
<i>Aristida contorta</i>	.	0.43
<i>Aristida holathera</i>	0.33	.
<i>Aristida latifolia</i>	0.33	.
<i>Arivela viscosa</i>	0.83	.
<i>Astrebla pectinata</i>	0.5	.
<i>Boerhavia gardneri</i>	0.33	.
<i>Corchorus tridens</i>	0.33	.
<i>Cullen cinereum</i>	0.33	.
<i>Dactyloctenium radulans</i>	0.67	.
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	0.83	0.57
<i>Diplachne fusca</i>	0.5	.

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Taxon	P1 PEC Roebourne Plains	P3 PEC Horseflat
<i>Eragrostis xerophila</i>	1	1
<i>Eriachne benthamii</i>	0.67	.
<i>Euphorbia coghlanii</i>	0.83	0.71
<i>Goodenia forrestii</i>	.	0.43
<i>Heliotropium cunninghamii</i>	0.83	1
<i>Hibiscus brachysiphonius</i>	0.33	.
<i>Indigofera linifolia</i>	0.67	0.57
<i>Indigofera trita</i>	0.5	.
<i>Ipomoea lonchophylla</i>	0.33	.
<i>Ipomoea muelleri</i>	0.33	.
<i>Iseilema eremaum</i>	0.33	0.71
<i>Neptunia dimorphantha</i>	0.83	.
<i>Operculina aequisepala</i>	1	.
<i>Panicum decompositum</i>	0.67	.
<i>Phyllanthus maderaspatensis</i> L.	0.83	0.43
<i>Portulaca oleracea</i>	.	0.71
<i>Ptilotus carinatus</i>	1	0.57
<i>Ptilotus exaltatus</i>	.	0.43
<i>Ptilotus gomphrenoides</i>	0.33	.
<i>Ptilotus murrayi</i> F. Muell	0.67	0.43
<i>Rhynchosia minima</i>	1	1
<i>Sida fibulifera</i>	0.33	1
<i>Sorghum plumosum</i>	1	0.86
<i>Stemodia kingii</i>	0.5	.
<i>Streptoglossa bubakii</i>	0.5	0.86
<i>Streptoglossa liatroides</i>	.	0.57
<i>Xerochloa barbata</i>	0.33	0.71

Both vegetation types are dominated by *Eragrostis xerophila* and *Sorghum plumosum*, but the latter is more abundant in the P1 PEC 'Roebourne Plains coastal grasslands' (Table 5). Also, the P1 PEC 'Roebourne Plains coastal grasslands' are co-dominated by *Eriachne benthamii*, which is absent from the P3 PEC 'Horseflat land system of the Roebourne Plains'.

Table 5. Importance (mean abundance) values for selected species within each vegetation type (only species within an importance value > 0.3 in a vegetation type shown). See supplemental Table 6 below for explanation of values.

Taxon	P1 PEC Roebourne Plains	P3 PEC Horseflat
* <i>Cenchrus ciliaris</i>	0.67	.
* <i>Tribulus terrestris</i>	0.33	0.43
<i>Aristida contorta</i>	.	0.43
<i>Aristida holathera</i>	0.5	.
<i>Aristida latifolia</i>	0.33	.
<i>Arivela viscosa</i>	1	.
<i>Astrelba pectinata</i>	0.5	.
<i>Boerhavia coccinea</i>	0.33	.

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Taxon	P1 PEC Roebourne Plains	P3 PEC Horseflat
<i>Boerhavia gardneri</i>	0.33	.
<i>Corchorus tridens</i>	0.33	.
<i>Cullen cinereum</i>	0.33	.
<i>Dactyloctenium radulans</i>	0.67	.
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	1	0.57
<i>Diplachne fusca</i>	0.5	.
<i>Eragrostis xerophila</i>	3.17	4
<i>Eriachne benthamii</i>	1	.
<i>Euphorbia coghlanii</i>	0.83	0.71
<i>Goodenia forrestii</i>	.	0.43
<i>Heliotropium cunninghamii</i>	1.83	2
<i>Hibiscus brachysiphonius</i>	0.33	.
<i>Indigofera linifolia</i>	0.83	0.57
<i>Indigofera trita</i>	0.67	.
<i>Ipomoea lonchophylla</i>	0.33	.
<i>Ipomoea muelleri</i>	0.33	.
<i>Iseilema eremaeum</i>	0.33	0.71
<i>Neptunia dimorphantha</i>	1	.
<i>Operculina aequisejala</i>	1.83	.
<i>Panicum decompositum</i>	0.67	.
<i>Phyllanthus maderaspatensis</i> L	1	0.43
<i>Portulaca oleracea</i>	.	0.71
<i>Ptilotus carinatus</i>	1	0.71
<i>Ptilotus exaltatus</i>	.	0.57
<i>Ptilotus gomphrenoides</i>	0.5	.
<i>Ptilotus murrayi</i> F. Muell	0.67	0.43
<i>Rhynchosia minima</i>	1.17	1
<i>Sida fibulifera</i>	0.33	1.29
<i>Sorghum plumosum</i>	4.33	2.43
<i>Stemodia kingii</i>	0.5	.
<i>Streptoglossa bubakii</i>	0.5	1.57
<i>Streptoglossa liatroides</i>	.	0.71
<i>Xerochloa barbata</i>	0.33	0.71

Table 6. Supplement: Range of importance values and the range of the corresponding cover values they represent as used in Table 5. For example, *Eragrostis xerophila* has an importance value of 3.17 in the Roebourne Plains grassland representing a mean cover in the range of 26 – 50%.

Importance Value Range	Cover Abundance Value Range
0 < x < 1	< 2%
1 < x < 2	2 - 5%
2 < x < 3	6 - 25%
3 < x < 4	26 - 50%
4 < x < 5	51 - 75%

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5 < x < 6	76 - 95%
6 < x < 7	96 - 99%
7 < x	< 99%

Although two PP quadrats (PP03 and PP05) were described in the field as P1 PECs and analysed as such, they were actually small mosaiced areas of both grassland PECs, often linear in occurrence, not extensive and as such difficult to map on such a micro scale.

The wet season survey indicated that the P1 PEC (VT 41) was more extensive in the Solar PV area than was previously identified in the dry season survey. The wet season mapping for the Solar PV footprint, indicating areas of P1 PEC (VT 41), P3 PEC (VT 42) and degraded P3 PEC (DV 42) is shown in Figure B.7 in Appendix B.

4.2.3 Vegetation of ‘Other’ Conservation Significance

The survey in 2019 identified an area along one of the larger drainage lines associated with the Solar PV area as having large, aged *Acacia coriacea* and *Acacia xiphophylla* trees (VT 34). Both species are fire sensitive and it is believed that they have reached this age as the fuel load of the Roebourne Plains grasslands is insufficient to maintain a large fire. As these trees are considered to have some conservation significance, Woodside have agreed to totally avoid any impact to this drainage line, with the proposed Solar PV footprint now approximately 2 km from this drainage line.

4.2.4 Vegetation Condition

Vegetation condition within the southern survey area was verified during the wet season survey as being the same as that mapped previously. Vegetation condition figures for the southern survey area can be found in Appendix E of the dry season survey report (VLA 2019).

4.3 Flora

A total of 83 plant taxa from 20 families were recorded during the detailed surveys in the southern area, indicating a relatively high species diversity for the area. Poaceae was the most well represented family with 21 species, and the *Aristida* and *Eragrostis* genuses within this family were represented by 3 species each. Fabaceae was almost equally well represented with 19 species. The genus *Ptilotus* in the Amaranthaceae family was also represented by five species.

This diversity is a result of the many annuals found in the grassland areas due to rainfall and survey areas located within different substrates and habitats, including deep cracking clays and weakly gilgaied clays with grasslands, loamy stone mantled silts with shrubland, mixed tussock and hummock grasslands and occasional creek lines and drainage zones. Apart from the PEC grasslands, the vegetation types and species associated with these different habitats are well represented in the local area and coastal region.

A complete list of flora for these surveys is attached as Appendix C.

4.3.1 Conservation Significant Flora

No State (DBCA 2019) or Commonwealth (Department of the Environment and Energy (DoEE) 2019) listed Threatened flora (were recorded within the survey locations). One State listed Priority 3 species,

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Themeda sp. Hamersley Station (ME Trudgen 11431) (Photo 1), was found at P1-E4 located outside of the survey area, but an extent of the P1 PEC within the survey area.

This robust tussock grass occurs on clay pans, grass plains and in creeklines associated with clay plains from Karratha through to Newman.



Photo 1: *Themeda* sp Hamersley Station (ME Trudgen 11431)

No occurrences of the P3 species, *Oldenlandia* sp. Hamersley Station (AA Mitchell PRP 1479) nor *Stackhousia clementii*, were recorded this survey. All vegetation types were searched for *Oldenlandia* sp. Hamersley Station (AA Mitchell PRP 1479) and in particular the cracking clays, which is a known habitat for this species. None of the vegetation types searched are considered suitable habitat for *Stackhousia clementii*, which prefers skeletal soils and sandstone hills.

4.3.2 Introduced Flora (Weeds)

Weeds were mostly confined to disturbed and semi-disturbed areas within the project footprint and surrounds.

Three weed species were recorded during the detailed survey undertaken in the southern area. The species recorded are:

- *Cenchrus ciliaris* occurs along most creek lines but is generally in equal proportions to other native tussock grasses found in these areas.
- *Tribulus terrestris* (caltrop) was relatively common throughout the survey area. It is a nuisance weed, but is too widespread in the area to attempt any control.
- *Vachellia farnesiana* (mimosa bush) was not abundant, but was widespread. It was found in low numbers along creek lines and in small, but not dense populations within the Solar PV and Power Plant sites. This species has historically been recorded in the area for a long time and conditions within the survey area do not encourage proliferation of this shrub.

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Each of the weeds are classified as having high ecological impact and rapid invasiveness (DPAW 2013). As the project is associated with P1 and P3 PEC areas, it is important that the introduction and spread of weeds is prevented. Areas of high weed abundance should only be worked after the areas containing PECs. A site-specific weed management plan (WMP) must consider weed density as mapped in this report, direction of work movement and location of vehicle and machine clean down areas.

4.3.3 Range Extensions

Two species recorded during the surveys, *Bonamia media* and *Stemodia kingii* are at the southern extent of their known ranges.

5. CONCLUSIONS AND RECOMMENDATIONS

The southern survey area, which includes two large areas for a proposed power plant and Solar PV farm, occurs on relatively flat coastal plain characterised by tussock grasslands over weakly gilgaied or deeper cracking clays mosaiced with areas of hummock grassland on sandy surfaced alluvial soils, bare scalds and, intersected by both shallow grassy and deeper incised wooded drainage lines.

The grasslands are either the P1 PEC - Roebourne Plains coastal grasslands with gilgai microrelief on deep cracking clays, the majority of which occur on the Solar PV area, or the P3 PEC - Horseflat land system of the Roebourne plains which occur over most of the PP area, or generally a mosaic of the two, which makes mapping at a refined level difficult.

The P1 PEC is represented by vegetation type 'SpExEb' (VT 41), which is described as *Sorghum plumosum* with *Eragrostis xerophila*, *Eriachne benthamii*, *Panicum decompositum*, *Astrelba pectinata* mixed tussock grassland with annual herbland. The P3 PEC is represented by vegetation type 'Ex' (VT 42) which is described as *Eragrostis xerophila* tussock grassland, sometimes with scattered to open *Sorghum plumosum*, *Panicum decompositum*, *Aristida species* over annual herbland.

The P1 PEC was found to be more abundant on the Solar PV area during the wet season survey, than was apparent during the dry season survey. Disturbance to areas of the P1 PEC will be avoided where possible and the vegetation type mapping will need to be used to identify these areas, as they will not be evident on ground, once the grasslands become dormant during the dry season.

Areas of degraded (now remnant) P3 PEC (VT 42 degraded) occur within the PP and Solar PV areas. This degradation is due to the impacts of historical overgrazing.

An occurrence of P3 Priority flora *Themeda* sp. Hamersley Station (ME Trudgen 11431) was recorded during this survey in P1-E4 which is outside the proposed development footprint, but an extent of the P1 PEC. The species is not abundant, but is dispersed widely along the creek lines within the region and it is unlikely that the disturbance of a few plants will have a significant impact on the population of this species.

No occurrences of the P3 species *Oldenlandia* sp. Hamersley Station (AA Mitchell PRP 1479) nor *Stackhousia clementii* were recorded this survey. All vegetation types were searched for *Oldenlandia* sp. Hamersley Station (AA Mitchell PRP 1479) and in particular, the cracking clays, which are a known habitat for this species. None of the vegetation types searched are considered suitable habitat for *Stackhousia clementii*, which prefers skeletal soils and sandstone hills.

One vegetation type, VT34, was considered by the field botanist to be of high conservation value. This vegetation type AcAxTt which contained very old, large trees of *Acacia xiphophylla* and *A. coriacea*, both of which are fire sensitive (do not regenerate following fire) and are slow growing species. Both species are experiencing a decline in numbers due to fire (WorldWideWattle) and the field botanist, who does extensive work in the area, rarely sees trees, particularly *A. xiphophylla* (Snakewood), of this size. This vegetation type should be protected from any direct or indirect impacts from the project. Woodside has acknowledged the importance of this vegetation type and amended the project footprint to avoid this drainage line.

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The condition of the PP and Solar PV areas was generally rated as being very good. **Cenchrus ciliaris* occurs along most creek lines but is generally in equal proportions to other native tussock grasses found in these areas.

A site-specific WMP must be developed to prevent the introduction or spread of weeds, in particular buffel, birdwood and kapok, from currently infested surrounding areas, into the uninfested P1 and P3 PECs within this southern survey area

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Appendix A: Field Data Sheets and Mapping Notes

vicki long & associates

Site: PP02

Type: 50 x 50m quadrat

Date: 09/04/2020

MGA Zone: 50

Easting: 0465460

Described by: VL

Northing: 7697780

Habitat/Landform: Cracking gilgai plain, red brown silty clays.

Rock type:

Vegetation: P3 *Eragrostis xerophila* tussock grassland over annual herbland.

Veg Condition: Excellent

Fire Age: >10 yrs

Species List

Name	Cover (%)
<i>Eragrostis xerophila</i>	35
<i>Euphorbia coghlanii</i>	<2
<i>Heliotropium cunninghamii</i>	5
<i>Indigofera trita</i>	<2
<i>Iseilema eremaeum</i>	<2
<i>Operculina aequisepala</i>	<2
<i>Phyllanthus maderaspatensis</i>	<2
<i>Portulaca oleracea</i>	<2
<i>Ptilotus carinatus</i>	<2
<i>Ptilotus murrayi</i>	<2
<i>Rhynchosia minima</i>	<2
<i>Sida fibulifera</i>	2
<i>Streptoglossa liatroides</i>	2
<i>Xerochloa barbata</i>	<2

Site: PP03

Type: 50 x 50m quadrat

Date: 09/04/2020

Described by: VL

MGA Zone: 50

Easting: 0465743

Northing: 7698037

Habitat/Landform: Gilgai plain with deeply cracking clays.

Rock type:

Vegetation: P1 *Sorghum plumosum* tussock grassland with open *Eragrostis xerophila*, *Eriachne benthamii* over annual mixed herbland of *Heliotropium cunninghamii* and *Operculina aequisepala*.

Veg Condition: Excellent

Fire Age: >10 yrs

Species List

Name	Cover (%)
<i>*Tribulus terrestris</i>	<2
<i>Aristida holathera</i>	<2
<i>Aristida latifolia</i>	<2
<i>Boerhavia gardneri</i>	<2
<i>Arivela viscosa</i>	<2
<i>Dactyloctenium radulans</i>	<2
<i>Eragrostis xerophila</i>	15
<i>Eriachne benthamii</i>	2
<i>Euphorbia coghlanii</i>	<2
<i>Heliotropium cunninghamii</i>	5
<i>Indigastrum parviflorum</i>	<2
<i>Indigofera linifolia</i>	<2
<i>Indigofera trita</i>	<2
<i>Neptunia dimorphantha</i>	<2
<i>Operculina aequisepala</i>	2
<i>Panicum decompositum</i>	<2
<i>Ptilotus carinatus</i>	<2
<i>Ptilotus murrayi</i>	<2
<i>Rhynchosia minima</i>	<2
<i>Sorghum plumosum</i>	60-70
<i>Stemodia kingii</i>	<2

Site: PP04

Type: 50 x 50m quadrat

Date: 09/04/2020

MGA Zone: 50

Easting: 0465905

Described by: VL

Northing: 7698065

Habitat/Landform: Flat gilgaedi plain, red brown silty clays, with moderate to deep cracking.

Rock type:

Vegetation: P3. *Eragrostis xerophila* and *Sorghum plumosum* tussock grassland over open annual herbland.

Veg Condition: Excellent

Fire Age: >10 yrs

Species List

Name	Cover (%)
<i>Eragrostis xerophila</i>	30
<i>Euphorbia coghlanii</i>	<2
<i>Goodenia forrestii</i>	<2
<i>Heliotropium cunninghamii</i>	2
<i>Indigofera trita</i>	<2
<i>Iseilema eremaeum</i>	<2
<i>Ptilotus carinatus</i>	<2
<i>Ptilotus murrayi</i>	<2
<i>Rhynchosia minima</i>	<2
<i>Sida fibulifera</i>	<2
<i>Sorghum plumosum</i>	30
<i>Streptoglossa bubakii</i>	2
<i>Streptoglossa liatroides</i>	<2

Site: PP07

Type: 50 x 50m quadrat

Date: 11/04/2020

Described by: VL

MGA Zone: 50

Easting: 0465952

Northing: 7697676

Habitat/Landform: Weakly gilgaied plain, red brown silty clays.

Rock type:

Vegetation: P3 *Eragrostis xerophila* tussock grassland over mixed annual *Heliotropium cunninghamii* herbland.

Veg Condition: Excellent

Fire Age: >10 yrs

Species List

Name	Cover (%)
<i>*Tribulus terrestris</i>	<2
<i>Aristida contorta</i>	<2
<i>Boerhavia paludosa</i>	<2
<i>Cynodon convergens</i>	<2
<i>Dichanthium sericeum</i> subsp <i>humilius</i>	<2
<i>Eragrostis xerophila</i>	45
<i>Euphorbia coghlanii</i>	<2
<i>Heliotropium cunninghamii</i>	10
<i>Indigofera linifolia</i>	<2
<i>Iseilema eremaeum</i>	<2
<i>Operculina aequisepala</i>	<2
<i>Portulaca oleracea</i>	<2
<i>Ptilotus murrayi</i>	<2
<i>Rhynchosia minima</i>	<2
<i>Sida fibulifera</i>	<2
<i>Sorghum plumosum</i>	2
<i>Streptoglossa bubakii</i>	2
<i>Xerochloa barbata</i>	<2

Site: Alp06

Type: 30 x 50 small vegetation type following shallow drainage area in Power Plant area

Date: 30/06/2020

Described by: VL

MGA Zone: 50

Easting: 0465786

Northing: 7698250

Vegetation: *Senna artemisioides* subsp. *oligophylla* low shrubland on scald with scattered *Eragrostis xerophila* and annual *Aristida contorta*, *Heliotropium cunninghamii* and *Portulaca* sp.

Vegetation Type Code: SoEx

Species List

Name	Cover (%)
<i>Aristida contorta</i>	<2
<i>Eragrostis xerophila</i>	<2-2
<i>Hakea lorea</i>	<2
<i>Heliotropium cunninghamii</i>	2
<i>Portulaca conspicua</i>	2
<i>Portulaca oleracea</i>	<2
<i>Ptilotus exaltatus</i>	<2
<i>Salsola australis</i>	<2
<i>Senna artemisioides</i> subsp. <i>oligophylla</i>	15
<i>Senna notabilis</i>	<2
<i>Sida fibulifera</i>	<2
<i>Sorghum plumosum</i>	2
<i>Streptoglossa liatroides</i>	<2

Site: SV02

Type: 50 x 50m quadrat

Date: 08/04/2020

Described by: VL

MGA Zone: 50

Easting: 0465751

Northing: 7699333

Habitat/Landform: Weakly gilgaied plain, pink brown alluvial silty clays, weakly cracking, areas of scald with sparse annual cover.

Rock type:

Vegetation: P3 *Eragrostis xerophila* tussock grassland with *Sorghum plumosum* over annual *Streptoglossa bubakii* *Heliotropium cunninghamii* herbland.

Veg Condition: Excellent

Fire Age: >10yrs

Species List

Name	Cover (%)
<i>*Tribulus terrestris</i>	<2
<i>Aristida contorta</i>	<2
<i>Arivela viscosa</i>	<2
<i>Dactyloctenium radulans</i>	<2
<i>Dichanthium sericeum</i> subsp <i>humilius</i>	<2
<i>Eragrostis xerophila</i>	30
<i>Euphorbia coghlanii</i>	<2
<i>Goodenia forrestii</i>	<2
<i>Heliotropium cunninghamii</i>	<2
<i>Indigofera linifolia</i>	<2
<i>Iseilema eremaeum</i>	<2
<i>Phyllanthus maderaspatensis</i>	<2
<i>Portulaca conspicua</i>	<2
<i>Portulaca oleracea</i>	<2
<i>Ptilotus exaltatus</i>	2
<i>Rhynchosia minima</i>	<2
<i>Sida fibulifera</i>	<2
<i>Sorghum plumosum</i>	15
<i>Streptoglossa bubakii</i>	2
<i>Xerochloa barbata</i>	<2

Site: SV03

Type: 50 x 50m quadrat

Date: 08/04/2020

Described by: VL

MGA Zone: 50

Easting: 0465779

Northing: 7699083

Habitat/Landform: Cracking clay plain, red brown clays, self-mulching with deep cracks. Scattered granite and gabbro rocks.

Rock type:

Vegetation: P1 *Sorghum plumosum* with *Eragrostis xerophila* tussock grassland with open annual *Heliotropium cunninghamii*, *Operculina aequisejala* herbland.

Veg Condition: Excellent

Fire Age: >10 yrs

Species List

Name	Cover (%)
<i>Arivela viscosa</i>	<2
<i>Corchorus tridens</i>	<2
<i>Dactyloctenium radulans</i>	<2
<i>Dichanthium sericeum</i> subsp. <i>humilius</i>	<2
<i>Eragrostis xerophila</i>	15-20
<i>Eriachne benthamii</i>	<2
<i>Euphorbia coghlanii</i>	<2
<i>Heliotropium cunninghamii</i>	2
<i>Ipomoea lonchophylla</i>	<2
<i>Iseilema eremaum</i>	<2
<i>Neptunia dimorphantha</i>	<2
<i>Operculina aequisejala</i>	2
<i>Panicum decompositum</i>	<2
<i>Phyllanthus maderaspatensis</i>	<2
<i>Portulaca intraterranea</i>	<2
<i>Ptilotus carinatus</i>	<2
<i>Ptilotus murrayi</i>	<2
<i>Rhynchosia minima</i>	<2
<i>Sida fibulifera</i>	<2
<i>Sorghum plumosum</i>	35-40
<i>Streptoglossa bubakii</i>	<2

Site: SV04

Type: 50 x 50m quadrat

Date: 08/04/2020

Described by: VL

MGA Zone: 50

Easting: 0466422

Northing: 7698268

Habitat/Landform: Weakly gilgai plain with red brown silty loams. Weakly cracked.

Rock type:

Vegetation: P3 *Eragrostis xerophila* with *Sorghum plumosum* over open annual *Heliotropium cunninghamii*, herbland.

Veg Condition: Excellent

Fire Age: >10 yrs

Species List

Name	Cover (%)
<i>Boerhavia gardneri</i>	<2
<i>Dactyloctenium radulans</i>	<2
<i>Dichanthium sericeum</i> subsp <i>humilius</i>	<2
<i>Eragrostis xerophila</i>	35
<i>Heliotropium cunninghamii</i>	2
<i>Iseilema eremaeum</i>	<2
<i>Portulaca oleracea</i>	<2
<i>Ptilotus carinatus</i>	2
<i>Rhynchosia minima</i>	<2
<i>Sida fibulifera</i>	2
<i>Sorghum plumosum</i>	20
<i>Streptoglossa bubakii</i>	<2
<i>Streptoglossa liatroides</i>	<2
<i>Vigna</i> sp Hamersley Clay (AA Mitchell PRP113)	<2
<i>Xerochloa barbata</i>	<2

Site: SV10

Type: 50 x 50m quadrat

Date: 08/04/2020

MGA Zone: 50 **Easting:** 0466354

Described by: VL

Northing: 7698694

Habitat/Landform: Cracking gilgai plain

Rock type:

Vegetation: P3 *Eragrostis xerophila* and *Sorghum plumosum* mixed tussock grassland with over annual herbland.

Veg Condition: Excellent

Fire Age: >10 yrs

Species List

Name	Cover (%)
<i>Eragrostis xerophila</i>	35
<i>Goodenia forrestii</i>	<2
<i>Heliotropium cunninghamii</i>	5
<i>Indigofera linifolia</i>	<2
<i>Iseilema vaginiflorum</i>	<2
<i>Neptunia dimorphantha</i>	<2
<i>Ptilotus carinatus</i>	<2
<i>Ptilotus exaltatus</i>	<2
<i>Rhynchosia minima</i>	<2
<i>Sida fibulifera</i>	<2
<i>Sorghum plumosum</i>	15
<i>Streptoglossa bubakii</i>	2
<i>Streptoglossa liatroides</i>	<2

Site: Alp05

Type: 50 x 50m quadrat

Date: 30/06/2020

MGA Zone: 50

Easting: 0466233

Described by: VL

Northing: 7697899

Rock type:

Vegetation: *Triodia wiseana* hummock grassland with scattered *Acacia inaequilatera* and *Hakea lorea* over annual herbland.

Veg Condition: Very Good

Fire Age: 10 yrs

Vegetation Type Code: Tw

Species List

Name	Cover (%)
* <i>Vachellia farnesiana</i>	<2
<i>Acacia inaequilatera</i>	<2
<i>Acacia pyrifolia</i>	<2
<i>Acacia synchronicia</i>	<2
<i>Alysicarpus muelleri</i>	<2
<i>Boerhavia gardneri</i>	<2
<i>Bonamia media</i>	<2
<i>Bonamia pannosa</i>	<2
<i>Arivela viscosa</i>	2
<i>Goodenia microptera</i>	<2
<i>Hakea lorea</i>	2
<i>Indigofera colutea</i>	<2
<i>Indigofera linifolia</i>	<2
<i>Ptilotus auriculifolius</i>	<2
<i>Rhynchosia minima</i>	<2
<i>Sorghum plumosum</i>	<2
<i>Triodia wiseana</i>	65
<i>Triumfetta clementii</i>	<2

Site: P1-E4

Type: 25 x 50m

Date: 30/06/2020

MGA Zone: 50

Easting: 0466512

Described by: VL

Northing: 7700187

Vegetation: P1 *Sorghum plumosum* mixed tussock grassland with *Eragrostis xerophila*, *Eriachne benthamii*, *Aristida holathera* and occasional patchy **Cenchrus ciliaris* over annual herbland.

Veg Condition: Excellent

Species List

Name	Cover (%)
<i>*Cenchrus ciliaris</i>	5
<i>Abutilon malvifolium</i>	<2
<i>Alysicarpus muelleri</i>	<2
<i>Aristida holathera</i>	2
<i>Cullen cinereum</i>	<2
<i>Dichanthium sericeum</i> subsp <i>humilius</i>	2
<i>Eragrostis xerophila</i>	15
<i>Eriachne benthamii</i>	5
<i>Indigofera trita</i>	<2
<i>Ipomoea muelleri</i>	<2
<i>Neptunia dimorphantha</i>	<2
<i>Operculina aequisejala</i>	<2
<i>Panicum decompositum</i>	<2
<i>Phyllanthus maderaspatensis</i>	<2
<i>Ptilotus carinatus</i>	<2
<i>Ptilotus gomphrenoides</i>	<2
<i>Rhynchosia minima</i>	<2
<i>Sorghum plumosum</i>	40
<i>Stemodia kingii</i>	<2
<i>Themeda</i> sp. <i>Hammersley Station (M.E. Trudgen 11431)</i>	<1
<i>Xerochloa barbata</i>	<2



Mapping Note Data Sheet

Site No:PPMN-5	Date: 09/04/20
Rec:VL	Waypoint: 0466023 7698341
Photo: 11	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain	
Vegetation Type: P3 <i>Eragrostis xerophila</i> tussock grassland over annual herbs	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Streptoglossa bubakii</i> , <i>Streptoglossa liatroides</i> , <i>Xerachloa barbata</i> , <i>Rhynchosia minima</i> , <i>Indigofera linifolia</i>	

Site No:PPMN-6	Date: 09/04/20
Rec:VL	Waypoint: 0465887 7698556
Photo: 12	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Gilgai plain	
Vegetation Type: P3 <i>Sorghum plumosum</i> and <i>Eragrostis xerophila</i> tussock grassland over open herbs	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Streptoglossa bubakii</i> , <i>Streptoglossa liatroides</i> , <i>Xerachloa barbata</i> , <i>Rhynchosia minima</i> , <i>Sida fibulifera</i>	

Site No:PPMN-9	Date: 09/04/20
Rec:VL	Waypoint: 0465993 7697062
Photo: 18	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Eroded drainage feature, red-brown silty clays	



Mapping Note Data Sheet

Vegetation Type: Mixed tussock grassland of, <i>Eragrostis tenellula</i> , <i>Diplachne fusca</i> , <i>Eriachne benthamii</i> , occasional <i>Sorghum plumosum</i> over open herbland of <i>Marsilea hirsuta</i> , <i>Stemodia kingii</i> .
Associated Species: <i>Centipeda minima</i> , <i>Dysphania plantaginella</i> , <i>Schoenoplectus subulatus</i> , <i>Bulbostylis barbata</i> , <i>Rhynchosia minima</i> , <i>Cullen cinereum</i> , <i>Trianthema triquetrum</i> , <i>Ipomoea muelleri</i> , <i>Grona muelleri</i> , <i>Portulaca oleracea</i>

Site No:PPMN-10	Date: 09/04/20
Rec:VL	Waypoint: 0466154 7697314
Photo: 19	Fire Age: 5 yrs
Vegetation Condition: Excellent (burnt)	
Habitat: Weakly gilgaied plain	
Vegetation Type: P3 <i>Eragrostis xerophila</i> open tussock grassland over <i>Heliotropium cunninghamii</i> , <i>Streptoglossa bubakii</i> herbland. Patchy burn in <i>Eragrostis xerophila</i> grassland	
Associated Species: <i>Streptoglossa liatroides</i> , <i>Xerochloa barbata</i> , <i>Rhynchosia minima</i> , <i>Sida fibulifera</i>	
Site No:PPMN-13	Date: 09/04/20
Rec:VL	Waypoint: 0466478 7697301
Photo: 20	Fire Age: 5 yrs
Vegetation Condition: Excellent (burnt previously)	
Habitat: Weakly gilgaied plain	
Vegetation Type: <i>Eragrostis xerophila</i> tussock grassland over annual <i>Heliotropium cunninghamii</i> and mixed herbland. Patchy burn in <i>Eragrostis xerophila</i> grassland	
Associated Species: <i>Streptoglossa bubakii</i> , <i>Rhynchosia minima</i> , <i>Sida fibulifera</i> , <i>Euphorbia coghlanii</i> , <i>Dichanthium sericeum</i> subsp <i>humilius</i>	



Mapping Note Data Sheet

Site No: PPMN-14	Date: 09/04/20
Rec: VL	Waypoint: 0466602 7697054
Photo: 21	Fire Age: >5 yrs
Vegetation Condition: Excellent (burnt previously)	
Habitat: Weakly gilgaied plain	
Vegetation Type: <i>Sorghum plumosum</i> and <i>Eragrostis xerophila</i> tussock grassland over open annual herbs.	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Ptilotus carinatus</i> , <i>Rhynchosia minima</i>	

Site No: PPMN-21	Date: 11/04/20
Rec: VL	Waypoint: 0465780 7697738
Photo: 7	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Very broad, shallow drainage zone with deep gilgai soils	
Vegetation Type P1 : <i>Sorghum plumosum</i> tussock grassland with mixed <i>Eragrostis xerophila</i> , <i>Eriachne benthamii</i> , <i>Panicum decompositum</i> , <i>Dichanthium sericeum subsp humilius</i> , <i>Iseilema eremaeum</i>	
Associated Species: <i>Operculina aequisejala</i> , <i>Cullen cinereum</i> , <i>Indigofera linifolia</i> , <i>Rhynchosia minima</i> , <i>Ipomoea mulleri</i>	



Mapping Note Data Sheet

Site No: SVMN-1 (between SV19 and SV22)	Date: 08/04/20
Rec: VL	Waypoint: 0465806 7698954
Photo: 17	Fire Age: >10 yrs
Vegetation Condition: Excellent but drying	
Habitat: Weakly gilgaied plain with scalds. Artefact site at 0465843 7698913	
Vegetation Type: P3 <i>Eragrostis xerophila</i> tussock grassland with <i>Sorghum plumosum</i> over open annual <i>Streptoglossa bubakii</i> , <i>Heliotropium cunninghamii</i> herbland.	
Associated Species: <i>Streptoglossa bubakii</i> , <i>Heliotropium cunninghamii</i> , <i>Ptilotus carinatus</i> , * <i>Tribulis terrestris</i> , <i>Rhynchosia minima</i>	

Site No: SVMN-2 and SVMN-3	Date: 08/04/2020
Rec: VL	Waypoint: SVMN-2: 0465972 7698866 SVMN-3: 0466033 7698654
Photo: 18 and 19	Fire Age: >10 yrs
Vegetation Condition: Excellent but drying	
Habitat: Deep cracking red-brown clays	
Vegetation Type: P1 <i>Sorghum plumosum</i> with <i>Eragrostis xerophila</i> tussock grassland over open annual herbland.	
Associated Species: <i>Operculina aequisejala</i> , <i>Sida fibulifera</i> , <i>Rhynchosia minima</i> , <i>Panicum decompositum</i> , <i>Eriachne benthamii</i> , <i>Astrelba pectinata</i> , <i>Cullen cinereum</i> , <i>Iseilema eremaeum</i> , <i>Crotalaria dissitiflora</i>	

Site No: SVMN-4	Date: 08/04/20
Rec: VL	Waypoint: 0466400 7698396
Photo: 23	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat:	
Vegetation Type: P1 <i>Sorghum plumosum</i> tussock grassland with <i>Eragrostis xerophila</i>	



Mapping Note Data Sheet

Associated Species: *Eriachne benthamii*, *Heliotropium cunninghamii*, *Operculina aequisejala*, *Dichanthium sericeum subsp humilius*, *Dactyloctenium radulans*, *Aristida latifolia*

Site No: SVMN-5	Date: 08/04/20
Rec: VL	Waypoint: 0466374 7698500
Photo:25	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain, occasional scalds, scattered stones	
Vegetation Type: P3 . <i>Eragrostis xerophila</i> open tussock grassland with <i>Sorghum plumosum</i> over open annual herbland.	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Iseilema eremaeum</i> , <i>Streptoglossa bubakii</i> , <i>Rhynchosia minima</i>	

Site No: SVMN-6	Date: 08/04/20
Rec: VL	Waypoint: 0466347 7698691 – SV23-A
Photo: 26	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain, occasional scalds, scattered stones	
Vegetation Type: P3 . <i>Eragrostis xerophila</i> grassland with <i>Sorghum plumosum</i> over open annual herbland	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Streptoglossa bubakii</i> , <i>Indigofera linifolia</i>	

Site No: SVMN-7	Date: 08/04/20
Rec: VL	Waypoint: 0466310 7698811
Photo:	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain – deeply cracked	



Mapping Note Data Sheet

Vegetation Type: P1 <i>Sorghum plumosum</i> tussock grassland with <i>Eragrostis xerophila</i> over annual herbland
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Rhynchosia minima</i> , <i>Operculina aequisejala</i> , <i>Sida fibulifera</i> , <i>Astrebla pectinata</i> , <i>Aristida latifolia</i> , <i>Dactyloctenium radulans</i> , <i>Euphorbia coghlanii</i> , <i>Goodenia forrestii</i> , <i>Boerhavia gardneri</i> , * <i>Cenchrus ciliaris</i> (<1%).

Site No: SVMN-8	Date: 08/04/20
Rec: VL	Waypoint: 0466237 7698982
Photo: 27-28	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain	
Vegetation Type: P3 <i>Eragrostis xerophila</i> tussock grassland with <i>Sorghum plumosum</i> over very open annual herbland	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Ptilotus carinatus</i>	

Site No: SVMN-9	Date: 08/04/20
Rec: VL	Waypoint: 0466060 7699211
Photo: 29	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Cracked gilgai plain	
Vegetation Type: P1 <i>Sorghum plumosum</i> tussock grassland with <i>Eragrostis xerophila</i> over annual herbland	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Ptilotus carinatus</i> , <i>Operculina aequisejala</i> , <i>Astrebla pectinata</i>	



Mapping Note Data Sheet

Site No: SVMN-10	Date: 08/04/20
Rec: VL	Waypoint: 0466026 7699240
Photo: 30	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain	
Vegetation Type: P3 . <i>Eragrostis xerophila</i> tussock grassland with <i>Sorghum plumosum</i>	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Ptilotus carinatus</i> , <i>Dactyloctenium radulans</i> , <i>Streptoglossa bubakii</i>	

Site No: SVMN-11 and SVMN-12	Date: 08/04/20
Rec: VL	Waypoint: 0466311 7699374
Photo: 40	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain	
Vegetation Type: P3 . <i>Eragrostis xerophila</i> tussock grassland with <i>Sorghum plumosum</i>	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Ptilotus carinatus</i> , <i>Indigofera linifolia</i> , <i>Xerochloa barbata</i> , <i>Goodenia forrestii</i>	

Site No: SVMN-13	Date: 08/04/20
Rec: VL	Waypoint: 0466599 7699156
Photo: 45	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Gilgaied clays, deeply cracking	



Mapping Note Data Sheet

Vegetation Type: P1. <i>Sorghum plumosum</i> closed tussock grassland with <i>Eragrostis xerophila</i> over of herbland of <i>Operculina aequisejala</i>
Note: 20 m south of SV02 but SV02= P1 <i>Eragrostis xerophila</i> grassland
Associated Species: <i>Dactyloctenium radulans</i> , <i>Swainsona kingii</i> , <i>Operculina aequisejala</i> , <i>Dichanthium sericeum subsp humilius</i> , <i>Ptilotus murrayi</i> , <i>Cullen cinereum</i> , <i>Iseilema eremaum</i>

Site No: SVMN-14	Date: 08/04/20
Rec: VL	Waypoint: 0466615 7699062
Photo: 45	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Cracking gilgai clays	
Vegetation Type: P1. <i>Sorghum plumosum</i> closed tussock grassland with <i>Eragrostis xerophila</i> over annual herbland of <i>Operculina aequisejala</i> , <i>Heliotropium cunninghamii</i> , <i>Boerhavia gardnerii</i>	
Associated Species: <i>Indigofera linifolia</i> , <i>Iseilema eremaum</i> , <i>Neptunia dimorphantha</i> , <i>Eragrostis brownii</i>	

Site No: SVMN-15	Date: 08/04/20
Rec: VL	Waypoint: 0466641 7699015
Photo: 46 and 47	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain	
Vegetation Type: P3. <i>Eragrostis xerophila</i> tussock grassland with <i>Sorghum plumosum</i>	
Associated Species:	



Mapping Note Data Sheet

Site No: SVMN-17	Date: 08/04/20
Rec: VL	Waypoint: 0466684 7698592
Photo:	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Plain, red-brown silty loams	
Vegetation Type: <i>Acacia inaequilatera</i> open tall shrubs over <i>Triodia wiseana</i> hummock grassland. Occasional <i>Sorghum plumosum</i> , <i>Acacia trudgeniana</i> .	
Associated Species: <i>Indigofera linifolia</i> , <i>Abutilon lepidum</i> , <i>Phyllanthus maderaspatensis</i> , <i>Indigofera colutea</i> , <i>Tephrosia</i> sp. NW Eremaean (<i>S. van Leeuwen et al. PBS 0356</i>), <i>Triumfetta clementii</i> , <i>Indigofera trita</i> , <i>Tribulus hirsutus</i> , <i>Corchorus tridens</i> , <i>Sporobolus australasicus</i> , <i>Aristida contorta</i> , <i>Portulaca conspicua</i> , <i>Senna notabilis</i> , <i>Gomphrena affinis</i> , <i>Enneapogon lindleyanus</i> <i>Evolvulus alsinoides</i> var. <i>villosicalyx</i> ,	

Site No: SVMN-18	Date: 08/04/20
Rec: VL	Waypoint: 0466906 7698361
Photo:	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain	
Vegetation Type: P3 . <i>Eragrostis xerophila</i> tussock grassland with <i>Sorghum plumosum</i> – Also at SV03	
Associated Species: <i>Heliotropium cunninghamii</i> , <i>Streptoglossa bubakii</i>	

Site No: SVMN-19	Date: 08/04/20
Rec: VL	Waypoint: 0466659 7699054
Photo: 56	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Cracking clay	



Mapping Note Data Sheet

Vegetation Type: P1. <i>Sorghum plumosum</i> closed tussock grassland with <i>Eragrostis xerophila</i>
Associated Species: <i>Dactyloctenium radulans</i> , <i>Operculina aequisejala</i> , <i>Heliotropium cunninghamii</i> , <i>Dichanthium sericeum subsp humilius</i> , <i>Boerhavia gardneri</i> , <i>Phyllanthus maderaspatensis</i> , <i>Ipomoea muelleri</i> , <i>Ipomoea lonchophylla</i>

Site No: SVMN-30	Date: 11/04/20
Rec: VL	Waypoint: 0465584 7699397
Photo: 20	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Deeply cracking gilgai plain	
Vegetation Type: P1. <i>Sorghum plumosum</i> tussock grassland with mixed <i>Eragrostis xerophila</i> , <i>Eriachne benthamii</i> , <i>Panicum decompositum</i> , <i>Aristida latifolia</i> over annual herbland of <i>Operculina aequisejala</i> , <i>Cullen cinereum</i> , <i>Phyllanthus maderaspatensis var. angustifolius</i>	
Associated Species: <i>*Tribulus terrestris</i> , <i>Dichanthium sericeum subsp humilius</i> , <i>Iseilema eremaeum</i> , <i>Astrebla pectinata</i>	

Site No: SVMN-31	Date: 11/04/20
Rec: VL	Waypoint: 0466104 7699157
Photo: 21	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain with moderate cracking	
Vegetation Type: P3. <i>Eragrostis xerophila</i> and <i>Sorghum plumosum</i> tussock grassland over open annual herbland of <i>Heliotropium cunninghamii</i> , <i>Streptoglossa bubakii</i>	
Associated Species: <i>Ptilotus carinatus</i> , <i>Rhynchosia minima</i>	

Site No: SVMN-32	Date: 11/04/20
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Mapping Note Data Sheet

Rec: VL	Waypoint: 0466265 7699029
Photo: 22	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Deeply cracking clay	
Vegetation Type: P1 <i>Sorghum plumosum</i> tussock grassland with open <i>Eragrostis xerophila</i> over <i>Operculina aequisejala</i>	
Associated Species: <i>Dactyloctenium radulans</i> , <i>Heliotropium cunninghamii</i> , <i>Dichanthium sericeum subsp humilius</i> , <i>Boerhavia paludosa</i> , <i>Astrebla pectinata</i> , <i>Iseilema eremaum</i> , <i>Phyllanthus maderaspatensis</i> , <i>Stemodia kingii</i> , <i>Arivela viscosa</i> , <i>Panicum decompositum</i> , * <i>Cenchrus ciliaris</i>	

Site No: SVMN-33	Date: 11/04/20
Rec: VL	Waypoint: WP177
Photo: 14	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Weakly gilgaied plain with occasional scalds	
Vegetation Type: P3 . <i>Eragrostis xerophila</i> and <i>Sorghum plumosum</i> mixed tussock grassland over open herbland of <i>Heliotropium cunninghamii</i> , <i>Streptoglossa bubakii</i>	
Associated Species: <i>Ptilotus carinatus</i> , <i>Rhynchosia minima</i> , <i>Ptilotus murrayi</i> , <i>Sida fibulifera</i> , <i>Streptoglossa liatroides</i>	

Site No: SVMN-34	Date: 11/04/20
Rec: VL	Waypoint: 0466236 7699364
Photo: 18	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat:	



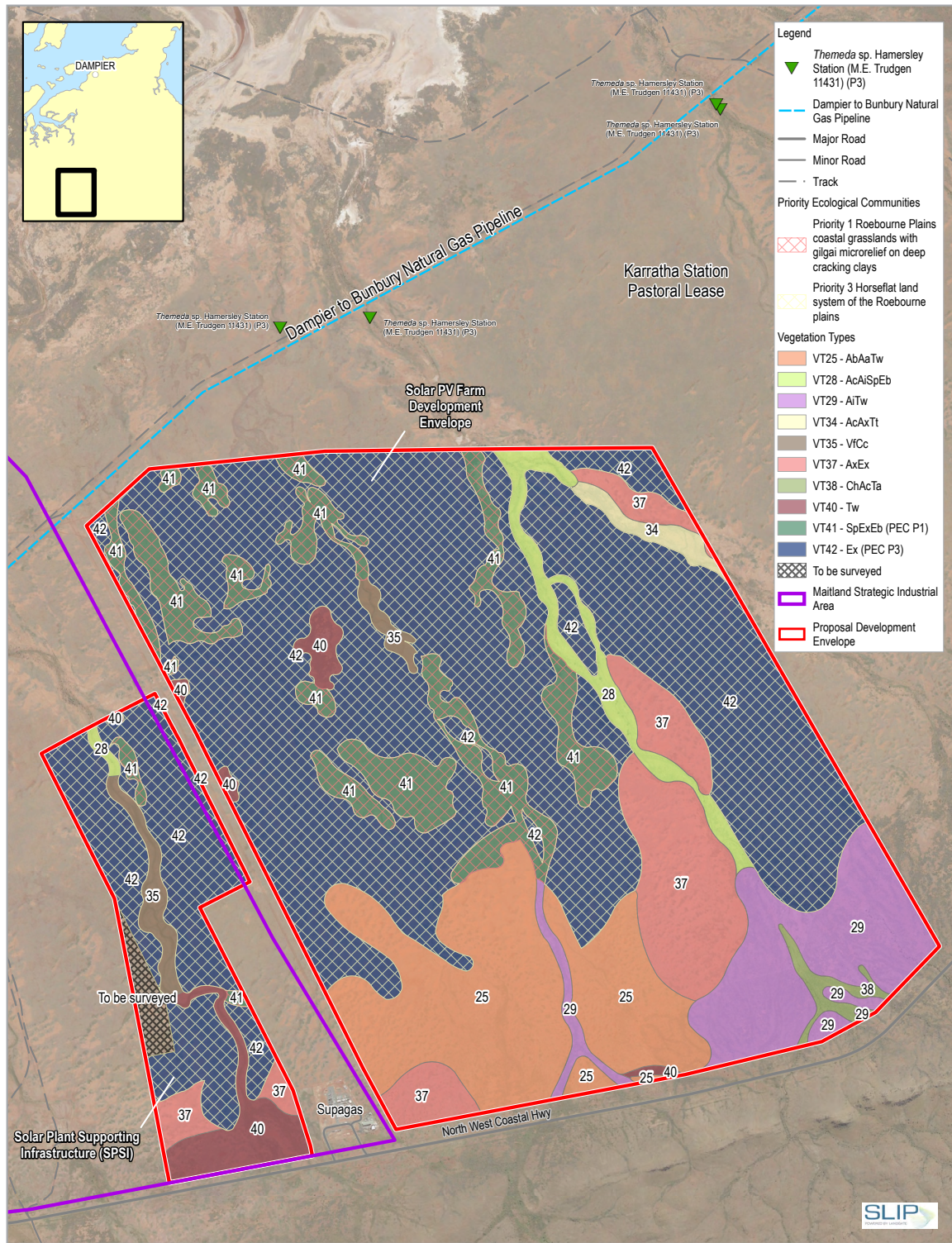
Mapping Note Data Sheet

<p>Mapping boundary point between P1 <i>Sorghum plumosum</i> grassland within P3 <i>Eragostis xerophila</i> grassland (see WP 182, 186, 188).</p> <p>Note to aid mapping only</p> <p>Associated Species:</p>
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Site No: MN-Solar	Date: 09/04/20
Rec: VL	Waypoint: 0466225 7697909
Photo: 22-23	Fire Age: >10 yrs
Vegetation Condition: Excellent	
Habitat: Stone arrangement – slightly raised, rectangular low mound with stones – AVOID	
Vegetation Type: <i>Triodia wiseana</i> with scattered <i>Hakea lorea</i>	
Associated Species:	

Appendix B: Vegetation Type Codes and Figures for southern survey area

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<p>Paper Size ISO A4 0 100 200 300 400 500 Metres</p> <p>Map Projection: Transverse Mercator Horizontal Datum: GDA 1994 Grid: GDA 1994 MGA Zone 50</p>			<p>Woodside Power Pty Ltd Woodside s38 Referral, Solar Farm</p> <p>Vegetation Types and Priority Ecological Communities</p>	<p>Project No. 12554973 Revision No. 0 Date 23 Sep 2021</p>
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FIGURE A-2

G:\61112554973\GIS\Maps\Working\12554973\12554973.aprx
Print date: 23 Sep 2021 - 05:51

Data source: GHD: Priority Ecological Communities, Vegetation Types - 20210304, Solar PV Farm Development Envelope, Solar Plant Ancillary and Supporting Infrastructure - 20210824; Woodside: Maitland Strategic Industrial Area, Dampier to Bunbury Natural Gas Pipeline - 20190909; Landgate: Roads - 20210302; Imagery - accessed: 20210923. Created by: mczeckaj

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Table B.1. Vegetation Type (VT) codes for the July 2019 and September 2020 surveys, cross referenced to the final VT codes used for the southern survey area.

July 2019 survey (September 2020 Wet Season Survey Results – Updates to VT Codes (southern survey area)		Final Vegetation Type List (southern survey area)	
VT#	VT Code	VT Code		VT#	VT Code
25	AbTw	AbAaTw		25	AbAaTw
28	AiAc?Eb	AcAiSpEb		28	AcAiSpEb
29	AiT _w	AiT _w		29	AiT _w
37	AcAx?Tt	AcAx?Tt		34	AcAxTt
38	VfCc	VfCc		35	VfCc
40	AxEx	AxEx		37	AxEx
41	ChAcTa	ChAcTa		38	ChAcTa
43	Tw	Tw		40	Tw
44	Eb?Cf	SpExEb (PEC P1)		41	SpExEb (PEC P1)
45	Ex spp	Ex (PEC P3)		42	Ex (PEC P3)
46	Ex	Ex (PEC P3)			

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Appendix C: Flora List for southern survey area

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Table C.1. Flora Species recorded within the southern survey area during the September 2020 Wet Season Survey.

Family	Species	Conservation Code	Weed Species
Aizoaceae	<i>Trianthema triquetrum</i>		
Amaranthaceae	<i>Gomphrena affinis</i>		
	<i>Ptilotus auriculifolius</i>		
	<i>Ptilotus carinatus</i>		
	<i>Ptilotus exaltatus</i>		
	<i>Ptilotus gomphrenoides</i>		
	<i>Ptilotus murrayi</i>		
Asteraceae	<i>Centipeda minima</i>		
	<i>Streptoglossa bubakii</i>		
	<i>Streptoglossa liatroides</i>		
Boraginaceae	<i>Heliotropium cunninghamii</i>		
Chenopodiaceae	<i>Dysphania plantaginella</i>		
	<i>Salsola australis</i>		
Cleomaceae	<i>Arivela viscosa</i>		
Convolvulaceae	<i>Bonamia media</i>		
	<i>Bonamia pannosa</i>		
	<i>Evolvulus alsinoides var. villosicalyx</i>		
	<i>Ipomoea lonchophylla</i>		
	<i>Ipomoea muelleri</i>		
	<i>Operculina aequisepala</i>		
Cyperaceae	<i>Bulbostylis barbata</i>		
	<i>Schoenoplectus subulatus</i>		
Euphorbiaceae	<i>Euphorbia coghlanii</i>		
Fabaceae	<i>*Vachellia farnesiana</i>		*
	<i>Acacia inaequilatera</i>		
	<i>Acacia pyrifolia</i>		
	<i>Alysicarpus muelleri</i>		
	<i>Crotalaria dissitiflora</i>		
	<i>Crotalaria medicaginea</i>		
	<i>Cullen cinereum</i>		
	<i>Grona muelleri</i>		
	<i>Indigostrum parviflorum</i>		
	<i>Indigofera colutea</i>		
	<i>Indigofera linifolia</i>		
	<i>Indigofera trita</i>		
	<i>Neptunia dimorphantha</i>		
	<i>Rhynchosia minima</i>		
	<i>Senna artemisioides subsp. oligophylla</i>		

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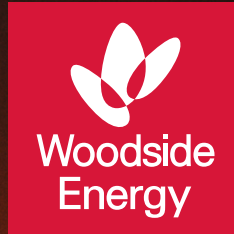
	<i>Senna notabilis</i>		
	<i>Swainsona kingii</i>		
	<i>Tephrosia</i> sp. NW Eremaean (S. van Leeuwen et al. PBS 0356)		
	<i>Acacia synchronicia</i>		
Goodeniaceae	<i>Goodenia forrestii</i>		
	<i>Goodenia microptera</i>		
Malvaceae	<i>Abutilon lepidum</i>		
	<i>Abutilon malvifolium</i>		
	<i>Corchorus tridens</i>		
	<i>Hibiscus brachysiphonius</i>		
	<i>Sida fibulifera</i>		
	<i>Triumfetta clementii</i>		
Marsileaceae	<i>Marsilea hirsuta</i>		
Nyctaginaceae	<i>Boerhavia coccinea</i>		
	<i>Boerhavia gardneri</i>		
	<i>Boerhavia paludosa</i>		
Phyllanthaceae	<i>Phyllanthus maderaspatensis</i>		
Plantaginaceae	<i>Stemodia kingii</i>		
Poaceae	* <i>Cenchrus ciliaris</i>		*
	<i>Aristida contorta</i>		
	<i>Aristida holathera</i>		
	<i>Aristida latifolia</i>		
	<i>Astrebula pectinata</i>		
	<i>Chrysopogon fallax</i>		
	<i>Cynodon convergens</i>		
	<i>Dactyloctenium radulans</i>		
	<i>Dichanthium sericeum</i> subsp <i>humilius</i>		
	<i>Diplachne fusca</i>		
	<i>Enneapogon lindleyanus</i>		
	<i>Eragrostis brownii</i>		
	<i>Eragrostis tenellula</i>		
	<i>Eragrostis xerophila</i>		
	<i>Eriachne benthamii</i>		
	<i>Iseilema eremaeum</i>		
	<i>Panicum decompositum</i>		
	<i>Sorghum plumosum</i>		
	<i>Sporobolus australasicus</i>		
	<i>Themeda</i> sp. Hamersley Station (M.E. Trudgen 11431)	P3	
<i>Xerochloa barbata</i>			
Portulacaceae	<i>Portulaca conspicua</i>		
	<i>Portulaca intraterranea</i>		

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	<i>Portulaca oleracea</i>		
Proteaceae	<i>Hakea lorea</i>		
Zygophyllaceae	* <i>Tribulus terrestris</i>		*
	<i>Tribulus hirsutus</i>		

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WOODSIDE SOLAR FACILITY TERRESTRIAL FAUNA SURVEY PLAN





Woodside Power Pty Ltd

Solar PV Power Plant Fauna Survey

September 2021

WATER | ENERGY & RESOURCES | ENVIRONMENT | PROPERTY & BUILDINGS | TRANSPORTATION

Executive summary

Introduction

Woodside Power Pty Ltd (Woodside) is proposing to develop a Solar PV Power Plant, approximately 15 kilometres (km) southwest of Karratha, Western Australia (WA). This will generate electricity from a large scale solar photovoltaic farm (Solar PV Farm), complemented by energy storage (battery) infrastructure (the Proposal). The proposed works and subsequently, the survey area, were revised in 2021. The results and recommendations outlined in this report have been updated to reflect the change in the proposed works since 2021, but the survey methodology remains the same as was conducted in 2019. The results of the fauna survey will be used to support the environmental approvals required for the construction and operation of the Solar PV Farm and Solar Plant Supporting Infrastructure (SPSI).

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the Report.

Survey effort

Field survey consisted of seven days over two periods the 10th to 13th of June and 22nd to 24th July 2019. The survey aimed to verify the findings of a desktop assessment and preliminary likelihood of occurrence assessment. The survey area was ground truthed with remote cameras and bat detectors installed to assist in species inventory within the survey area. In total 30 camera nights over nine locations and three bat detector nights over three locations were undertaken.

Key results

- Three broad fauna habitat types (excluding disturbed areas) were recorded in the survey area. These habitat types closely align with the different vegetation types and landforms within the survey area. The fauna habitat present include, Minor Drainage lines (and small areas of exposed granite), , Tussock Grasslands on Cracking Clays, Granite and Triodia on stony soils. Some disturbed areas are also present.
- The survey area is largely intact, contiguous with disturbances including, land modifications and cattle grazing
- The Reconnaissance survey identified 84 species from within the survey area, consisting of 59 birds, 13 reptiles and 12 mammals. Of these species, four were introduced and comprise Dog, Cat, Cattle and Black Rat
- No conservation significant fauna were recorded

1. Introduction

1.1 Background

Woodside Power Pty Ltd (Woodside) is proposing to develop a Solar PV Power Plant, approximately 15 kilometres (km) southwest of Karratha, Western Australia (WA). This will generate electricity from a large scale solar photovoltaic farm (Solar PV Farm), complemented by energy storage (battery) infrastructure (the Proposal). The proposed works and subsequently, the survey area, were revised in 2021. This report describes the survey effort that pertains to the 2019 proposed works by Woodside. The results of this survey have been modified in this report, to address the relevant impacts associated with the now survey area (Solar PV Farm and SPSI).

Woodside is referring the Proposal to the WA Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986* (EP Act), as a Proposal that has potential to have a significant impact on the environment. Woodside is also referring the Proposal to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) as a Proposal that has potential to impact matters of national environmental significance (MNES).

1.2 Purpose of this report

GHD Pty Ltd (GHD) was commissioned by Woodside to undertake a Reconnaissance fauna assessment of the survey area. The purpose of the assessment is to delineate key fauna values within the survey area and the potential impact to areas of sensitivity. The outcomes of the assessment will be used in the environmental assessment and approvals process.

1.3 Scope of Works

For the purposes of undertaking this desktop assessment, the survey area refers to the proposed Solar PV Farm, where a 20 km buffer has been applied for database searches. The search area is known as the study area.

The scope of works for this project is to complete a:

- Desktop assessment of the study area was completed prior to the field survey work to identify significant fauna values which may be in, or nearby the survey area. This included a likelihood of occurrence assessment
- Review of existing and relevant environmental reports
- Field survey to verify / ground truth the desktop assessment findings
- Fauna habitat assessment across the Development Envelope
- Determination of the presence and distribution of fauna species within the survey area using motion cameras
- Determination of the presence of conservation significant bat species using bat detectors
- Series of environmental constraints maps using Geographic Information Systems (GIS) mapping software
- Concise report (this document) on the findings of the fauna survey was provided

1.4 Limitations

This report has been prepared by GHD for Woodside and may only be used and relied on by Woodside for the purpose agreed between GHD and Woodside as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Woodside arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Woodside and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of access tracks, infrastructure and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

This report has assessed the fauna within the survey area Figure 1. Should the survey area change or be refined, further assessment may be required.

2. Methods

2.1 Desktop

The desktop assessment reviewed existing information for the survey area to determine likelihood of occurrence of conservation significant species and inform the design of the field surveys and timing of the survey.

This assessment is restricted to vertebrate terrestrial fauna within the survey area. The desktop assessment includes:

- A review of the Department of the Environment and Energy Protected Matters Search Tool (PMST) database to identify Matters of National Environmental Significance (MNES), fauna species listed under the EPBC Act potentially occurring within the study area
- A review of the DBCA *NatureMap* database for fauna species previously recorded within a 20 km buffer of the survey area. The following data sets within *NatureMap* included: Atlas of Australian birds, Birddata – Birdlife Australia, Fauna Survey returns database (new), Pilbara Biological Survey fauna, Pilbara Threatened Fauna, WA Threatened Fauna database, and WA Museum fauna databases
- A review of DBCA Threatened Fauna databases to identify conservation significant fauna species present within the survey area and surrounds that are contained in DBCA records (20 km buffer). The above database search detail are presented in Table 1
- A review of a previous and relevant fauna assessment in the area (Fauna records are generally expressed in the *NatureMap* searches, unless Level 1). Aecom 2013 Environmental Due Diligence, Maitland Industrial Estate. Unpublished report consolidates previous works on the area and this has been reviewed as part of this survey
- Aerial photography, geology/soils and hydrology information: these datasets were reviewed to provide background information on the variability of the environment and likely habitat types
- DBCA-managed conservation estates and reserves present within or near the survey area.

Details of the database searches conducted are summarised in Table 1 and the search results are presented in Appendix E. Conservation codes and legislation is presented in Appendix B.

Table 1 Database searches undertaken for this study

Databases	Search Focus	Search area
Department of Agriculture, Water and the Environment Protected Matters Search Tool (DAWE 2021)	MNES - Fauna	20 km buffer around line transect, coordinates - 20.799064 116.682674,- 20.596088 116.78361,- 20.596088 116.782924,- 20.596088 116.782924
Threatened and Priority Fauna Database (Department of Biodiversity, Conservation and Attractions 2019)	Listed threatened and priority flora	20 km radius around survey area shapefiles provided
<i>NatureMap</i> (Department of Biodiversity, Conservation and Attractions 2019)	Fauna diversity and fauna of conservation significance	20 km buffer around coordinates -20.596088 116.78361

2.2 Field survey

A Reconnaissance fauna survey was undertaken over two periods the 10th to 13th of June and 22nd to 24th July 2019. Where access permitted, the area was ground truthed by senior zoologist Glen Gaikhorst. The agreed exclusion areas were maintained, otherwise all areas within the survey area were traversed and visually assessed.

The fauna survey was undertaken with reference to Technical Guide – Terrestrial Fauna Surveys (EPA 2020). The purpose of the reconnaissance survey was to verify the accuracy of the desktop study and characterise the fauna and faunal assemblages present in the survey area.

The majority of the survey area was traversed on foot and by vehicle over the course of seven days. The purpose of the survey was to:

- Identify and describe the dominant fauna habitat types present and their condition, and
- Assess habitat connectivity, identify and record fauna species within the survey area.

An assessment of the likelihood of conservation significant fauna and their habitats occurring within the survey area was also undertaken.

Habitat assessment

A fauna habitat assessment was undertaken to document the type, condition and extent of habitats within the survey area. The following information was recorded:

- Habitat structure (e.g. vegetation type, presence/absence of structural layers such as ground cover and mid storey)
- Presence/absence of refuge including: density of ground covers, fallen timber (coarse woody debris), hollow-bearing trees and stags and rocks/boulder piles, and the type and extent of each refuge
- Presence/absence of waterways including type, extent and habitat quality within waterway

- Location of the habitat within the survey area in comparison to the habitat within the surrounding landscape
- Habitat connectivity and identification of wildlife corridors within and immediately adjacent to the survey area
- Current land use and disturbance history
- Evaluation of key habitat features and types identified during the desktop assessment relevant to fauna of conservation significance
- Evaluation of the likelihood of occurrence of conservation significant fauna within the habitat (based on presence of suitable habitat)

Opportunistic fauna searches

Opportunistic fauna searches were conducted across the survey area. The majority of opportunistic searches focussed on the following:

- Searching the survey area for tracks, scats, bones, diggings and feeding areas for both native and feral fauna (Triggs 2004). For each scat found, the location, date, brief habitat description and GPS coordinate was recorded
- Searching through microhabitats including turning over rocks and ground debris (e.g. leaf litter) and examining tree hollows and hollow logs for reptile and other small vertebrate fauna
- Visual and aural surveys. This accounted for many bird species potentially utilising the survey area
- A visual assessment of the water bodies to identify any fish species observed
- Recording GPS locations of any conservation significant fauna species.

Camera trapping

Motion sensor cameras (Reconyx-Hyperfire) were deployed for a total of 30 camera nights (each camera between 2 and 4 nights) at nine locations within the survey area, primarily to identify additional cryptic or nocturnal species that may utilise the survey area. Cameras were positioned in areas where conservation significant species may frequent (e.g. rocky outcrops with cavities and cracking clays). For each camera location the time and date deployed and recovered, a GPS coordinate and brief habitat description was recorded. Camera locations are displayed in Figure 3.

Data from the cameras were downloaded to a computer and analysed for the presence of animals following the field survey. Glen Gaikhorst, senior zoologist, undertook the identification of fauna images captured by the cameras. Table 2 provides the camera and bat detector locations and habitat associated.

Table 2 Remote Camera information

Item	Longs	Lats	Environment	Habitat	Total Nights
Remote camera	116.778063	-20.610273	Rocky Hills	Boulder Pile beneath Fig tree	4
Remote camera	116.774419	-20.615333	Rocky Hills	Boulder Piles	4
Remote camera	116.743543	-20.654963	Rocky Hills	Boulder Piles	4
Remote camera	116.740900	-20.659612	Rocky Hills	Boulder Piles	4

Item	Longs	Lats	Environment	Habitat	Total Nights
Remote camera	116.730168	-20.674946	Rocky Hills	Boulder Piles	4
Remote camera	116.728945	-20.676541	Rocky Hills	Boulder Piles	4
Remote camera ¹	116.674933	-20.817698	Cracking Clays	On ground amongst tussock grasses	2
Remote camera ¹	116.689948	-20.808314	Minor Drainage line	Amongst shrubs along minor drainage line	2
Remote camera ¹	116.699785	-20.830550	Rocky Plain	Amongst Triodia	2

¹Relevant to the survey area

Bat survey

A Songmeter SM4BAT+ recorder (Wildlife Acoustics Inc., USA) was deployed at three locations for a total of three nights to record ultrasonic echolocation calls emitted by microchiropteran bats.

Table 3 Bat Detector Information

Item	Longs	Lats	Environment	Habitat	Total Nights
Bat detector	116.769890	-20.630216	Mudflats	Mangroves	1
Bat detector	116.733319	-20.669921	Rocky Hills	Boulder Piles	1
Bat detector	116.730229	-20.681949	Sandy Plain	Shrublands	1

Call analysis

Craig Grabham, senior zoologist, completed the analysis of all data collected during the survey using the ultrasonic bat detectors. Data from SM units were downloaded and viewed using Kaleidoscope Pro (version 4.3.1, Wildlife Acoustics Inc 2016) as full-spectrum files. WAV files were also converted to Anabat sequence files (zero-crossing format) suitable for analysis in Analoow version 4.1s (Corben 2015).

WAV files were viewed and bat calls identified by visually comparing the Kaleidoscope Viewer spectrogram and call characteristics (e.g. characteristic frequency and call shape) with reference calls and/or species call descriptions from available reference material (e.g. McKenzie and Bullen 2009; Armstrong and Coles 2007). The spectrogram displayed each call sequence (see below for call definition) with information on the number and timing of calls.

Calls were also identified using zero-crossing analysis and Analoow by visually comparing the time-frequency graph and call characteristics (e.g. characteristic frequency (Fc) and call shape) with reference calls and/or species call descriptions from available reference material.

The call identification was also assisted by consulting distribution information for possible species (Atlas of Living Australia and DBCA *NatureMap* records) and previous GHD surveys within the region of the survey area. No reference calls were collected during the survey.

A call (pass) was defined as a sequence of three or more consecutive pulses of similar frequency and shape. Calls with less than three defined consecutive pulses of similar frequency and shape were not unambiguously identified to a species (see below) but were used as part of the activity count for the survey area.

Due to variability in the quality of calls, the lack of published information regarding non-search phase calls and the difficulty in distinguishing some species the identification of each call was assigned a confidence rating (see Mills *et al.* 1996 and Duffy *et al.* 2000) as summarised in

Table 4. Due to the absence of reference calls from the study area and the poor quality of some the recordings and known overlap in call characteristics between some species, a conservative approach was taken when analysing calls.

Table 4 Confidence ratings applied to calls

Identification	Description
D - Definite	Species identification not in doubt. Call sequence contains three or more consecutive pulses of similar frequency and shape. Call characteristics match those in referenced material or species reference calls.
PR - Probable	Call most likely to represent a particular species, but there exists a low probability of confusion with species of similar call type or call lacks sufficient detail (e.g. number of pulses).
SG – Species Group	Call made by one of two or more species. Call characteristics overlap making it too difficult to distinguish between species.

Fauna Species Identification

Fauna species were identified in the field using available field and electronic guides (e.g. Morcombe 2014). Nomenclature follows that used by the WA Museum (as shown on *NatureMap*), as it is regarded to contain the most up-to-date species information for WA, with the exception of birds, where Christidis and Boles (2008) or bats which follows Armstrong (2011), then van Dyck *et al.* (2008) was used.

2.3 Limitations

2.3.1 Desktop limitations

Desktop investigations use a variety of online resources such as the WA Museum and DBCA *NatureMap* database (DBCA 2007–), and the EPBC Act PMST. The responsibility for the accuracy of such data remains with the issuing authority, not with GHD.

The EPBC Act PMST is based on bioclimatic modelling for the potential presence of species. As such, this does not represent actual records of the species within the area. The records from the DBCA searches of threatened flora and fauna provide more accurate information for the general area. However, some records of collections, sightings or trappings cannot be dated and often misrepresent the current range of threatened species.

2.3.2 Field survey limitations

The EPA (2020) Technical Guidance states survey reports for environmental impact assessment in Western Australia should contain a section describing the limitations of the survey methods used. The limitations and constraints associated with this field survey are discussed in Table 5. Based on this assessment, the present survey effort is not subject to any constraints which affect the thoroughness of the assessment and the conclusions that have been formed.

Table 5 Field Survey Limitations

Aspect	Constraint	Comment
Completeness and further work which might be needed (e.g. was the relevant area fully surveyed)	Minor	The majority of the survey area was accessed by vehicle and on foot. Information gained from the survey was extrapolated across those sections of the survey area not accessed on foot during the field survey to assist with determining the vegetation and habitat types for the entire survey area.
Mapping reliability	Nil	Data were recorded in the field using a hand-held GPS tool. Certain atmospheric factors and other sources of error can affect the accuracy of such GPS receivers. On average, the GPS units used during this field survey (Garmin GPS, Samsung Tablet units) have an accuracy to approximately ± 5 m. Therefore the data points consisting of coordinates recorded from the GPS may contain inaccuracies.
Timing/weather/season/cycle	Moderate	The survey was conducted in June and July 2019 which was relatively late in the season for assessing migratory birds. Typically migratory bird surveys are undertaken in the summer period (Dutsun et al 2009) between October to March. Due to the habitats present in the survey area migratory species may not have been identified from the survey.
Disturbances (e.g. fire, flood, accidental human intervention)	Minor	A number of disturbances were observed that impacted the survey. These included current and historic vegetation clearing pipelines and tracks, as well as some historic grazing. No evidence of recent fire was observed.
Intensity (in retrospect, was the intensity adequate)	Nil	The terrestrial fauna was sampled in accordance with the EPA (2020) Reconnaissance assessment. The survey area was sufficiently covered by GHD zoologist during the survey.
Access restrictions	Minor	Some areas had restricted access during the survey, however these could be visually assessed from a distance to determine habitats present. The majority of the survey area was accessed by vehicle and/or on foot.
Experience Levels	Nil	The survey zoologist is suitably qualified and experienced in his field. Glen Gaikhorst is a Senior Zoologist with over 20 years' experience in undertaking ecological surveys in Western Australia.

3. Results

3.1 Desktop

3.1.1 Fauna diversity

A search of *NatureMap* identified 331 terrestrial vertebrate fauna taxa previously recorded within 20 km of the survey area. This total included 194 birds, 37 mammals, 7 amphibian and 93 reptiles (Appendix E).

Of the 331 species identified 13 are considered introduced to the region, these include four Birds (Domestic Pigeon, Spotted Turtle Dove, European Sparrow and House Sparrow), eight mammals (Cat, Fox, Goat, Sheep, Dog, Rabbit, House mouse and Black Rat) and one reptile (Asian House Gecko).

A number of Short Range Endemic (SRE) invertebrates were also recorded; however, the habitat present in the survey area is not conducive to SRE environments.

Due to the close proximity to the marine environment a number of marine species were identified, these were excluded from the search. Marine species (such as Gulls and Terns) that are known to opportunistically use terrestrial areas/habitats remained in the assessment. There are some species duplications within the database search due to the inclusion of subspecies and due to recent taxonomic name changes. These species were also excluded from the numbers.

3.1.2 DBCA Database

The DBCA database identified 2281 individual fauna records of conservation significant species (consisting of both terrestrial and marine). Of these records, only one new terrestrial vertebrate species was identified, that was not recorded in other searches. This species is the North-western Free-tailed Bat (*Mormopterus (Ozimops) cobourgianus*) and has been added to the Likelihood of Occurrence table presented in Appendix D.

3.1.3 Conservation significant fauna

Searches of the EPBC Act PMST identified the presence/potential presence of 47 conservation significant fauna, including 41 birds, four mammals and two reptiles (Appendix E). The EPBC Act PMST indicated the potential presence of nine additional introduced fauna taxa within 20 km of the survey area. Species identified by the PMST as marine or pelagic and migratory wetland were excluded from this assessment as no marine or wetland habitat is present within the survey area.

3.1.4 Previous Report for the Maitland Industrial Estate

AECOM (2013) completed a desktop assessment for the Maitland Industrial Estate referencing three previous fauna reports undertaken over the area dating back to 1994. The key finding of the summary includes:

- Three main fauna habitats (from the most recent survey) have previously been recorded in the Maitland Industrial Estate including Paddock grassland consisting of **Cenchrus ciliaris*, *Eragrostis xerophila* and *Eriachne aristidea* tussock grassland with *Alternanthera nudiflora*, *Hybanthus auranticatus* and *Heliotropium conocarpum* mixed herbs, Creepline community of *Grevillea wickhamii* and *Acacia coriacea* tall open shrubland over *Triodia wiseana*, *Triodia pungens* hummock grassland with patches of *Chrysopogon fallax* and Hummock grassland of *Triodia wiseana* and *Triodia pungens* with **Cenchrus ciliaris* and *Eragrostis xerophila* tussock grassland.
- Previous surveys had identified 24 birds, 3 mammals and 10 reptiles and frogs (Aecom 2013).
- The Peregrine Falcon and Grey Falcon were recorded as potential 'fly over' the site while Northern Quoll, Pilbara Olive Python, Short-tailed Mouse, Bar-tailed Godwit, Common Greenshank, Curlew Sandpiper and Pin-tailed Snipe are possible to occur. The Lined Soil Crevice Skink and Bridled Tern are known to breed in the area. Note: A number of other species were listed as possible however these species no longer have a conservation listing.

- An assessment of likelihood determined that no EPBC Act listed species were likely to be present, with the exception of 31 migratory, marine species that are known or likely to occur.

The reports referenced by AECOM (2013) were desktop-only and 10+ years old, and therefore not an appropriate representation of species that may / may not be present in the survey area.

3.1.5 Conservation Managed Lands

The survey area does not contain any DBCA-managed conservation estates or reserves or any in the near vicinity.

3.2 Field Survey

3.2.1 Fauna Habitats

Three main fauna habitat types were recorded during the field survey, which are described in detail in Table 6 and mapped in Figure 4, and include:

- Minor Drainage lines and small exposed granite outcrops
- Tussock Grasslands on Cracking Clays
- Hummock Grassland on Rocky Plain (Triodia on stony soils)

The topography of the survey area varied from stony plains to minor drainage lines, cracking clays and granite outcrops. Minor drainage systems occur within the survey area which drain from to the coast or across plain. Flow varies in direction through the survey area however always drains to the coast. No waterbodies were present within the minor drainages at the time of the survey. Soils varied greatly over the survey area and included red-brown stony or sandy loams, cracking clays on the plain and areas of exposed rocky hills. The habitat types for the survey area are described in Table 6.

Habitat connectivity

The fauna habitats of the survey area are part of a contiguous largely intact area of remnant vegetation within leased land primarily used for industrial, cattle grazing and resource extraction. The fauna habitats of the survey area are part of a much larger area of similar habitats within the local area and greater study area. The ephemeral drainage lines within the survey area drain towards the coast and provide corridors. Overall, the habitats within the survey area are largely contiguous through the local area and mostly well connected with habitats through the study area.




Disturbance

Some of the habitats within the survey area have been impacted by past disturbances including land clearing for infrastructure, linear corridors, pastoral practices and mineral resource extraction which has been conducted within the survey area. on the survey area lies on Karratha Station and so has suffered degradation from cattle grazing. Some signs of cattle (scats) were observed throughout the survey area.


Habitat value

The survey area provides a moderate level of habitat value within the environment. This is due to the diversity of fauna the area maintains and the conservation significance of many native fauna species that are present or likely to be present in the survey area.

Table 6 Fauna habitats recorded in the survey area

Habitat	Image
<p>Minor Drainage lines and small areas of exposed granite</p> <p>This habitat type is limited to the linear drainage systems which flow randomly on the plains. They primarily consist of a thin, linear corridor of denser vegetation which drain into the intertidal mudflats and coastline. This habitat type is mostly dominated by <i>Acacia</i> species on the plain. Understorey includes <i>Triodia</i> hummock grassland and <i>Buffel Grass (Cenchrus spp.)</i> and mixed small shrub species. Litter, woody debris and logs were present along drainage line edges or where water flow created build up. No recent fire scarring was present in the survey area but historical evidence was obvious via the age of vegetation present. This habitat, particularly on the plain provides a habitat corridor from the coastal tidal zone to an open plain over the cracking clays. The tall <i>Corymbia</i>'s present in the survey area, provide roosting and breeding opportunities for a range of fauna via tall canopy or hollows large trees provide. A number of fauna species favouring riparian vegetation were also recorded including White-plumed Honeyeater (<i>Lichenostomus penicillatus</i>), Bush Stone Curlew (<i>Burhinus grallarius</i>), Budgerigar (<i>Melopsittacus undulatus</i>), Red Kangaroo (<i>Macropus rufus</i>) and Long-snouted Water Dragon (<i>Gowidon longirostris</i>).</p> <p>The minor drainage lines also contain a habitat-feature of small, exposed granite outcrops. These are known to support a range of reptile spp, which will utilise the rock as shelter and for foraging.</p>	
<p>Habitat value for fauna species of conservation significance</p> <p>Patchy and typically linear in the landscape but part of a larger area of contiguous remnant vegetation extending beyond the survey area. This habitat was present within the entire survey area and provides potential hunting and foraging opportunities for the Peregrine Falcon.. On the plain, the Northern Short-tailed Mouse (<i>Leggadina lakedowniensis</i>) and Lined Crevice Skink (<i>Notoscincus butleri</i>) would utilise this habitat.</p>	
<p>High value</p> <p>Linear corridor of habitat utilised by Peregrine Falcon and Northern Short-tailed Mouse and Lined Crevice Skink on the plain. A fauna corridor for all other species on the plain. Contains granite outcrops for a range of reptile spp.</p>	

Habitat	Image
<p>Hummock Grassland on Rocky Plain (Triodia on stony soils)</p> <p>This habitat type occurs in some portions across the survey area, but mostly in the south-east corner of the survey area. It is often associated with slight undulation where there is association to low hills. This habitat type is mostly dominated by a <i>Triodia wiseana</i> hummock grassland with heavy loam stony soils. The vegetation is a mosaic of shrubs however is dominated by <i>Acacia</i> spp. and <i>Hakea lorea</i> over <i>Triodia wiseana</i> hummock grassland. Litter, woody debris and branches were present in areas where shrubs were present. No logs or hollows were observed due to the low shrub-vegetation structure present. No recent fire scarring was present in the survey area but historical evidence was obvious via the age of vegetation present. The grasslands provide good foraging and breeding opportunities for small native ground mammals, ground dwelling birds and reptiles. Several ground dwelling birds, small skinks and dragons were observed active during the survey (Little Button-quail (<i>Turnix velox</i>), Brown Songlark (<i>Cinchoramphus cruralis</i>), Spinifexbird (<i>Eremiornis carteri</i>)) and several raptor species were observed foraging over the grasslands (Black-shouldered Kite (<i>Elaeornis axillaris</i>), Spotted Harrier (<i>Circus assimilis</i>), Australian Kestrel (<i>Falco cenchroides</i>)).</p> <p>Habitat value for fauna species of conservation significance</p> <p>Part of a larger area of contiguous remnant vegetation extending beyond the survey area. This habitat provides potential hunting and foraging opportunities for the Peregrine Falcon. Where sand incursion and in association with drainage lines is present within this habitat, the Northern Short-tailed Mouse and Lined Crevice Skink may be present.</p> <p>Moderate to High value</p> <p>Habitat that typically supports high diversity of small vertebrate fauna and provides foraging habitat to Peregrine Falcon. The Northern Short-tailed Mouse and Lined Crevice Skink may also utilise this habitat.</p> <p>Tussock Grasslands on Cracking Clays</p> <p>This habitat type dominates the survey area and intergrades with smaller areas or scattered <i>Triodia</i> hummock grasslands on stony soils. Overstorey was minimal, containing sometimes a mix of tussock grasses, but dominated by <i>Eragrostis xerophila</i> tussock grassland over an annual herbland. The grasslands provide good foraging and breeding opportunities for grassland and cracking clay specialists such as small native ground mammals, ground dwelling birds and reptiles. Several ground dwelling birds were observed active during the survey (Rufous Songlark (<i>Cinchoramphus mathewsi</i>), Brown Songlark (<i>Cinchoramphus cruralis</i>), Horsfield's Bushlark (<i>Mirafra javanica</i>)) and several raptor species were observed foraging over the grasslands (Black-shouldered Kite, Spotted Harrier, Australian Kestrel). Old nests were recorded for songlarks and bushlarks suggesting the species breed in the area. Animal tracks, digs and occasional small burrows were recorded in this habitat type, most of which were kangaroos and other small mammals.</p>	<p>Exposed granite along a minor drainage line</p>  
<p>Moderate to High value</p> <p>Habitat that typically supports high diversity of small vertebrate fauna and provides foraging habitat to Peregrine Falcon. The Northern Short-tailed Mouse and Lined Crevice Skink may also utilise this habitat.</p> <p>Tussock Grasslands on Cracking Clays</p> <p>This habitat type dominates the survey area and intergrades with smaller areas or scattered <i>Triodia</i> hummock grasslands on stony soils. Overstorey was minimal, containing sometimes a mix of tussock grasses, but dominated by <i>Eragrostis xerophila</i> tussock grassland over an annual herbland. The grasslands provide good foraging and breeding opportunities for grassland and cracking clay specialists such as small native ground mammals, ground dwelling birds and reptiles. Several ground dwelling birds were observed active during the survey (Rufous Songlark (<i>Cinchoramphus mathewsi</i>), Brown Songlark (<i>Cinchoramphus cruralis</i>), Horsfield's Bushlark (<i>Mirafra javanica</i>)) and several raptor species were observed foraging over the grasslands (Black-shouldered Kite, Spotted Harrier, Australian Kestrel). Old nests were recorded for songlarks and bushlarks suggesting the species breed in the area. Animal tracks, digs and occasional small burrows were recorded in this habitat type, most of which were kangaroos and other small mammals.</p>	

<p>Habitat</p> <p>Logs, branches and debris were very sparse in this habitat type-which is an artefact of the lack of over storey. Leaf-litter and other forms of non-vascular (ground cover of dead plant material) was localised beneath small clumps of trees but was uncommon.</p> <p>Habitat value for fauna species of conservation significance</p> <p>No conservation significant species were recorded in this habitat at the time of the survey. Typically this habitat is utilised in the wet period (December to April) when migratory species are present and grasses are flourishing. The migratory species previously recorded in this habitat are the Oriental Plover (<i>Charadrius veredus</i>), Oriental Pratincole (<i>Glaucola maldivarum</i>), Bridled Tern (<i>Onychoprion anaethetus</i>) (which has been recorded breeding just to the west) and any other migratory species that may temporarily and opportunistically utilise open plains. The Northern Short-tailed Mouse and Lined Crevice Skink would utilise this habitat.</p> <p>Moderate value</p> <p>Seasonal opportunistic use of habitat by migratory-bird species. The Northern Short-tailed Mouse and Lined Crevice Skink may also utilise this habitat.</p>	<p>Image</p> 
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3.2.2 Species Diversity

During the survey 84 species were identified from within the survey area, consisting of 59 birds, 13 reptiles and 12 mammals. Of these species, four were introduced and comprise Dog, Cat, Cattle and Black Rat. The remaining species were all native and are known from the region. The full list of species identified can be seen in Appendix C.

Three of these species were recorded on camera and include the Cat Woolley's False Antechinus (Plate 1), Black Rat and Rothchild's Rock Wallaby (Plate 2).



Plate 1 Woolley's False Antechinus (zoomed in)



Plate 2 Rothchild's Rock Wallaby

Conservation Significant Fauna

No Conservation Significant species were recorded in the survey area.

3.2.3 Likelihood of Occurrence

A preliminary likelihood of occurrence assessment was undertaken pre field survey. This assessment identified a number of species that are likely to exist in the habitats within the survey area. The field survey further refined this data based on species recorded and habitats present.

Searches of the EPBC Act PMST, DBCA Threatened and Priority Fauna database and NatureMap database (Appendix E) identified the presence/potential presence of 60 conservation significant fauna species. These species populate the Likelihood of Occurrence assessment which can be found in Appendix D. Species identified by the PMST as marine or sole marine were excluded from this assessment as no sole marine habitats were present within the survey area however species identified by the PMST as migratory terrestrial/wetland were considered as part of this assessment.

This assessment found (post survey) that 6 species were identified as likely to occur within the survey area, based on species records and habitat identified and review of previous works undertaken in the region. These species can be seen in Table 7.

Table 7 Summary of fauna species of conservation significance determined likely to occur within the survey area

Species and status (EPBC, WC Act)	Justification for Likelihood of Occurrence
Peregrine Falcon (<i>Falco peregrinus</i>) OS	Likely – regular visitor or resident to survey area The survey area provides suitable hunting habitat. The survey area is probably part of the species broader home range, limited breeding habitat occurs within the survey area. Important breeding habitat (e.g. steep cliffs) may be found in nearby ranges and coastal cliffs outside of the survey area but within the study area. There are five records within the study area.
Northern Short-tailed Mouse (<i>Leggadina lakedownensis</i>) P4	Likely –resident to survey area, restricted to the cracking clays and minor drainage lines The survey area provides suitable habitat for the species particularly in minor drainage line associated to cracking clays on plain habitats. The species has been recorded within the study area and the species likely present. There is three historical records within 2 km of the survey area.
Lined Soil-crevice Skink (<i>Notoscincus butleri</i>) P4	Likely – resident in/to the survey area The survey area provides suitable habitat for the species particularly in minor drainage line associated to cracking clays or stony soils on plain habitats. The species has been recorded within the study area and the species likely present. There is five historical records within the study area.
Bridled Tern (<i>Onychoprion anaethetus</i>) Mi, IA	Likely – regular visitor or resident to survey area Most records for this species are on or around the off shore islands, however the species has been recorded breeding on the mainland adjacent to the Maitland Industrial Estate survey area (AECOM 2003) (exact location unknown). A small amount of habitat is present for this

Species and status (EPBC, WC Act)	Justification for Likelihood of Occurrence
	species particularly within the intertidal mudflats and minor drainage lines. However use would be irregular and opportunistic.
Oriental Pratincole (<i>Glareola maldivarum</i>) Mi, IA	<p>Likely –seasonal visitor, opportunistic use in/to the survey area</p> <p>This species has been recorded in the survey area and within the vicinity of the survey area previously and habitat is present for the species. This species is known to utilise habitats in the Pilbara, including mudflats, plain and minor drainage lines.</p> <p>The species is known from the area with one record from the plain along the infrastructure corridor and another record within 2 km of the survey area.</p>
Oriental Plover (<i>Charadrius veredus</i>) Mi, IA	<p>Likely –seasonal visitor, opportunistic use in/to the survey area</p> <p>This species has been recorded in the vicinity of the survey area previously and habitat is present for the species. This species is known to utilise habitats in the Pilbara, including mudflat and plain.</p> <p>The species is known from the area with three records from within 2 km of the survey area.</p>

Table note:

Status (see Appendix B for full explanation)

EPBC Act – Species listed as one or more of the following: MiT = migratory terrestrial species, Vu = Vulnerable, En = Endangered

BC Act - Species listed as CR = critically endangered, En = endangered, Vu = Vulnerable, IA = international migratory agreement migratory birds, OS = other specially protected fauna

DBCA – Species listed as Priority (P) 1, 2, 3 or 4

4. Conclusion

Six species are likely to occur in the survey area and include Peregrine Falcon (*Falco peregrinus*), Northern Short-tailed Mouse (*Leggadina lakedownensis*), Lined Soil-crevice Skink (*Notoscincus butleri*), Bridled Tern (*Onychoprion anaethetus*), Oriental Pratincole (*Glareola maldivarum*), Oriental Plover (*Charadrius veredus*).

The Peregrine Falcon is known from the region and foraging habitat is present for the species however, the habitat available is not critical to the survival of the species (not breeding habitat) and generally restricted to foraging areas of the survey area. Foraging can occur anywhere in the survey area but is sporadic and opportunistic, the works will have little impact on the species.

The Northern Short-tailed Mouse, Lined Soil-crevice Skink have been recorded in the area previously and within 2 km of the survey area. Both species prefer habitats associated to minor drainage lines on plains of either cracking clays or stony soils. Both species are patchily distributed with the Northern Short-tailed Mouse typically a responsive boom/bust species during good and bad times. Where the Lined Soil-crevice Skink is reliant on more stable suitable habitats. The minor drainage lines in the survey area would be considered critical habitat. Due to the open, exposed nature of the cracking clays plain in this region, these drainage lines provide the only available vegetative corridors from the coast to the surrounding hills in the east. Numerous large bird species were recorded along these drainages line such as the Australian Bustard, White-bellied Sea-eagle and Whistling Kite. Large mammal like the Red Kangaroo were also utilising the corridors. Numerous smaller birds, reptiles and mammals were also recorded in these areas.

The Bridled Tern, Oriental Plover and Oriental Pratincole have previously been recorded within 2 km of the survey area and habitats are present in the survey area. These species may utilise minor drainage line and cracking clay environments, but only during the wet season when there is an availability of foraging material. There is more suitable habitat immediately outside of the survey area, including the saltworks in the north and larger drainage systems in the west. More optimal habitat including mudflats, mangroves and chenopod herblands all occur outside to the northeast of the survey area. The potential impacts to these species are therefore considered minimal.

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Appendices

GHD | Report for Woodside Power Pty Ltd - Hybrid Renewable Power Project, 6137808

Appendix A - (Figures)

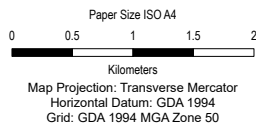
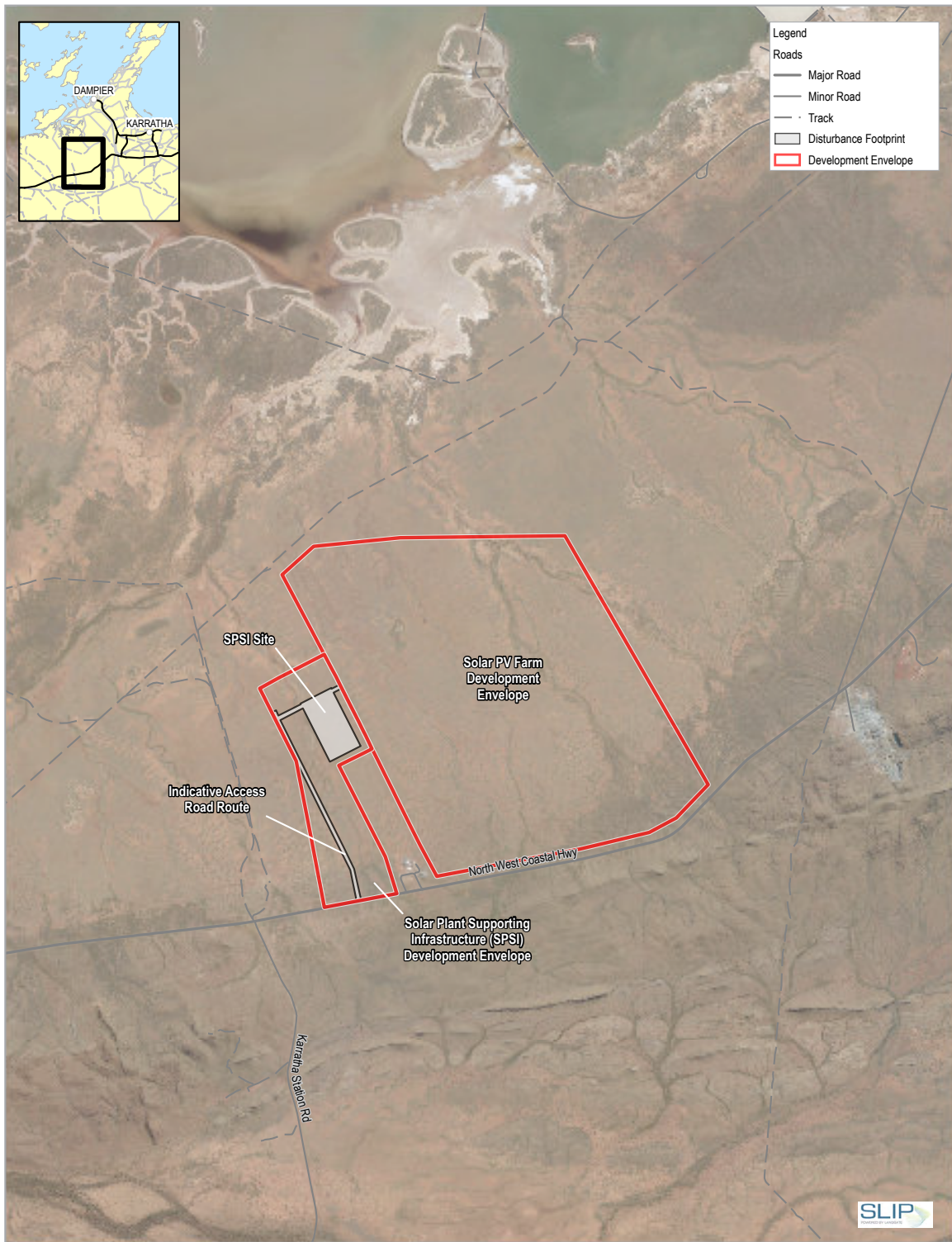
Figure 1 Survey Area Location

Figure 2 Biological Constraints

Figure 3 Survey Methods

Figure 4 Fauna Habitat Types

Figure 5 Fauna Results



Woodside Power Pty Ltd
Woodside s38 Referral, Solar Farm

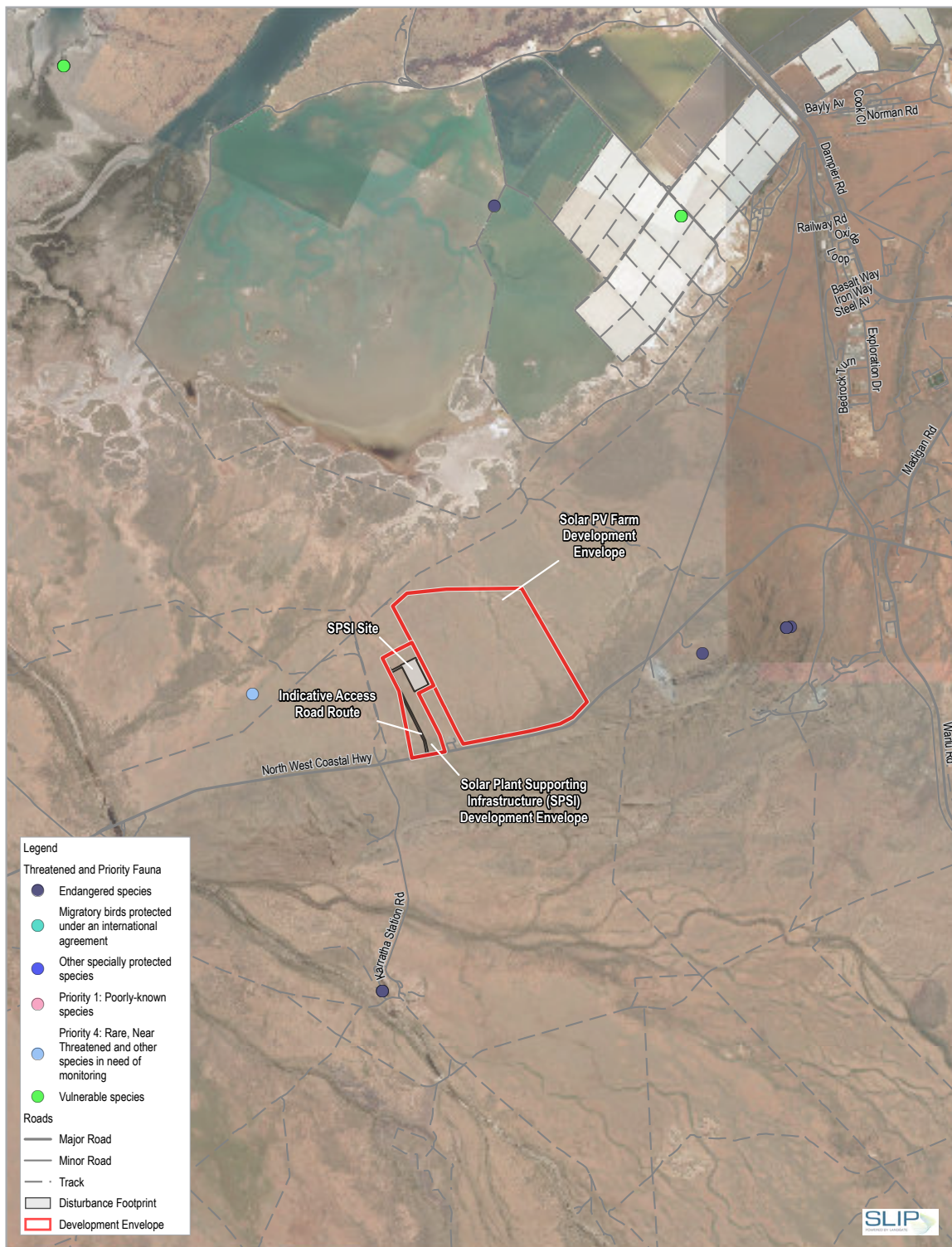
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Revision No. 1
Date 21 Oct 2021

Survey Area Location

FIGURE 1

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Data source: Woodside: Disturbance Footprint, Development Envelope - 20211019; Landgate: Roads - 20210302; Imagery - accessed: 20211021. Created by: mczelej



Legend

Threatened and Priority Fauna

- Endangered species
- Migratory birds protected under an international agreement
- Other specially protected species
- Priority 1: Poorly-known species
- Priority 4: Rare, Near Threatened and other species in need of monitoring
- Vulnerable species

Roads

- Major Road
- Minor Road
- - - Track
- ▭ Disturbance Footprint
- ▭ Development Envelope

Paper Size ISO A4

Kilometers

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Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



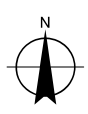
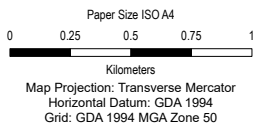
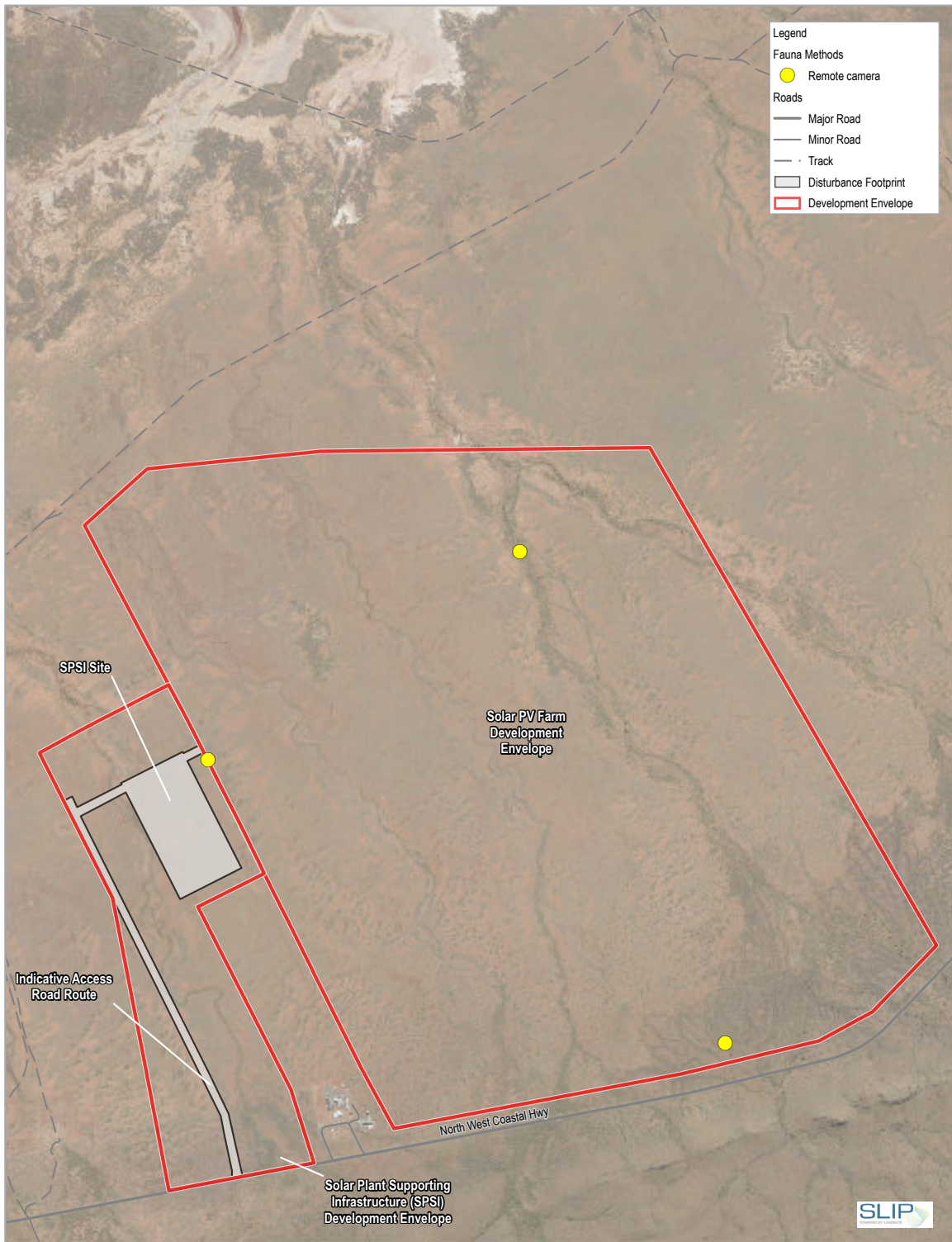
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Woodside s38 Referral, Solar Farm

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Biological Constraints

FIGURE 2

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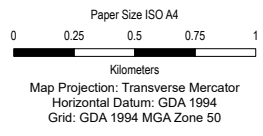
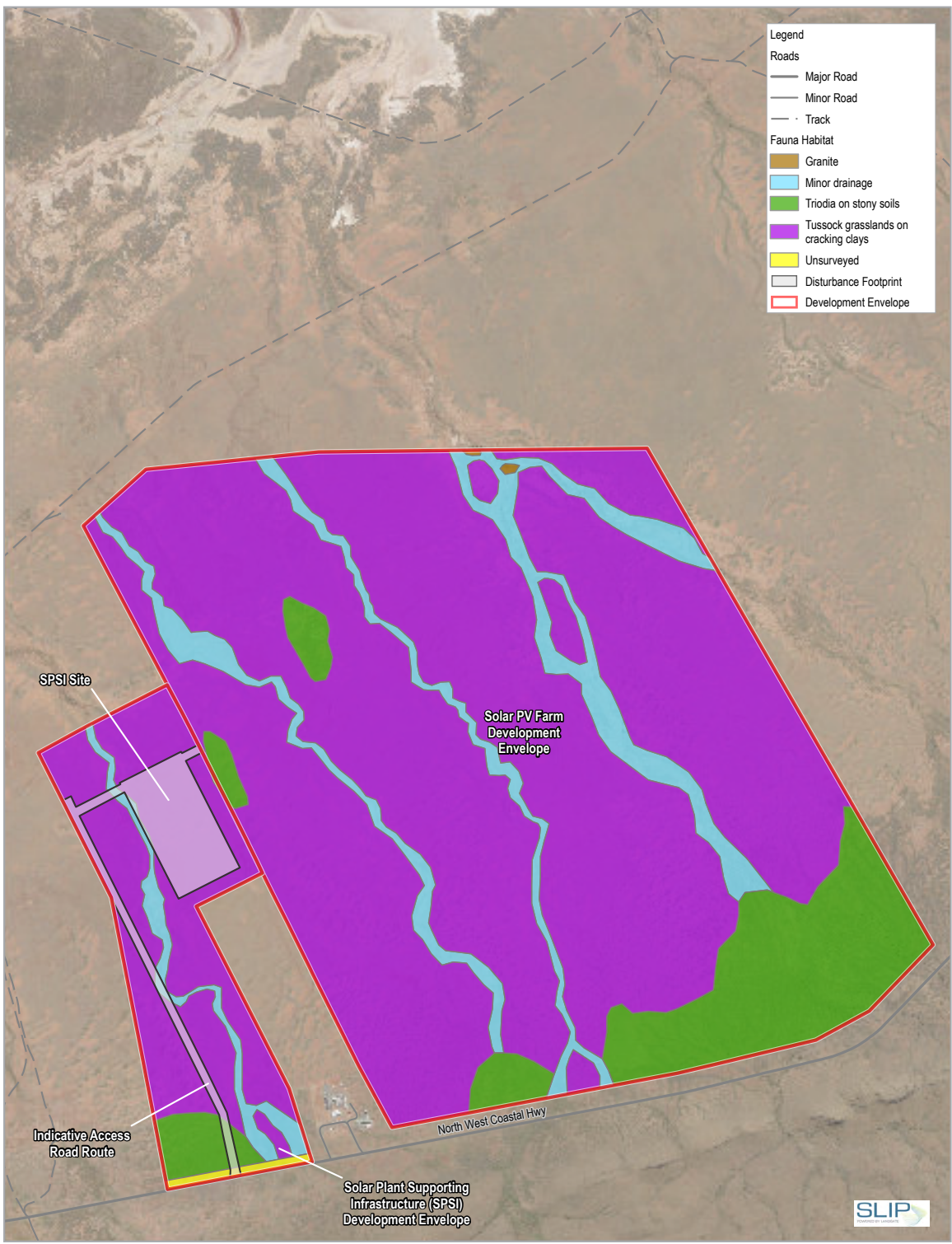
Woodside Power Pty Ltd
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Project No. 12554973
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Survey Methods

FIGURE 3

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Date 22 Oct 2021

Fauna Habitat Types

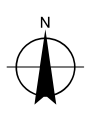
FIGURE 4

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 Kilometers
 Map Projection: Transverse Mercator
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 Grid: GDA 1994 MGA Zone 50



Woodside Power Pty Ltd
 Woodside s38 Referral, Solar Farm

Project No. 12554973
 Revision No. 1
 Date 22 Oct 2021

Fauna Results

FIGURE 5

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 Data source: Woodside: Disturbance Footprint, Development Envelope - 20211019, GHD: Fauna Results, Landgate: Roads - 20210302, Imagery - accessed: 20211022, Created by: mczelej

Appendix B - (Relevant legislation, conservation codes and background information)

Relevant legislation to Fauna

Federal *Environment Protection and Biodiversity Conservation Act 1999*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Federal Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as Matters of National Environmental Significance (MNES).

The biological aspects listed as MNES include:

- Nationally threatened flora and fauna species and ecological communities
- Migratory species

A person must not undertake an action that has, will have, or is likely to have a significant impact (direct or indirect) on MNES, without approval from the Federal Minister for the Environment.

The EPBC Act is administered by the Department of the Environment and Energy (DEE).

State *Environmental Protection Act 1986*

The *Environmental Protection Act 1986* (EP Act) is the primary legislative Act dealing with the protection of the environment in Western Australia. The Act allows the Environmental Protection Authority (EPA), to prevent, control and abate pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. Part IV of the EP Act is administered by the EPA and makes provisions for the EPA to undertake environmental impact assessment of significant proposals, strategic proposals and land use planning schemes.

The Department of Water and Environment Regulation (DWER) is responsible for administering the clearing provisions of the EP Act (Part V). Clearing of native vegetation in Western Australia requires a permit from the DWER, unless exemptions apply. Applications for clearing permits are assessed by the Department and decisions are made to grant or refuse the application in accordance with the Act. When making a decision the assessment considers clearing against the ten clearing principles as specified in Schedule 5 of the EP Act:

- a) Native vegetation should not be cleared if it comprises a high level of biodiversity.
- b) Native vegetation should not be cleared if it comprises the whole or a part of, or is necessary for the maintenance of a significance habitat for fauna indigenous to Western Australia.
- c) Native vegetation should not be cleared if it includes, or is necessary, for the continued existence of rare flora.
- d) Native vegetation should not be cleared if it comprises the whole or part of native vegetation in an area that has been extensively cleared.
- e) Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared.
- f) Native vegetation should not be cleared if it is growing in, or in association with, an environment associated with a watercourse or wetland.
- g) Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area.
- h) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation.

- i) Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water.
- j) Native vegetation should not be cleared if clearing the vegetation is likely to cause, or exacerbate, the incidence of flooding.

Exemptions for clearing include clearing that is a requirement of a written law or authorised under certain statutory processes (listed in Schedule 6 of the EP Act) and exemptions for prescribed low impact day-to-day activities (prescribed in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004); these exemptions do not apply in environmentally sensitive areas (ESAs).

State Biodiversity and Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) provides for the conservation and protection of biodiversity and biodiversity components, as well as the promotion of the ecologically sustainable use of biodiversity components in Western Australia. The BC Act replaces both the repealed *Wildlife Conservation Act 1950* (WC Act) and the *Sandalwood Act 1929* (Sandalwood Act), as well as their associated regulations. To attain the objectives of the BC Act, principles of ecological sustainable development have been established:

- Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations
- If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- The conservation of biodiversity and ecological integrity should be a fundamental consideration in decision-making
- Improved valuation, pricing and incentive mechanisms should be promoted.

The BC Act is administered by the Department of Biodiversity Conservation and Attractions (DBCA).

State Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (BAM Act) and associated regulations are administered by the Department of Primary Industries and Regional Development (DPIRD) and replace the repealed *Agriculture and Related Resources Protection Act 1976*. The main purposes of the BAM Act and its regulations are to:

- Prevent new animal and plant pests (vermin and weeds) and diseases from entering WA
- Manage the impact and spread of those pests already present in the state
- Safely manage the use of agricultural and veterinary chemicals
- Increased control over the sale of agricultural products that contain violative chemical residues.

The Western Australian Organism List (WAOL) provides the status of organisms which have been categorised under the BAM Act. A Declared Pest is a prohibited organism or an organism for which a declaration under Section 22(2) of the Act is in force. Declared Pests may be assigned a control category including: C1 (exclusion), C2 (eradication) and C3 (management). The category may apply to the whole of the State, LGAs, districts, individual properties or even paddocks, and all landholders are obliged to comply with the specific category of control. Categories of control are defined below.

DPIRD Categories for Declared Pests under the BAM Act

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

Fauna Conservation codes

Conservation significant fauna

The Federal conservation level of fauna species and their significance status is assessed under the EPBC Act. The significance levels for fauna used in the EPBC Act align with the International Union for Conservation of Nature (IUCN) Red List criteria, which are internationally recognised as providing best practice for assigning the conservation status of species. The EPBC Act also protects land and migratory species that are listed under International Agreements. The list of migratory species established under section 209 of the EPBC Act comprises:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals Appendices I and II)
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China–Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under, or an instrument made under, an international agreement approved by the Minister, such as the republic of Korea–Australia Migratory Bird Agreement (ROKAMBA)

The State conservation level of fauna species and their significance status also follows the IUCN Red List criteria. Under the BC Act fauna can be listed as Threatened, Extinct and as Specially Protected species.

Threatened species are those are species which have been adequately searched for and are deemed to be, in the wild, either rare, under identifiable threat of extinction, or otherwise in need of special protection, and have been gazetted as such. The assessment of the conservation status of Threatened species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria. Specially protected species meet 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 or Extinct species under the BC Act cannot also be listed as Specially Protected species.

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna List 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 flora or fauna.

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.

For the purposes of this assessment, all species listed under the EPBC Act, BC Act and DBCA Priority species are considered conservation significant.

Conservation categories and definitions for EPBC Act and BC Act listed fauna species

Conservation category	Definition
Threatened species	
Critically Endangered (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.
Endangered (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
Vulnerable (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.
Extinct species	
Extinct (EX)	Species where “there is no reasonable doubt that the last member of the species has died”, and listing is otherwise in accordance with the ministerial guidelines (section 24 of the BC Act).
Extinct in the Wild (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).
Specially protected species	

Conservation category	Definition
Migratory (MI)	<p>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).</p> <p>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</p>
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.
Other specially protected fauna (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).

Conservation codes for DBCA listed Priority fauna

Priority category	Definition
Priority 1	<p>Poorly-known taxa</p> <p>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.</p>
Priority 2	<p>Poorly-known taxa</p> <p>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.</p>
Priority 3	<p>Poorly-known taxa</p> <p>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.</p>

Priority category	Definition
Priority 4	<p>Rare, Near Threatened and other taxa in need of monitoring</p> <p>A. Rare: Taxa 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 taxa are usually represented on conservation lands.</p> <p>B. Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.</p> <p>C. Taxa that have been removed from the list of threatened taxa during the past five years for reasons other than taxonomy.</p>

Other significant fauna

Fauna species may be significant for a range of reasons other than those protected by international agreement or treaty, Specially Protected or Priority Fauna. Significant fauna may include short-range endemic species, species that have declining populations or declining distributions, species at the extremes of their range, or isolated outlying populations, or species which may be undescribed (EPA 2010).

References

ANZECC 2000, *Core Environmental Indicators for Reporting on the State of Environment*, ANZECC State of the Environment Reporting Task Force.

Commonwealth of Australia 2001, *National Targets and Objectives for Biodiversity Conservation 2001–2005*, Canberra, AGPS.

EPA 2010, *Technical Guide – Terrestrial Fauna Surveys*, EPA, Perth, WA.

Appendix C - (Species Recorded)

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Species recorded from the survey area

Family	Genus	Species	Common Name	Status	Observed 10-13 June	Observed 22-24 July
Birds						
Acanthizidae	<i>Smicromis</i>	<i>brevirostris</i>	Weebill		8	
Acanthizidae	<i>Gerygone</i>	<i>tenebrosa</i>	Dusky Gerygone		2	
Accipitridae	<i>Aquila</i>	<i>audax</i>	Wedge-tailed Eagle		2	1
Accipitridae	<i>Circus</i>	<i>assimilis</i>	Spotted Harrier		1	1
Accipitridae	<i>Elanus</i>	<i>axillaris</i>	Black-shouldered Kite		2	1
Accipitridae	<i>Haliaeetus</i>	<i>leucogaster</i>	White-bellied Sea Eagle		4	1
Accipitridae	<i>Haliaeetus</i>	<i>indus</i>	Brahminy Kite		1	1
Accipitridae	<i>Haliaeetus</i>	<i>sphenurus</i>	Whistling Kite		3	2
Accipitridae	<i>Milvus</i>	<i>migrans</i>	Black Kite		23	5
Aegothelidae	<i>Aegotheles</i>	<i>cristatus</i>	Australian Owllet-nightjar		1	
Alaudidae	<i>Mirafra</i>	<i>javanica</i>	Horsefield's Bushlark			2
Ardeidae	<i>Egretta</i>	<i>novaeahollandiae</i>	White-faced Heron		1	
Artamidae	<i>Artamus</i>	<i>cinereus</i>	Black-faced Woodswallow		8	2
Artamidae	<i>Artamus</i>	<i>leucorhynchus</i>	White-breasted Woodswallow		2	
Artamidae	<i>Artamus</i>	<i>minor</i>	Little Woodswallow		2	
Artamidae	<i>Cracticus</i>	<i>nigrogularis</i>	Pied Butcherbird		2	3
Cacatuidae	<i>Cacatua</i>	<i>sanguinea</i>	Little Corella		24	12
Cacatuidae	<i>Eolophus</i>	<i>roseicapilla</i>	Galah		60	26
Cacatuidae	<i>Nymphicus</i>	<i>hollandicus</i>	Cockatiel		8	6
Campephagidae	<i>Coracina</i>	<i>novaeahollandiae</i>	Black-faced Cuckoo-Shrike		3	1
Campephagidae	<i>Lalage</i>	<i>sueurii</i>	White-winged Triller		4	
Columbidae	<i>Phaps</i>	<i>chalcoptera</i>	Common Bronzewing			1
Columbidae	<i>Geophaps</i>	<i>plumifera</i>	Spinifex Pigeon		12	7
Columbidae	<i>Geopelia</i>	<i>cuneata</i>	Diamond Dove		4	
Columbidae	<i>Geopelia</i>	<i>striata</i>	Peaceful Dove		2	
Columbidae	<i>Ocyphaps</i>	<i>lophotes</i>	Crested Pigeon		4	6
Corvidae	<i>Corvus</i>	<i>orru</i>	Torresian Crow		4	6
Cuculidae	<i>Chalcites</i>	<i>basilis</i>	Horsefield's Bronze-cuckoo			1
Cuculidae	<i>Cacomantis</i>	<i>pallidus</i>	Pallid Cuckoo		1	
Estrilidae	<i>Emblema</i>	<i>pictum</i>	Painted Finch		4	
Estrilidae	<i>Taeniopygia</i>	<i>guttata</i>	Zebra Finch		52	18

Family	Genus	Species	Common Name	Status	Observed	Observed
Falconidae	<i>Falco</i>	<i>cecnchroides</i>	Nankeen Kestrel		2	5
Falconidae	<i>Falco</i>	<i>berigora</i>	Brown Falcon		2	3
Falconidae	<i>Falco</i>	<i>longipennis</i>	Hobby Falcon		1	
Halcyonidae	<i>Todiramphus</i>	<i>pyrrhopygius</i>	Red-backed Kingfisher		6	1
Hirundinidae	<i>Hirundo</i>	<i>neoxena</i>	Welcome Swallow		5	
Hirundinidae	<i>Petrochelidon</i>	<i>nigricans</i>	Tree Martin		3	6
Maluridae	<i>Malurus</i>	<i>lamberti</i>	Variagated Fairy-wren			4
Maluridae	<i>Malurus</i>	<i>leucopterus</i>	White-winged Fairy-wren			6
Megaluridae	<i>Cincloramphus</i>	<i>cruralis</i>	Brown Songlark		5	1
Megaluridae	<i>Cincloramphus</i>	<i>mathewsi</i>	Rufous Songlark		13	5
Megaluridae	<i>Eremiornis</i>	<i>carteri</i>	Spinifexbird			2
Meliphagidae	<i>Epthianura</i>	<i>tricolor</i>	Crimson Chat		8	6
Meliphagidae	<i>Lichenostomus</i>	<i>penicillatus</i>	White-plumed Honeyeater		14	2
Meliphagidae	<i>Lichenostomus</i>	<i>virescens</i>	Singing Honeyeater		5	4
Meliphagidae	<i>Lichmera</i>	<i>indistincta</i>	Brown Honeyeater		1	
Meliphagidae	<i>Manorina</i>	<i>flavigula</i>	Yellow-throated Miner		16	4
Meropidae	<i>Merops</i>	<i>ornatus</i>	Rainbow Bee-eater		4	4
Monarchidae	<i>Grallina</i>	<i>cyanoleuca</i>	Magpie-lark		4	1
Motacillidae	<i>Anthus</i>	<i>novaezeelandiae</i>	Australasian Pipit		3	2
Motacillidae	<i>Ardeotis</i>	<i>australis</i>	Australian Bustard			prints
Pachycephalidae	<i>Colluricincla</i>	<i>harmonica</i>	Grey Shrike-thrush		1	
Psittacidae	<i>Barnardius</i>	<i>zonarius</i>	Port Lincoln Parrot		2	
Psittacidae	<i>Melopsittacus</i>	<i>undulatus</i>	Budgerigar		18	24
Ptilonorhynchidae	<i>Ptilonorhynchus</i>	<i>guttatus</i>	Western Bowerbird		1	
Rhipiduridae	<i>Rhipidura</i>	<i>leucophrys</i>	Willie Wagtail		4	6
Threskiornithidae	<i>Threskiornis</i>	<i>spinicollis</i>	Straw-necked Ibis		6	
Tunicidae	<i>Turnix</i>	<i>velox</i>	Little Button-quail		2	
Zosteropidae	<i>Zosterops</i>	<i>luteus</i>	Yellow White-eye		6	
Reptiles						
Agamidae	<i>Gowidon</i>	<i>longirostris</i>	Long-snouted Water Dragon		1	
Agamidae	<i>Ctenophorus</i>	<i>caudicinctus</i>	Ringtail Dragon		4	
Agamidae	<i>Ctenophorus</i>	<i>isolepis isolepis</i>	Central Military Dragon		6	
Gekkonidae	<i>Gehyra</i>	<i>punctata</i>	Spotted Dtella		3	
Gekkonidae	<i>Gehyra</i>	<i>variegata or crypta</i>	Dtella		1	3

Family	Genus	Species	Common Name	Status	Observed	Observed
Gekkonidae	<i>Gehyra</i>	<i>variegata</i>	Tree Dtella		1	
Gekkonidae	<i>Heteronotia</i>	<i>binoei</i>	Bynoë's Gecko	2	5	
Scincidae	<i>Ctenotus</i>	<i>pantherinus ocellifer</i>	Panther's Skink	3	1	
Scincidae	<i>Ctenotus</i>	<i>saxatilis</i>	Rock Ctenotus	7	1	
Scincidae	<i>Lerista</i>	<i>clara</i>	Sharp-blazed Three-toed Skink	3		
Scincidae	<i>Lerista</i>	<i>onsloviana</i>	Onslow Broad-striped Slider	4		
Scincidae	<i>Menetia</i>	<i>surda surda</i>	Surd's Dwarf Skink	1		
Varanidae	<i>Varanus</i>	<i>panoptes rubidus</i>	Yellow spotted Monitor	1	1	
Mammals						
Bovidae	<i>Bos</i>	<i>taurus</i>	Cow	intro		scats
Canidae	<i>Canus</i>	<i>lupis domesticus</i>	Dog	intro	1	scats
Dasyuridae	<i>Pseudantechinus</i>	<i>woolleyae</i>	Woolley's False antechinus		camera	
Felidae	<i>Felis</i>	<i>catus</i>	Cat	intro	camera, 1	prints
Macropodidae	<i>Macropus</i>	<i>robustus</i>	Euro		14	2
Macropodidae	<i>Macropus</i>	<i>rufus</i>	Red Kangaroo		camera	12
Macropodidae	<i>Petrogale</i>	<i>rothchildi</i>	Rothchilds Rock Wallaby			
Molossidae	<i>Austronomus</i>	<i>australis</i>	White-striped freetail Bat	D		X
Molossidae	<i>Chaerephon</i>	<i>jobensis</i>	Northern Free-tail Bat	PR	PR	
Molossidae	<i>Mormopetrus</i>	<i>Ozimops lumsdenae</i>	Northern Free-tail Bat	PR	PR	
Muridae	<i>Rattus</i>	<i>rattus</i>	Black Rat	intro	camera	
Tachyglossidae	<i>Tachyglossus</i>	<i>aculeatus</i>	Echidna	X		digs

Key

3, numbers recorded

intro, introduced species

camera, identified via remote camera

X, Present, identified from echolocation

Pr, Probable, probably present identified from echolocation either as this species or to species group

Mi, Migratory under EPBC Act

IA, International Agreement under BC Act

P1, 4, Priority species under DECA

Appendix D - (Likelihood of Occurrence)

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Parameters of fauna likelihood of occurrence assessment

Assessment outcome	Description
Present	Species recorded during the field survey or from recent, reliable records from within or close proximity to the survey area.
Likely	Species are likely to occur in the survey area where there is suitable habitat within the survey area and there are recent records of occurrence of the species in close proximity to the survey area. OR Species known distribution overlaps with the survey area and there is suitable habitat within the survey area.
Unlikely	Species assessed as unlikely include those species previously recorded within 5 km of the survey area however: <ul style="list-style-type: none"> • There is limited (i.e. the type, quality and quantity of the habitat is generally poor or restricted) habitat in the survey area. • The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area. OR Those species that have a known distribution overlapping with the survey area however: <ul style="list-style-type: none"> • There is limited habitat in the survey area (i.e. the type, quality and quantity of the habitat is generally poor or restricted). • The suitable habitat within the survey area is isolated from other areas of suitable habitat and the species has no capacity to migrate into the survey area.
Highly unlikely	Species that are considered highly unlikely to occur in the survey area include: <ul style="list-style-type: none"> • Those species that have no suitable habitat within the survey area. • Those species that have become locally extinct, or are not known to have ever been present in the region of the survey area.

Definitions: Survey area = a 20 km buffer around the survey area

Source information - desktop searches

PMST – DoEE Protected Matters Search Tool (PMST) to identify fauna listed under the EPBC Act potentially occurring within the survey area

DBCA – DBCA (2007 -) records of threatened fauna, database search within the survey area (accessed March 2019)

NM – DBCA NatureMap (accessed March 2019)

Table 8 Fauna likelihood of occurrence assessment

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA			
Birds								
Common Sandpiper (<i>Actitis hypoleucos</i>)	IA	Mi	X	X	X	<p>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. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream, around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags (Geering et al. 2007; Higgins & Davies 1996). 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. Birds sometimes venture into grassy areas adjoining wetlands (Higgins & Davies 1996).</p>	<p>This species has been recorded within 20 km of the survey area</p>	<p>Unlikely – No estuarine areas or water-bodies are present in the survey area.</p>
Ruddy Turnstone (<i>Arenaria interpres</i>)	IA	Mi	X		X	<p>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 bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats. In north Australia it is known to occur in a wide variety of habitats, and may prefer wide mudflats. Surveys demonstrate that the species can live away from coastal areas in habitats such as river beds, and on inland lakes and adjacent farmland (Higgins & Davies 1996).</p>	<p>This species has been recorded within 20 km of the survey area</p>	<p>Highly unlikely – No suitable habitat exists in the survey area.</p>

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	Cr	NM	PMST	DBCA			
Curlew Sandpiper (<i>Calidris ferruginea</i>)	Cr	Cr		X	X	X	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. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (Higgins & Davies 1996). Curlew Sandpipers forage on mudflats and nearby shallow water. In non-tidal wetlands, they usually wade, mostly in water 15–30 mm, but up to 60 mm, deep. (Higgins & Davies 1996).	This species has been recorded within 20 km of the survey area	Highly unlikely – No suitable habitat exists in the survey area.
Red Knot (<i>Caladris canutus</i>)	IA	EN		X	X	X	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. They rarely use inland lakes or swamps (Higgins & Davies 1996).	This species has been recorded within 20 km of the survey area	Highly unlikely – No suitable habitat exists in the survey area.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	CR Act	NM	EPBC PMST	DBCA			
Greater Knot (<i>Calidris tenuirostris</i>)	Cr	CR		X	X	X	In Australasia, the species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats. This includes inlets, bays, harbours, estuaries and lagoons. They are occasionally found on exposed reefs or rock platforms, shorelines with mangrove vegetation, ponds in saltworks, at swamps near the coast, saltlakes and non-tidal lagoons. The Great Knot rarely occurs on inland lakes and swamps (Higgins & Davies 1996). Typically, the Great Knot roosts in large groups in open areas, often at the waters edge or in shallow water close to feeding grounds (Higgins & Davies 1996; Rogers 2001). It is known that in hot conditions, waders prefer to roost where a damp substrate lowers the local temperature (Rogers 1999b). A group of approximately 8610 birds have been recorded roosting at an inland claypan near Roebuck Bay in north-west Western Australia (Collins et al. 2001).	This species has been recorded within 20 km of the survey area	Highly unlikely – No suitable habitat exists in the survey area
Greater Sand Plover (<i>Charadrius leschenaultii</i>)	Vu	VU		X	X	X	In the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs. They are occasionally recorded on near-coastal saltworks and saltlakes, including marginal saltmarsh, and on brackish swamps (Stewart et al. 2007).	This species has been recorded within 20 km of the survey area	Highly unlikely – no suitable habitat for the species in the survey area

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	EN	EPBC Act	NM	PMST			
Lesser Sand Plover <i>(Charadrius mongolus)</i>	En	EN	X	X	X	X	In non-breeding grounds in Australia, this species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sandflats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wave-cut rock platforms and rocky outcrops. In north-western Australia, the species appears to use the Port Hedland saltworks in preference to nearby beaches. The species is seldom recorded away from the coast, at margins of lakes, soaks and swamps associated with artesian bores (Marchant & Higgins 1993).	This species has been recorded within 20 km of the survey area	Highly unlikely – no suitable habitat for the species in the survey area
Bar-tailed Godwit <i>(Limosa lapponica baueri)</i> Western Alaskan Population	Vu	VU	X	X	X	X	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. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas (Marchant & Higgins 1993).	This species has been recorded within 20 km of the survey area	Highly unlikely – no suitable habitat for the species in the survey area
Bar-tailed Godwit <i>(Limosa lapponica menzibieri)</i> Northern Siberian Population	Cr	CR	X	X	X	X	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. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas (Marchant & Higgins 1993).	This species has been recorded within 20 km of the survey area	Highly unlikely – no suitable habitat for the species in the survey area

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	MI	NM	EPBC PMST	DBCA			
Black-tailed Godwit (<i>Limosa limosa</i>)	IA	MI	X	X	X	X	In Australia the Black-tailed Godwit has a primarily coastal habitat environment. The species is commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit; occasionally recorded on rocky coasts or coral islets. The use of habitat often depends on the stage of the tide. It is also found in shallow and sparsely vegetated, near-coastal, wetlands, such as saltmarsh, saltflats, river pools, swamps, lagoons and floodplains. There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. They also use lagoons in sewage farms and saltworks (Higgins & Davies 1996).	This species has been recorded within 20 km of the survey area	Highly unlikely – no suitable habitat for the species in the survey area
Eastern Curlew (<i>Numenius madagascariensis</i>)	Vu	CR	X	X	X	X	The Eastern Curlew is a large non-breeding migratory shorebird, found commonly along the north coast of Western Australia, but rarely south of Shark Bay. The species is found along the coastline from Barrow Island and Dampier Archipelago, through the Kimberley in WA to the NT. It is found in estuaries, bays, harbours, inlets and coastal lagoons, saltworks and sewerage farms, areas (e.g. intertidal mudflats or sandflats fringed by mangroves) often with beds of seagrass and occasionally on ocean beaches, coral reefs, rock platforms and rocky islets. The Eastern Curlew forages on soft, sheltered, intertidal sand- or mudflats, often near mangroves, on saltflats, saltmarshes, rock pools, coastal reefs and ocean beaches near the tideline. The species roosts in large flocks, separate from other waders on sandy spits and islets, dry beach sand near the high-water mark, among coastal vegetation (including low saltmarsh and mangroves) and occasionally reef-flats, in the shallow water of lagoons, near-coastal wetlands and trees (Morcombe 2004).	This species has been recorded within 20 km of the survey area	Highly unlikely – no suitable habitat for the species in the survey area

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA			
Little Curlew <i>(Numenius minutus)</i>	IA	Mi	X		X	When resting during the heat of day, the Little Curlew congregates around pools, river beds and water-filled tidal channels, and shallow water at edges of billabongs. The species prefers pools with bare dry mud (including mudbanks in shallow water) and they do not use pools if they are totally dry, flooded or heavily vegetated (Higgins & Davies 1996). Birds may also rest in grassy, open woodlands and on bare blacksoil plains, or on dry or recently burnt grasslands on floodplains, which may be without vegetation for hundreds of metres, and occasionally on mudflats when nearby grasslands are unburnt, or around swamps. Resting has also been recorded under partly submerged vegetation. After freshwater pools dry up, roosting may occur in the shallows of reservoirs and the sea (Higgins & Davies 1996).	This species has been recorded within 20 km of the survey area,	Unlikely – opportunistic visitor/no suitable habitat for the species in the survey area
Whimbrel <i>(Numenius phaeopus)</i>	IA	Mi	X	X	X	The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, un-vegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms. It has been infrequently recorded using saline or brackish lakes near coastal areas. It also used saltflats with saltmarsh, or saline grasslands with standing water left after high spring-tides, and in similar habitats in sewage farms and saltfields (Higgins & Davies 1996). There are a small number of inland records from saline lakes and canegrass swamps (Jarman 1978). It has also been recorded in coastal dunes and on a football field (Smith & Chafer 1987).	This species has been recorded within 20 km of the survey area	Unlikely – however use is opportunistic, limited and irregular with limited habitat present.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	Mi	EPBC Act	NM	PMST			
Osprey (<i>Pandion haliaetus</i>)	IA	Mi		X	X	X	Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging (Marchant & Higgins 1993). They frequent a variety of wetland habitats including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs and large lakes and waterholes. They exhibit a preference for coastal cliffs and elevated islands in some parts of their range, but may also occur on low sandy, muddy or rocky shores and over coral cays. Often nests in elevated artificial structures.	This species has been recorded within 20 km of the survey area.	Highly unlikely – No suitable habitat in the survey area
Red-necked Phalarope (<i>Phalaropus lobatus</i>)	IA	Mi			X		During the non-breeding period the Red-necked Phalarope occurs mainly at sea. It is commonly sighted in Australia from mid-October to early-April, where it is recorded at both inland and coastal lakes/swamps, including highly saline waters and artificial wetlands notably saltworks. In WA the species has been seen on Rothwest Island, Pelican Point, the Swan River, Port Hedland Saltworks, the Eyre Bird Observatory and Hinds Lake Nature Reserve (DotE 2016).	The species has not been recorded within 20 km of the survey area.	Highly unlikely – No suitable habitat present in the survey area

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	PMST	DBCA			
Sanderling (<i>Calidris alba</i>)	IA	Mi	X		X	In Australia, the Sanderling is almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell, and also on exposed sandbars and spits, and shingle banks, where they forage in the wave-wash zone and amongst rotting seaweed. Sanderlings also occur on beaches that may contain wave-washed rocky outcrops. Less often the species occurs on more sheltered sandy shorelines of estuaries, inlets and harbours. Rarely, they are recorded in near-coastal wetlands. There are rare inland records from sandy shores of ephemeral brackish lakes and brackish river-pools. They occur on most of the coast from Eyre to Derby, and also around Wyndham. They are more often recorded on the south and southwest coasts, north to around southern Shark Bay, with more sparsely scattered records further north in Gascoyne and Pilbara Regions and the Kimberley Division (DotE 2016).	This species has been recorded within 20 km of the survey area	Highly unlikely – no suitable habitat for the species in the survey area
Red-necked Stint (<i>Calidris ruficollis</i>)	IA	Mi	X		X	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. They also occur in saltworks and sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in salflats. They sometimes use flooded paddocks or damp grasslands. They have occasionally been recorded on dry gibber plains, with little or no perennial vegetation (Higgins & Davies 1996).	This species has been recorded within 20 km of the survey area	Highly unlikely – opportunistic visitor/no suitable habitat for the species in the survey area

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	Mi	EPBC Act	NM	PMST			
Long-toed Stint (<i>Calidris subminuta</i>)	IA	Mi		X			In Australia, the Long-toed Stint occurs in a variety of terrestrial wetlands. They prefer shallow freshwater or brackish wetlands including lakes, swamps, river floodplains, streams, lagoons and sewage ponds. The species is also found in areas of muddy shoreline, growths of short grass, weeds, sedges, low or floating aquatic vegetation, reeds, rushes and occasionally stunted samphire. It has also been observed at open, less vegetated shores of larger lakes and ponds and is common on muddy fringes of drying ephemeral lakes and swamps. The Long-toed Stint also frequents permanent wetlands such as reservoirs and artificial lakes. They are uncommon, but not unknown, at tidal estuaries, saline lakes, saltponds and bore swamps (Higgins & Davies 1996). The Long-toed Stint forages on wet mud or in shallow water, often among short grass, weeds and other vegetation on islets or around the edges of wetlands. They occasionally feed on open water, well away from the shore; this is more common in drying ephemeral wetlands. They roost or loaf in sparse vegetation at the edges of wetlands and on damp mud near shallow water. It also roosts in small depressions in the mud (Higgins & Davies 1996).	This species has been recorded within 20 km of the survey area	Highly unlikely – no suitable habitat for the species in the survey area
Pin-tailed Snipe (<i>Gallinago stenura</i>)	IA	Mi		X			During non-breeding periods the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands. In WA the species was reported in the Pilbara, Port Headland, Myaree Pool, Maitland River and near Karratha. In Pilbara the distribution is believed to be bound by Pardoo (Banningarra Spring) and the lower Maitland River and Shay Gap (DotE 2016).	Recorded historically in study area	Unlikely – No suitable habitat in survey area

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	En Act	NM	EPBC PMST	DBCA			
Night Parrot <i>(Pezoporus occidentalis)</i>	Cr	En			X		The Night Parrot inhabits arid and semi-arid inland areas that are characterised by having dense, low vegetation. Based on accepted records, the habitat of the Night Parrot consists of <i>Triodia</i> grasslands in stony or sandy environments and of samphire and chenopod shrublands, including genera such as <i>Atriplex</i> , <i>Bassia</i> and <i>Maireana</i> , on floodplains and claypans, and on the margins of saltlakes, creeks or other sources of water (Parker, 1980). It has also been observed to enter dense <i>Muehlenbecki</i> growth when flushed from a more typical habitat (Boles et al. 1994).	Identified as potentially occurring species (PMST) based on historical (limited) records in Pilbara region.	Unlikely – Some suitable habitat exists in the survey area (Triodia on stony soils), but the area is outside of the modelled distribution for the species.
Australian Painted Snipe <i>(Rostratula australis)</i>	En	En			X		The Australian Painted Snipe is rarely seen as it is extremely secretive, keeping to dense vegetation of swamps, emerging only in subdued light of dawn and dusk. The preferred habitat of this species includes surrounds and shallows of wetlands that are well vegetated with dense low cover (Morcombe 2004).	Identified as potentially occurring species (PMST) in the study area but no records exist.	Highly Unlikely - Unlikely – Habitat is not suitable in the survey area
Gull-billed Tern <i>(Gelocheilidon nilotica)</i>	IA	Mi		X		X	The Gull-billed Tern is a nomadic or migratory species in Australia. Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands, where resources are favourable (Morcombe 2004). They are only rarely found over the ocean. The Gull-billed Tern. Although essentially an inland species, outside breeding season it shows a distinct preference for saltmarshes and lagoons near the coast. Movements are not fully understood but it is common and widespread in Australia (Morcombe 2004).	Identified as potentially occurring species (PMST) in the study area	Highly Unlikely – no suitable habitat in the survey area.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	DBCA	NM	EPBC PMST	DBCA			
White-winged Black Tern (<i>Chlidonias leucopterus</i>)	IA			X		X	In Australia, the White-Winged Tern mostly inhabits fresh, brackish or saline, and coastal or subcoastal wetlands. They frequent tidal wetlands, such as harbours, bays, estuaries and lagoons, and their associated tidal sandflats and mudflats. Terrestrial wetlands, including swamps, lakes, billabongs, rivers, floodplains, reservoirs, saltworks, sewage ponds and outfalls are also inhabited. Wetlands may be open, or with floating emergent or marginal vegetation. Most breeding is on vegetated, freshwater inland wetlands. The species is widespread on the southern west coast, north to Mongers Lake, and also on coasts of the Pilbara region and Kimberley Division, with occasional records farther inland, mainly along major river systems, such as the Ord. The species only rarely occurs in the Gascoyne Region of the central-western coast, and is occasionally recorded along the southern coast (DotE 2016).	Identified as potentially occurring species (PMST) in the study area	Highly unlikely – No suitable habitat in the survey area
Bridled Tern (<i>Onychoprion anaethetus</i>)	IA	Ma		X	X	X	Bridled Terns occupy tropical and subtropical seas, breeding on islands, including vegetated coral cays, rocky continental islands and rock stacks. They are only rarely found in inshore continental waters and along mainland coastlines, though the species is reported to breed on the mainland of far southern WA. In WA, breeding is widespread from islands off Cape Leeuwin north to Shark Bay and in Pilbara region and Kimberley Division. At sea, distribution extends from Cape Leeuwin north to Dirk Hartog Island, with isolated mainland coastal records at Point Maud and Ningaloo, and from Barrow Island to the Dampier Archipelago, and at sea off the Kimberley coast from waters west of the Dampier Peninsula to Ashmore Reef and Joseph Bonaparte Gulf (DotE 2016).	This species has been recorded within 1 km of the survey area in the saltworks and breeding recorded within the Maitland Industrial Estate, however limited habitat is present for the species in the survey area.	Likely –however use is opportunistic, limited and irregular.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	Ma Act	NM	EPBC PMST	DBCA			
Roseate Tern (<i>Sterna dougalli</i>)	IA	Ma		X	X	X	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. In WA, the subspecies is regularly recorded north from Mandurah to around Eighty Mile Beach. Around the Kimberley coastline, the subspecies occurs at scattered sites, north to the Bonaparte Archipelago and possibly further. The subspecies used to be a sporadic visitor to the southwest, but occurs regularly at present. In addition, breeding colonies have been established on Lancelin Island and Second Rock (DotE 2016).	This species has been recorded within 1 km of the survey area in the saltworks.	Unlikely –Habitat is not suitable in the survey area
Common Tern (<i>Sterna hirundo</i>)	IA	Mi		X		X	Common Terns are marine, pelagic and coastal. In Australia, they are recorded in all marine zones, but are commonly observed in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores. Occasionally they are recorded in coastal and near-coastal wetlands, either saline or freshwater, including lagoons, rivers, lakes, swamps and saltworks. Sometimes they occur in mangroves or saltmarsh and, in bad weather, in coastal sand-dunes or coastal embayments. In WA, the species is rarely recorded south of approximately 30° S, with only scattered records north of there to the Kimberley Division (DotE 2016).	This species has been recorded within 1 km of the survey area in the saltworks.	Unlikely –habitat in the survey area is not suitable.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	Mi	EPBC Act	NM	PMST	DBCA			
Little Tern (<i>Sterna albigrons</i>)	IA	Mi	X				X	In Australia, Little Terns inhabit sheltered coastal environments, including lagoons, estuaries, river mouths and deltas, lakes, bays, harbours and inlets, especially those with exposed sandbanks or sand-spits, and also on exposed ocean beaches. One of its breeding populations is found across northern Australia, from about Broome to the Gulf of Carpentaria and eastern Cape York Peninsula. Non-breeding birds extend farther around the Australian coast than known breeding colonies. In WA the species regularly occurs south to approximately 20° S, with occasional records south of there (e.g. Shark Bay) (DoIE 2016).	This species has been recorded within 2 km of the survey area in the saltworks.	Unlikely –Habitat is not suitable in the survey area
Caspian Tern (<i>Sterna caspia</i>)	IA	Mi	X		X		X	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, waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks. In offshore areas the species prefers sheltered situations, particularly near islands, and is rarely seen beyond reefs (Higgins & Davis 1996). The Caspian Tern usually forages in open wetlands, including lakes and rivers. They often prefer sheltered shallow water near the margins, but can also be found in open coastal waters. In coastal inlets they may prefer to forage in tidal channels, or over submerged mudbanks (Higgins & Davis 1996).	This species has been recorded within 1 km of the survey area in the saltworks.	Unlikely – the habitat in the survey area is not suitable
Crested Tern (<i>Thalasseus bergii</i>)	IA	Ma	X		X		X	A common tern to coastal regions of Australia. A large species with a large straw yellow bill, white body and black legs. The black cap and slight crest is also evident. The species preferred habitat is primarily coastal and off shore waters including beaches, bays, inlets, tidal rivers, swamps, lakes and large rivers (Higgins & Davis 1996).	This species has been recorded within 1 km of the survey area in the saltworks.	Unlikely – no suitable habitat is present in the survey area.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA			
Australian Fairy Tern (<i>Sterna nereis subsp. nereis</i>)	VU	VU	X	X	X	The habitat of the fairy tern is essentially marine, including sheltered coasts, bays, inlets, estuaries, coastal lagoons, ocean beaches but rarely out to sea or out of sight of land. They also inhabit wetlands near the coast including salt ponds and lakes. This species favours sites with sand spits and small sand islets in river mouth channels (Morcombe 2004).	This species has been recorded within 1 km of the survey area in the saltworks.	Unlikely –Habitat is not suitable for this species in the survey area.
Grey-tailed Tattler (<i>Tringa brevipes</i>)	P4, IA	Ma, Mi,	X	X	X	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. It is less often on open flat sandy beaches or sandbanks, especially around accumulated seaweed or isolated clumps of dead coral. It is occasionally found around near-coastal wetlands, such as lagoons and lakes and ponds in sewage farms and saltworks. Inland records for the species are rare with sightings on river banks and the edges of rock pools (Higgins & Davies 1996).	This species has been recorded within 1 km of the survey area.	Unlikely –habitat in the survey area is marginal as only small ephemeral drainage lines exist

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence	
	BC Act	EPBC Act	Mi	EPBC Act	NM	EPBC Act	PMST			DBCA
Marsh Sandpiper (<i>Tringa stagnatilis</i>)	IA	Mi		X	X	X	X	<p>The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, salt pans, 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 (Higgins & Davies 1996), although surveys in Kakadu recorded more birds around shallow freshwater lakes than in areas influenced by tide (Bamford 1988). Three of the five sites with highest recorded numbers are saltwater habitats (Hunter Estuary, NSW; Port Hedland Saltworks, Western Australia; Tullakool Evaporation Ponds, NSW) (Watkins 1993). In Western Australia they prefer freshwater to marine environments. In south-east Australia they prefer inland saline lakes and coastal saltworks. They are found infrequently around mangroves (Higgins & Davies 1996).</p>	This species has been recorded within 1 km of the survey area.	Unlikely –Habitat in the survey area is not suitable.
Common Redshank (<i>Tringa totanus</i>)	IA	Mi				X		<p>The Common Redshank is found at sheltered coastal wetlands such as bays, river estuaries, lagoons, inlets and saltmarsh (with bare open flats and banks of mud or sand). They are also found around salt lakes, freshwater lagoons, artificial wetlands and saltworks and sewage farms (Higgins & Davies 1996). The Common Redshank has been observed feeding in shallow water, on wet bare mud or sand, or on algal deposits, round the edges of wetlands, near rocks or samphire (Higgins & Davies 1996). They have been recorded roosting on small elevated areas such as estuarine sandbars and muddy islets surrounded by water (Higgins & Davies 1996).</p>	Species identified in the PMST search with potential to occur, but no records exist in the area.	Unlikely –habitat present in survey area is not suitable.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	Mi	EPBC Act	NM	PMST			
Broad-billed Sandpiper <i>(Limicola falcinellus)</i>	IA	Mi		X			X	This species has been recorded within 2 km of the survey area. .	Unlikely –Habitat in the survey area is not suitable.
Peregrine Falcon <i>(Falco peregrinus)</i>	OS			X			X	Nearest records are 25 km north of the survey area. The	Likely – regular visitor or resident to survey area, foraging habitat only

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	Mi	NM	PMST			
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	IA	Mi	X	X	X	X	This species has been recorded adjacent to the survey area (~ 1 km).	Unlikely –Habitat is marginal for suitability in the survey area.
Grey Plover (<i>Pluvialis squatarola</i>)	IA	Mi	X	X	X	X	This species has been recorded within 1 km of the survey area.	Unlikely – Habitat is marginal for suitability in the survey area.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search			Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA				
Pacific Golden Plover (<i>Pluvialis fulva</i>)	IA	Mi	X	X	X	In Australia the Pacific Golden Plover usually inhabits coastal habitats, on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as Sarcocornia, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in saltworks. It is sometimes recorded on islands, sand and coral cays and exposed reefs and rocks. They are less often recorded in terrestrial habitats, but can be seen in habitats with short grass in paddocks, crops or airstrips, or ploughed or recently burnt areas. In WA, the species is seldom recorded along the southern or south-western coasts (DotE 2016).	This species has been recorded within 2 km of the survey area.	Unlikely –Habitat in the survey area is not suitable.	
Oriental Plover (<i>Charadrius veredus</i>)	IA	Mi	X	X	X	Immediately after arriving in non-breeding grounds in northern Australia, Oriental Plovers spend a few weeks in coastal habitats such as estuarine mudflats and sandbanks, on sandy or rocky ocean beaches or nearby reefs, or in near-coastal grasslands, before dispersing further inland. Thereafter they usually inhabit flat, open, semi-arid or arid grasslands, where the grass is short and sparse, and interspersed with hard, bare ground, such as claypans, dry paddocks, playing fields, lawns and cattle camps or open areas that have been recently burnt (Storr, 1980).	This species has been recorded within 2 km of the survey area. habitat is present for the species in and adjacent to the survey area.	Likely –however use is opportunistic, limited and irregular.	
Fork-tailed Swift (<i>Apus pacificus</i>)	IA	Mi	X	X	X	In WA there are sparsely scattered records along the south coast, ranging from the Eyre Bird Observatory and west to Denmark. They are widespread in coastal and sub-coastal areas between Augusta and Port Hedland, including some on nearshore and offshore islands. This species is almost exclusively aerial, flying less than 1 m to at least 300 m above ground. This species is considered rare in the south-west region (DSEWPac 2013).	No habitat present and the species is predominantly aerial utilising terrestrial environments rarely.	Unlikely – No habitat present, not known from the survey area. Use would be very opportunistic and rare.	

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	MI	NM	EPBC PMST	DBCA			
Oriental Pratincole (<i>Glareola maldivarum</i>)	IA	MI		X	X	X	In non-breeding grounds in Australia, the Oriental Pratincole usually inhabits open plains, floodplains or short grassland (including farmland or airstrips), often with extensive bare areas. They often occur near terrestrial wetlands, such as billabongs, lakes or creeks, and artificial wetlands such as reservoirs, saltworks and sewage farms, especially around the margins. The species also occurs along the coast, inhabiting beaches, mudflats and islands, or around coastal lagoons (Lloyd and Lloyd, 1991). The Common Greenshank does not breed in Australia; however, the species occurs in all types of wetland and has the widest distribution of any shorebird in Australia (DSEWPac 2013).	This species has been recorded within 20 km of the survey area, habitat is present for the species in and adjacent to the survey area.	Likely –however use is opportunistic, limited and irregular.
Common Greenshank (<i>Tringa nebularia</i>)	IA	MI		X	X	X		This species has been recorded within 20 km of the survey area and some habitat is present for the species.	Unlikely –No suitable wetland habitat available in the survey area
Pectoral Sandpiper (<i>Calidris melanotos</i>)	IA	MI			X		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. The species is usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands (Higgins & Davies 1996).	No records of the species are present in the region.	Unlikely – Suitable habitat is not available in the survey area.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	PMST	DBCA	EPBC Act		
Terek Sandpiper (<i>Xenus cinereus</i>)	IA	Mi	X	X	X	<p>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 (<i>Halosarcia</i> spp.). Birds are seldom near the edge of water, however, birds may wade into the water (Marchant & Higgins 1993). Less often seen on sandy or shingle beaches, or on rock or coral reefs or platforms. Terek Sandpipers are occasionally sighted around drying sewage ponds and saltpans if surrounded by mudflats. The species is also found around brackish coastal swamps, lagoons and dune-lakes; and also on gravel or rocky edges of estuarine pools and freshwater river-pools (Marchant & Higgins 1993). Very occasionally, birds use swampy, grassy or cultivated paddocks near the coast (Marchant & Higgins 1993). Preferring to roost in or among mangroves, birds may perch in branches or roots up to 2 m from the ground, or beneath them in the shade on hot days. Occasionally, they roost in dead trees or among tangled driftwood. Elsewhere, they may roost with other waders on flat shores, on muddy spits, islets or banks, and sometimes on sandy and pebbly beaches (Marchant & Higgins 1993).</p>	Several records are present in adjacent the survey area in the coastal habitats.	Unlikely – no suitable habitat present
Wood Sandpiper (<i>Tringa glareola</i>)	IA	Mi	X		X	<p>The Wood Sandpiper is a seasonal visitor to Australia and has its largest numbers recorded in north-west Australia (Roebuck Bay near to Broome). Off the Tringa group (like the Common Greenshank) the Wood Sandpiper utilises a broad range of habitat types throughout Western Australia. Typical habitat includes well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes. This species does not breed in Australia (DSEWPaC 2013).</p>	This species has been recorded within 20 km of the survey area. Numerous records occur at Karratha and Cape Lambert.	Unlikely – the survey area does not contain suitable wetland habitat.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)			Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	Mi	NM	EPBC PMST	DBCA			
Barn Swallow (<i>Hirundo rustica</i>)	IA	Mi		X	X	X	In Australia, the Barn Swallow is recorded in open country in coastal lowlands, often near water, towns and cities. Birds are often sighted perched on overhead wires, and also in or over freshwater wetlands, paperbark Melaleuca woodland, mesophyll shrub thickets and tussock grassland (Schodde et al 1999).	Species has not been recorded in the survey area. Four records are present and associated to the estuary side of the saltworks	Unlikely – No habitat present, not known from the survey area.
Glossy Ibis (<i>Plegadis falcinellus</i>)	IA	Mi		X		X	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. Within Australia, the largest contiguous areas of prime habitat is inland and northern floodplains (Marchant & Higgins 1993).	Species has not been recorded in the immediate area.	Unlikely – No habitat present, not known from the area.
Grey Wagtail (<i>Motacilla cinerea</i>)	IA	Mi			X		A migratory species that regularly visits northern Australia particularly the area from Broome to Darwin (Morcombe 2004). The species prefers coastal habitat near to water where it prefers to forage. However the species has been recorded further inland feeding on plains (Morcombe 2004).	Species has not been recorded in the immediate area.	Unlikely – Limited habitat present, not known from the area. Can opportunistically use survey area
Yellow Wagtail (<i>Motacilla cinerea</i>)	IA	Mi			X		A migratory species that regularly visits northern Australia particularly the area from Broome to Darwin (Morcombe 2004). The species prefers coastal habitat near to water where it prefers to forage. However the species has been recorded further inland feeding on plains (Morcombe 2004).	Some habitat present and the species has not been recorded in the immediate area.	Unlikely – Limited habitat present, not known from the area. Can opportunistically use survey area
Reptiles									

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA			
Airlie Island Skink (<i>Ctenotus angusticeps</i>)	P3	VU	X	X	X	This species was formerly known from only two widely separated localities in Western Australia: Airlie Island, off the north-west coast and Roebuck Bay, just south of Broome. On Airlie Island it inhabits Acacia shrublands, coastal spinifex and tussock grasses. On the mainland, the Airlie Island <i>Ctenotus</i> generally inhabits samphire shrubland in the intertidal zone along mangrove (Grey Mangrove (<i>Avicennia marina</i>) with occasional Red Mangrove (<i>Rhizophora stylosa</i>) margins, however, subtle differences in vegetation/topography exist among sites where the species has been recorded. The Roebuck Bay lizards have been observed on coastal mudflats vegetated with samphire (Wilson and Swan 2017). Recent surveys determined the species' distribution between Karratha and Broome therefore showing the distribution of this species is more widespread than previously thought.	The species has been recorded 3 km west of the survey area in the samphire areas fringing the coastal mudflats.	Unlikely – The survey area provides no habitat for the species as it is associated with samphire and mudflats typically fringing mangroves and where crab holes are present.
Lined Soil-crevice Skink (<i>Notoscincus butleri</i>)	P4		X		X	<i>Notoscincus butleri</i> is a pale coppery-brown skink with bold black vertebral and dorsal stripes, broad black upper lateral stripes, white mid-lateral stripes and a narrow dark ventrolateral stripe. This species range is restricted to arid, rocky areas of near-coastal Pilbara region. Habitat is found in spinifex dominated areas near creek and river margins (Wilson and Swan 2017).	There are historical records near to the survey area and numerous records occur within 20 km (particularly Karratha).	Likely – resident within the survey area. The survey area provides extensive suitable habitat for the species (hummock and tussock grasslands near drainage lines).

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search			Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA			
Pilbara Olive Python (<i>Liasis olivaceus subsp. barroni</i>)	VU	VU	X	X	X	The Olive Python (Pilbara subspecies) is a dull olive-brown to pale fawn or rich-brown python with a white underside and pale finely dotted lips. This species reaches an average size of 2.5 m but can grow up to 4 m long. The Olive Python's range is restricted to the Pilbara region, north Western Australia, and the Dampier Archipelago. Habitat consists of rocky escarpments, gorges and waterholes within the Pilbara region. The preferred microhabitats for this species are under rock piles, on top of rocks, and under heaps, railway embankments and sewerage treatment ponds. The species' breeding season occurs from June to August, with males moving long distances in search of breeding females (Wilson and Swan 2017).	s. There are records on the Burrup Peninsula (20 km from the survey area).	Unlikely – The minor drainage lines in the survey area are regarded as limited habitat for the species.
Mammals								
Northern Quoll (<i>Dasyurus hallucatus</i>)	En	En	X	X	X	The Northern Quoll once occurred across the majority of northern Australia but its range has significantly contracted. It occurs in the Pilbara region but in disjoint populations. The Northern Quoll inhabits a range of vegetation associations but is especially abundant on dissected rocky escarpment and eucalypt woodland within 200 km of the coast. It is known to den in rock crevices and rock piles and favours rocky areas. They are predominantly nocturnal but are occasionally active during the day, particularly during the mating season and are known to have a large home range (Van Dyck and Strahan 2008).	The species is known from the region, particularly from rocky areas or along drainage lines with wooded areas.	Unlikely – The minor drainage lines in the survey area are regarded as limited habitat for the species.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA			
Northern Short-tailed Mouse (<i>Leggadina lakedownsensis</i>)	P4		X		X	The Lakeland Downs Mouse occupies a diverse range of habitats from the monsoon tropical coast to semiarid climates, including spinifex and tussock grasslands, samphire and sedgeland, Acacia shrublands, tropical Eucalyptus and Melaleuca woodlands and stony ranges. Most habitats, however, are seasonally inundated on red or white sandy-clay soils. They are nocturnal, largely solitary, and individuals spend the day in simple, single-chambered burrows (Van Dyck and Strahan 2008).	There are historical records near to the survey area and numerous records occur within 20 km (particularly Karratha).	Likely – resident within the survey area on the plain and in minor drainage lines. The survey area provides extensive suitable habitat for the species (hummock and tussock grasslands on clay plains).
Western Pebble-mound Mouse (<i>Pseudomys chapmani</i>)	P4		X		X	The Western Pebble-mound Mouse is restricted to the Pilbara region where it is recognised as an endemic species. Habitat for the Western Pebble-mound Mouse can be found on stony hillsides with hummocky grasslands and little or no soil. It constructs large mounds of pebbles on stony slopes which cover an area of 0.5-9.0 square metres. 'Active' mounds are characterized by volcano-like cones capped by 'craters' that mark occluded entrances to subterranean burrow systems in which the mice live, often gregariously (Van Dyck and Strahan 2008).	Numerous records occur within 20 km (particularly Burrup Peninsula, hills behind Karratha and Cape Lambert areas). The populations on Burrup and around Karratha are presumed locally extinct.	Unlikely – The survey area provides some suitable habitat for the species (stony soils), but the species may be extinct in the area.

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search		Description and habitat requirements	Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST			
Water Rat (<i>Hydromys chrysogaster</i>)	P4		X		X	The Water Rat lives in the vicinity of permanent bodies of fresh or brackish water, from sub-alpine streams to lakes and farm dams, and on sheltered coastal beaches, mangroves and offshore islands. It can travel considerable distance overland and is an occasional vagrant to temporary waters. Water Rats dens are made at the end of tunnels in banks and occasionally in logs (Van Dyck and Strahan 2008).	Records occur within 20 km (particularly Burrup Peninsula) Unlikely – unlikely resident within survey area, restricted to coastal water bodies in this area
Ghost Bat (<i>Macroderma gigas</i>)	VU	VU	X	X	X	The Ghost Bat occurs in a wide range of habitats, and requires an undisturbed cave, deep fissure or disused mine shaft in which to roost. It is patchily distributed across Australia, and is sensitive to disturbance (Van Dyck and Strahan 2008).	The species is known from the region, however are restricted to caves, and old mine shafts. There are none of these recorded in the survey area. Foraging may occur across the survey area opportunistically. Unlikely – unlikely a resident within survey area, may opportunistically utilise to survey area for foraging.
North-western Free-tail Bat (<i>Mormopterus (Ozimops) cobourgiensis</i>)	P1				X	The Little North-western Free-tail Bat occurs along the Western Australian coast from Lake McLeod to Point Torment, occurring sparsely across its range. The Western Australian populations have only been recorded from mangrove stands, particularly those that include mature mangroves (Van Dyck and Strahan 2008). It roosts in crevices and sprouts of the dead upper branches of the mangrove <i>Avicennia marina</i> . The genus for this species is in the process of being renamed in a taxonomic review of molossid by Terry Reardon, which has shown the genus <i>Mormopterus</i> does not occur in Australia (Churchill 2008).	The species is known from the region, however are restricted to mangroves Unlikely – There are no mangroves in the survey area

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search		Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA			
Greater Bilby (<i>Macrotis lagotis</i>)	VU	VU		X		<p>The Greater Bilby distribution in Western Australia is restricted to the north, including the Pilbara, Sandy and Gibson Deserts. The Greater Bilby usually spends the daytime in burrows, often built against termite mounds, spinifex hummock or shrubs (Van Dyck and Strahan 2008). Extant population of the Greater Bilby occur in a variety of habitats, usually on landforms with level to low slope topography and light to medium soils. It occupies three major vegetation types: open tussock grassland on uplands and hills, mulga woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. Laterite and rock feature substrates are an important part of Greater Bilby habitat. After dark they leave their burrows to feed and populations are known to move long distances when current habitat ranges become unsuitable. Bilbies are largely solitary, widely dispersed and found in low numbers. The current occurrence of the Greater Bilby is strongly associated with higher rainfall and temperatures, which promote areas of higher plant and food production. (Pavey 2006; Southgate et al. 2007).</p>	<p>The nearest record is greater than 150 km from the survey area.</p>	<p>Unlikely – The survey area does not contain any suitable habitat for this species.</p>

Common name (species name)	Status (BC Act/DBCA, EPBC Act)		Search			Description and habitat requirements		Nearest record	Likelihood of Occurrence
	BC Act	EPBC Act	NM	EPBC PMST	DBCA				
<p>Pilbara Leaf-nosed Bat</p> <p><i>(Rhinonictotis aurantia)</i></p> <p>In the NatureMap search this species was reported as the Kimberley population although should have been the Pilbara population.</p>	VU	VU	X	X	X	<p>The Pilbara Leaf-nosed Bat roosts in deep caves or mines in the wet season and forages nearby. This species occurs in the Pilbara region where its populations are scattered and localised. There are a few known populations of this species in the western Pilbara, roosting in caves formed in gorges that dissect massive siliceous sedimentary geology. It is most often observed in flight over waterholes in gorges (Van Dyck and Strahan 2008). Optimal roosts are thought to occur in caves that form between ascending rock layers, where humidity is maintained from seeping groundwater (Van Dyck and Strahan 2008). Roosts are commonly located over pools of water, or areas deep within the mine or cave structure which provides elevated temperature and humidity. Foraging habitat includes: Triodia hummock grasslands covering low rolling hills and shallow gullies, with <i>Eucalyptus carnatulensis</i> along the creeks; over small watercourses throughout granite boulder terrain; over pools and low shrubs in ironstone gorges; and in and around gravelly watercourses with <i>Melaleuca leucadendron</i>.</p>	<p>There are records within 20 km of the survey area.</p>	<p>Unlikely – No suitable roosting habitat occurs within the survey area. However, the species may forage over the survey area.</p>	

Appendix E - (Database Searches)

NatureMap Species Report

Created By Guest user on 14/03/2019

Kingdom	Animalia
Current Names Only	Yes
Core Datasets Only	Yes
Species Group	All Animals
Method	'By Line'
Vertices	20° 36' 04" S, 116° 46' 50" E 20° 48' 29" S, 116° 40' 10" E 20° 48' 29" S, 116° 40' 10" E
Group By	Family

Family	Species	Records
Acanthizidae	4	36
Accipitridae	15	653
Aegothelidae	1	10
Aeshnidae	2	4
Agamidae	11	162
Alaudidae	2	51
Ambassidae	1	2
Anatidae	10	266
Anhingidae	1	43
Antennariidae	2	2
Apistidae	1	2
Apodidae	1	2
Apogonidae	15	29
Arameidae	1	3
Arcollidae	1	1
Ardeidae	8	161
Ariidae	3	3
Artamidae	6	219
Atherinidae	3	3
Baetidae	2	7
Balaenopteridae	1	2
Batrachoididae	3	5
Bdelloidea	2	3
Belonidae	1	1
Belostomatidae	1	1
Blenniidae	9	21
Boidae	8	61
Bolbooceratidae	1	1
Bothidae	3	4
Bovidae	2	10
Brachionidae	4	4
Burhinidae	2	30
Buthidae	1	3
Bythitidae	3	3
Cacatuidae	1	42
Caenidae	2	5
Callionymidae	4	7
Camaenidae	7	71
Campephagidae	2	222
Canidae	2	108
Caprimulgidae	1	3
Carabidae	9	19
Carangidae	7	8
Carcharinidae	1	1
Carphodactylidae	1	2
Casuaridae	1	1
Centriscidae	1	1
Centropomidae	1	1
Centropagidae	1	1
Centropodidae	1	30
Centropomidae	1	1
Ceratopogonidae	3	7
Chaetodontidae	3	4
Chanidae	1	1
Charadriidae	11	340
Cheloniidae	4	64
Chirocentridae	1	2
Chironomidae	14	30
Chydoridae	6	8
Ciconiidae	1	12
Clupeidae	4	7
Coenagrionidae	2	6
Colubridae	1	3
Columbidae	10	597
Congridae	1	1
Corinnidae	1	7
Corixidae	5	8
Corvidae	3	95
Cracticidae	3	194
Cuculidae	3	20
Culicidae	6	13
Cyclopidae	4	7
Cynoglossidae	3	10
Cypridae	13	18
Cyzicidae	1	1

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Daphniidae	3	3
Dasyuridae	7	488
Delphinidae	3	4
Diatom Family	12	12
Dicaeidae	1	4
Dicruridae	5	541
Diffugiidae	1	1
Diplodactylidae	13	274
Dugongidae	1	2
Dytiscidae	12	27
Ecnomidae	2	4
Elapidae	17	91
Electridae	1	1
Elopidae	1	1
Emballonuridae	1	9
Enchytraeidae	1	1
Ephyridae	2	2
Epistylididae	1	1
Estrilidae	5	336
Euchlanidae	2	3
Euglyphidae	1	1
Exocoetidae	2	2
Falconidae	7	208
Felidae	1	38
Flosculariidae	1	1
Fregatidae	1	18
Gallieniellidae	1	1
Gekkonidae	5	373
Gerreidae	2	4
Gingylmostomatidae	1	1
Glareolidae	2	13
Gobiesocidae	3	3
Gobiidae	34	73
Gobioididae	1	1
Gomphidae	1	1
Gruidae	1	3
Gyrinidae	1	1
Haematopodidae	3	272
Haemulidae	2	2
Halacaridae	20	53
Halcyonidae	6	187
Hebridae	1	1
Hemicorduliidae	1	1
Hemiramphidae	1	1
Hexarthridae	2	2
Hipposideridae	1	1
Hirundinidae	4	195
Holocentridae	3	4
Hydrachnidae	1	1
Hydraenidae	2	4
Hydrobatidae	1	7
Hydrobiidae	1	1
Hydrometridae	1	1
Hydrophilidae	9	17
Hydropsychidae	1	1
Hydroptilidae	2	2
Hylidae	4	82
Hypsimepodidae	1	1
Ilyocypridae	1	2
Ixodidae	1	1
Labridae	9	20
Lamponidae	3	17
Laridae	15	414
Latidae	1	1
Lecanidae	9	14
Leiognathidae	2	2
Lepadellidae	1	2
Leporidae	1	1
Leptoceenidae	1	3
Libellulidae	6	13
Limnadiidae	4	4
Limnocytheridae	1	1
Limnodynastidae	2	5
Lutjanidae	5	12
Lycosidae	3	13
Lymnaeidae	1	1
Macropodidae	5	209
Macrotrichidae	1	1
Maluridae	2	75
Megadermatidae	1	4
Melanotaeniidae	1	2
Meliphagidae	8	324
Meropidae	1	150
Mesovellidae	2	2
Moiridae	1	1
Molossidae	3	5
Monacanthidae	2	10
Monodactylidae	1	1
Motacillidae	2	27
Mugilidae	7	10
Mullidae	1	1
Muraenidae	4	7
Muridae	10	290
Muscidae	1	1
Myobatrachidae	1	1
Naididae	1	1
Nematoda	1	4
Nemesiidae	2	4
Nemipteridae	6	6
Nepidae	1	1
Notommatidae	4	4
Notonectidae	5	8
Ogcocephalidae	1	1
Oligochaeta	1	1
Opiidae	1	1

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Ophichthidae	6	8
Ophichthidae	1	5
Opisthopora	1	1
Opistognathidae	1	3
Ostracoda	1	3
Otididae	1	4
Oxyopidae	1	1
Pachycephalidae	4	60
Paradoxosomatidae	2	4
Paralichthyidae	4	4
Pardalotiidae	3	16
Passeridae	2	5
Pegasidae	1	1
Pelecanidae	1	93
Pempheridae	1	1
Petroicidae	2	23
Phalacrocoracidae	5	127
Phasianidae	3	36
Pholidae	1	3
Phreodrilidae	2	4
Pinguipedidae	1	1
Pittidae	1	1
Planorbidae	3	6
Platycephalidae	9	19
Pleidae	1	2
Plotostidae	7	15
Podargidae	2	12
Podicipedidae	2	50
Polynemidae	2	3
Pomacanthidae	1	1
Pomacentridae	9	20
Pomatostomidae	2	29
Pontarachnidae	2	4
Priacanthidae	1	1
Pristinidae	1	1
Procellariidae	2	33
Prodidomidae	6	20
Psettodidae	1	1
Pseudochromidae	4	6
Psettidae	8	355
Pteropodidae	2	3
Ptilonrhynchidae	2	9
Pygopodidae	5	55
Pyalidae	1	1
Rallidae	7	62
Recurvirostridae	3	129
Salticidae	4	6
Scarabaeidae	2	5
Scatophagidae	3	3
Sciaenidae	1	1
Scincidae	42	867
Scirtidae	1	1
Scolopacidae	21	807
Scolopendridae	4	24
Scoorbridae	1	1
Scorpaenidae	2	3
Scutigerae	1	19
Serranidae	9	21
Sididae	2	3
Sillaginidae	2	4
Simuliidae	1	1
Soleidae	3	6
Sparassidae	4	4
Sparidae	1	2
Sphyracidae	2	2
Stratiomyidae	1	3
Strigidae	2	5
Sturnidae	1	9
Sulidae	1	4
Sylviidae	2	61
Synacrididae	2	2
Synchaetidae	1	2
Syngnathidae	5	5
Tabanidae	1	3
Tachyglossidae	1	6
Terapontidae	4	11
Testudinellidae	1	3
Tetraodontidae	1	1
Tetrarogidae	3	5
Tettigoniidae	1	1
Theridiidae	1	2
Thiaridae	1	2
Threskiornithidae	3	42
Triacanthidae	1	1
Trichocercidae	1	1
Trichonotidae	1	1
Trichotriidae	1	1
Trigidae	1	1
Trigonulidae	1	3
Triopsidae	2	2
Tripterygiidae	7	13
Trombidiformes	1	4
Turbellaria	1	1
Turnicidae	1	18
Tytonidae	1	4
Unionicolidae	1	1
Urodacidae	1	2
Varanidae	10	65
Veliferidae	1	1
Velidae	2	2
Vespertilionidae	5	26
Zodariidae	1	1
Zosteropidae	1	108
TOTAL	951	12291

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Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Acanthizidae				
1.	25530 <i>Gerygone fusca</i> (Western Gerygone)			
2.	<i>Gerygone</i> sp.			
3.	24276 <i>Gerygone tenebrosa</i> (Dusky Gerygone)			
4.	30948 <i>Smicronis brevirostris</i> (Weebill)			
Accipitridae				
5.	25535 <i>Accipiter cirrocephalus</i> (Collared Sparrowhawk)			
6.	25536 <i>Accipiter fasciatus</i> (Brown Goshawk)			
7.	24285 <i>Aquila audax</i> (Wedge-tailed Eagle)			
8.	24288 <i>Circus approximans</i> (Swamp Harrier)			
9.	24289 <i>Circus assimilis</i> (Spotted Harrier)			
10.	<i>Elanus axillaris</i>			
11.	24290 <i>Elanus caeruleus</i> subsp. <i>axillaris</i> (Australian Black-shouldered Kite)			
12.	24293 <i>Haliaeetus leucogaster</i> (White-bellied Sea-Eagle)			
13.	25541 <i>Haliastur indus</i> (Brahminy Kite)			
14.	24294 <i>Haliastur indus</i> subsp. <i>girrenera</i> (Brahminy Kite)			
15.	24295 <i>Haliastur sphenurus</i> (Whistling Kite)			
16.	24297 <i>Hamirostra melanosternon</i> (Black-breasted Buzzard)			
17.	47965 <i>Hieraaetus morphnoides</i> (Little Eagle)			
18.	25542 <i>Milvus migrans</i> (Black Kite)			
19.	48591 <i>Pandion cristatus</i> (Osprey, Eastern Osprey)		IA	
Aegothelidae				
20.	25544 <i>Aegotheles cristatus</i> (Australian Owlet-nightjar)			
Aeshnidae				
21.	<i>Aeshnidae</i> sp.			
22.	<i>Anax papuensis</i>			
Agamidae				
23.	30831 <i>Amphibolurus gilberti</i> (Ta-ta, Gilbert's Dragon)			
24.	30833 <i>Amphibolurus longirostris</i> (Long-nosed Dragon)			
25.	25458 <i>Ctenophorus caudicinctus</i> (Ring-tailed Dragon)			
26.	24865 <i>Ctenophorus caudicinctus</i> subsp. <i>caudicinctus</i> (Ring-tailed Dragon)			
27.	25459 <i>Ctenophorus isolepis</i> (Crested Dragon, Military Dragon)			
28.	24876 <i>Ctenophorus isolepis</i> subsp. <i>isolepis</i> (Crested Dragon, Military Dragon)			
29.	24882 <i>Ctenophorus nuchalis</i> (Central Netted Dragon)			
30.	24886 <i>Ctenophorus reticulatus</i> (Western Netted Dragon)			
31.	25510 <i>Pogona minor</i> (Dwarf Bearded Dragon)			
32.	24907 <i>Pogona minor</i> subsp. <i>minor</i> (Dwarf Bearded Dragon)			
33.	30814 <i>Tympanocryptis cephalus</i> (Pebble Dragon)			
Alaudidae				
34.	25545 <i>Mirafra javanica</i> (Horsfield's Bushlark, Singing Bushlark)			
35.	24302 <i>Mirafra javanica</i> subsp. <i>horsfieldii</i> (Horsfield's Bushlark, Singing Bushlark)			
Ambassidae				
36.	<i>Ambassis vachellii</i>			
Anatidae				
37.	24312 <i>Anas gracilis</i> (Grey Teal)			
38.	24316 <i>Anas superciliosa</i> (Pacific Black Duck)			
39.	24318 <i>Aythya australis</i> (Hardhead)			
40.	24321 <i>Chenonetta jubata</i> (Australian Wood Duck, Wood Duck)			
41.	24322 <i>Cygnus atratus</i> (Black Swan)			
42.	24324 <i>Dendrocygna arcuata</i> (Wandering Whistling Duck, Chestnut Whistling Duck)			
43.	24325 <i>Dendrocygna eytoni</i> (Plumed Whistling Duck)			
44.	24326 <i>Malacorhynchus membranaceus</i> (Pink-eared Duck)			
45.	24327 <i>Nettapus pulchellus</i> (Green Pygmy-goose)			
46.	24329 <i>Stictonetta naevosa</i> (Freckled Duck)			
Anhingidae				
47.	47414 <i>Anhinga novaehollandiae</i> (Australasian Darter)			
Antennariidae				
48.	<i>Lophiocharon hutchinsi</i>			
49.	<i>Lophiocharon trisignatus</i>			
Apistidae				
50.	<i>Apistus carinatus</i>			
Apodidae				

Name ID	Species Name	Naturalised	Conservation Code	Endemic To Query Area
51.	25554 <i>Apus pacificus</i> (Fork-tailed Swift, Pacific Swift)		IA	
Apogonidae				
52.	<i>Apogon breviceaudatus</i>			
53.	<i>Apogon cavitiensis</i>			
54.	<i>Apogon cookii</i>			
55.	<i>Apogon dianthus</i>			
56.	<i>Apogon doederleini</i>			
57.	<i>Apogon fasciatus</i>			
58.	<i>Apogon nigripinnis</i>			
59.	<i>Apogon pallidofasciatus</i>			
60.	<i>Apogon rueppellii</i>			
61.	<i>Apogon talboti</i>			
62.	<i>Apogon trimaculatus</i>			
63.	<i>Foa brachygramma</i>			
64.	<i>Fowleria aurita</i>			
65.	<i>Pterapogon mirifica</i>			
66.	<i>Siphamia majimae</i>			
Araneidae				
67.	<i>Nephila edulis</i>			
Arcellidae				
68.	<i>Arcella</i> sp.			
Ardeidae				
69.	25559 <i>Ardea intermedia</i> (Intermediate Egret)			
70.	41324 <i>Ardea modesta</i> (great egret, white egret)			
71.	24341 <i>Ardea pacifica</i> (White-necked Heron)			
72.	47897 <i>Bulorides striata</i> (Striated Heron, Mangrove Heron)			
73.	<i>Egretta garzetta</i>			
74.	<i>Egretta novaehollandiae</i>			
75.	25562 <i>Ixobrychus flavicollis</i> (Black Bittern)			
76.	25564 <i>Nycticorax caledonicus</i> (Rufous Night Heron)			
Ariidae				
77.	<i>Arius leptaspis</i>			Y
78.	<i>Netuma bilineata</i>			
79.	<i>Netuma proxima</i>			
Artamidae				
80.	25566 <i>Artamus cinereus</i> (Black-faced Woodswallow)			
81.	25567 <i>Artamus leucorhynchus</i> (White-breasted Woodswallow)			
82.	24354 <i>Artamus leucorhynchus</i> subsp. <i>leucopygialis</i> (White-breasted Woodswallow)			
83.	24355 <i>Artamus minor</i> (Little Woodswallow)			
84.	24356 <i>Artamus personatus</i> (Masked Woodswallow)			
85.	24357 <i>Artamus superciliosus</i> (White-browed Woodswallow)			
Atherinidae				
86.	<i>Atherinid</i> sp.			
87.	<i>Atherinomorus endrachtensis</i>			
88.	<i>Craterocephalus pauciradiatus</i>			
Baetidae				
89.	<i>Baetidae</i> sp.			
90.	<i>Cloeon</i> sp.			
Balaenopteridae				
91.	24051 <i>Megaptera novaeangliae</i> (Humpback Whale)		S	
Batrachoididae				
92.	<i>Batrachomoeus dahli</i>			
93.	<i>Batrachomoeus trispinosus</i>			
94.	<i>Halophryne diemensis</i>			
Bdelloidea				
95.	<i>Bdelloidea</i> sp. 2:2			
96.	<i>Bdelloidea</i> sp. 3:3			
Belonidae				
97.	<i>Tylosurus crocodilus</i>			
Belostomatidae				
98.	<i>Belostomatidae</i> sp.			
Blenniidae				
99.	<i>Cirripectes filamentosus</i>			



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100.	<i>Ecesenius yaeyamaensis</i>			
101.	<i>Istiblennius meleagris</i>			
102.	<i>Laiphognathus multimaculatus</i>			
103.	<i>Omobranchus punctatus</i>			
104.	<i>Omobranchus rotundiceps</i>			
105.	<i>Omobranchus</i> sp.			
106.	<i>Petroscirtes mitratus</i>			
107.	<i>Salarias sexfilum</i>			
Boidae				
108.	25317 <i>Antaresia childreni</i> (Children's Python)			
109.	25318 <i>Antaresia perthensis</i> (Pygmy Python)			
110.	25448 <i>Antaresia stimsoni</i> (Stimson's Python)			
111.	25241 <i>Antaresia stimsoni</i> subsp. <i>stimsoni</i> (Stimson's Python)			
112.	25320 <i>Aspidites melanocephalus</i> (Black-headed Python)			
113.	25236 <i>Aspidites ramsayi</i> (Woma)			
114.	25238 <i>Liasis olivaceus</i> subsp. <i>barroni</i> (Pilbara Olive Python)		T	
115.	25239 <i>Liasis olivaceus</i> subsp. <i>olivaceus</i> (Olive Python)			
Bolboceratidae				
116.	<i>Bolboleus truncatus</i>			
Bothidae				
117.	<i>Arnoglossus waitei</i>			Y
118.	<i>Asterorhombus intermedius</i>			
119.	<i>Engyprosoon</i> sp.			
Bovidae				
120.	24253 <i>Capra hircus</i> (Goat)	Y		
121.	34016 <i>Ovis aries</i> (Sheep)			
Brachionidae				
122.	<i>Anuraeopsis navicula</i>			
123.	<i>Brachionus</i> n sp P2 (PSW)			
124.	<i>Brachionus quadridentatus</i>			
125.	<i>Keratella procurva</i>			
Burhinidae				
126.	24359 <i>Burhinus grallarius</i> (Bush Stone-curlew)			
127.	47938 <i>Esacus magnirostris</i> (Beach Stone-curlew, Beach Thick-knee)			
Buthidae				
128.	<i>Lychas</i> sp. 2			
Bythitidae				
129.	<i>Didymothallus mizolepis</i>			
130.	<i>Dinematchthys</i> sp.			
131.	<i>Eusurculus pistillum</i>			
Cacatuidae				
132.	<i>Eolophus roseicapillus</i>			
Caenidae				
133.	<i>Caenidae</i> sp.			
134.	<i>Tasmanocoenis arcuata</i>			
Callionymidae				
135.	<i>Callionymus japonicus</i>			Y
136.	<i>Callionymus russelli</i>			
137.	<i>Callionymus</i> sp.			
138.	<i>Repomucenus calcaratus</i>			
Camaenidae				
139.	<i>Quistrachia legendrei</i>			
140.	<i>Rhagada angulata</i>			
141.	<i>Rhagada convicta</i>			
142.	<i>Rhagada dampierana</i>			
143.	<i>Rhagada intermedia</i>			
144.	<i>Rhagada minima</i>			
145.	<i>Rhagada perprima</i>			
Campephagidae				
146.	25568 <i>Coracina novaehollandiae</i> (Black-faced Cuckoo-shrike)			
147.	24367 <i>Lalage tricolor</i> (White-winged Triller)			
Canidae				
148.	48920 <i>Canis familiaris</i> (Dog, Dingo)	Y		

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149.	24040 <i>Vulpes vulpes</i> (Red Fox)	Y		
Caprimulgidae				
150.	24368 <i>Eurostopodus argus</i> (Spotted Nightjar)			
Carabidae				
151.	<i>Carenum pulchrum</i>			
152.	<i>Carenum subplanatum</i>			
153.	<i>Carenum venustum</i>			
154.	<i>Catadromus lacordairei</i>			
155.	<i>Chlaenius australis</i>			
156.	<i>Geoscaptus laevissimus</i>			
157.	<i>Loxandrus micantior</i>			
158.	<i>Megacephala greyana</i>			
159.	<i>Pheropsophus verticalis</i>			
Carangidae				
160.	<i>Alepes apercna</i>			
161.	<i>Alepes mate</i>			Y
162.	<i>Atule mate</i>			
163.	<i>Carangoides</i> sp.			
164.	<i>Caranx bucculentus</i>			
165.	<i>Caranx sexfasciatus</i>			
166.	<i>Selaroides leptolepis</i>			
Carcharhinidae				
167.	<i>Carcharhinus brachyurus</i>			
Carphodactylidae				
168.	24969 <i>Nephurus levis</i> subsp. <i>pilbarensis</i>			
Casuariidae				
169.	24470 <i>Dromaius novaehollandiae</i> (Emu)			
Centriscidae				
170.	<i>Centriscus scutatus</i>			
Centrogeniidae				
171.	<i>Centrogenys vaiigiensis</i>			
Centropagidae				
172.	<i>Boeckella triarticulata</i>			
Centropodidae				
173.	25600 <i>Centropus phasianinus</i> (Pheasant Coucal)			
Centropomidae				
174.	<i>Hypopterus macropterus</i>			
Ceratopogonidae				
175.	<i>Alluaudomyia</i> sp.			
176.	<i>Ceratopogonidae</i> sp.			
177.	<i>Dasyheleinae</i> sp. P2 (FSW)			
Chaetodontidae				
178.	<i>Chaetodon aureofasciatus</i>			
179.	<i>Chelmon marginalis</i>			
180.	<i>Chelmon muelleri</i>			
Chanidae				
181.	<i>Chanos chanos</i>			
Charadriidae				
182.	25575 <i>Charadrius leschenaultii</i> (Greater Sand Plover)		T	
183.	25576 <i>Charadrius mongolus</i> (Lesser Sand Plover)		T	
184.	24375 <i>Charadrius mongolus</i> subsp. <i>mongolus</i> (Lesser Sand Plover)		T	
185.	24377 <i>Charadrius ruficapillus</i> (Red-capped Plover)			
186.	24378 <i>Charadrius veredus</i> (Oriental Plover)		IA	
187.	47937 <i>Eiseyornis melanops</i> (Black-fronted Dotterel)			
188.	24379 <i>Erythronyx cinctus</i> (Red-kneed Dotterel)			
189.	24382 <i>Pluvialis fulva</i> (Pacific Golden Plover)		IA	
190.	24383 <i>Pluvialis squatarola</i> (Grey Plover)		IA	
191.	25577 <i>Vanellus miles</i> (Masked Lapwing)			
192.	24386 <i>Vanellus tricolor</i> (Banded Lapwing)			
Cheloniidae				
193.	25336 <i>Chelonia mydas</i> (Green Turtle)		T	
194.	25473 <i>Eretmochelys imbricata</i> (Hawksbill Turtle)		T	

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195.	25342 <i>Eretmochelys imbricata</i> subsp. <i>bissa</i> (Hawksbill Turtle)		T	
196.	25344 <i>Natator depressus</i> (Flatback Turtle)		T	
Chirocentridae				
197.	<i>Chirocentrus dorab</i>			
Chironomidae				
198.	<i>Chironominae</i> sp.			
199.	<i>Chironomus</i> aff. <i>alternans</i> (V24) (CB)			
200.	<i>Cryptochironomus griseidorsum</i>			
201.	<i>Dicrotendipes</i> P5 (=balciunasi?) (PSW)			
202.	<i>Larsia albiceps</i>			
203.	<i>Orthoclaadiinae</i> sp.			
204.	<i>Paratanytarsus</i> sp. P2 (PSW)			
205.	<i>Polypedilum nubifer</i>			
206.	<i>Procladius paludicola</i>			
207.	<i>Rheotanytarsus trivittatus</i>			
208.	<i>Tanypodinae</i> sp.			
209.	<i>Tanytarsus fuscithorax/semibarbitarsus</i>			
210.	<i>Tanytarsus</i> sp. D (SAP)			
211.	<i>Tanytarsus</i> sp. P8 (PSW)			
Chydoridae				
212.	<i>Alona anodonta</i>			
213.	<i>Alona</i> cf. <i>verrucosa</i>			
214.	<i>Alona rigidicaudis</i>			
215.	<i>Ephemeroporus barroisi</i> s.l.			
216.	<i>Leberis</i> cf. <i>diaphanus</i>			
217.	<i>Ovatalona</i> cf. <i>cambouei</i>			
Ciconiidae				
218.	25578 <i>Ephippiorhynchus asiaticus</i> (Black-necked Stork)			
Clupeidae				
219.	<i>Clupeid</i> sp.			
220.	<i>Herklotsichthys koningsbergeri</i>			
221.	<i>Nematalosa erebi</i>			
222.	<i>Spratelloides delicatulus</i>			
Coenagrionidae				
223.	<i>Coenagrionidae</i> sp.			
224.	<i>Ischnura aurora aurora</i>			
Colubridae				
225.	25327 <i>Fordonia leucobalia</i> (White-bellied Mangrove Snake)			
Columbidae				
226.	24399 <i>Columba livia</i> (Domestic Pigeon)	Y		
227.	24401 <i>Geopelia cuneata</i> (Diamond Dove)			
228.	24402 <i>Geopelia humeralis</i> (Bar-shouldered Dove)			
229.	25585 <i>Geopelia striata</i> (Zebra Dove)			
230.	24403 <i>Geopelia striata</i> subsp. <i>placida</i> (Peaceful Dove)			
231.	24404 <i>Geophaps plumifera</i> (Spinifex Pigeon)			
232.	24407 <i>Ocyphaps lophotes</i> (Crested Pigeon)			
233.	24409 <i>Phaps chalcoptera</i> (Common Bronzewing)			
234.	24411 <i>Phaps histrionica</i> (Flock Bronzewing, Flock Pigeon)			
235.	25589 <i>Streptopelia chinensis</i> (Spotted Turtle-Dove)	Y		
Congridae				
236.	<i>Conger cinereus</i>			
Corinnidae				
237.	<i>Supunna picta</i>			
Corixidae				
238.	<i>Agraptocorixa parvipunctata</i>			
239.	<i>Corixidae</i> sp.			
240.	<i>Micronecta gracilis</i>			
241.	<i>Micronecta</i> n. sp. P3 (PSW)			
242.	<i>Micronecta</i> sp.			
Corvidae				
243.	24416 <i>Corvus bennetti</i> (Little Crow)			
244.	25593 <i>Corvus orru</i> (Torresian Crow)			
245.	24419 <i>Corvus splendens</i> (House Crow)			

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Cracticidae				
246.	24420 <i>Cracticus nigrogularis</i> (Pied Butcherbird)			
247.	25595 <i>Cracticus tibicen</i> (Australian Magpie)			
248.	25596 <i>Cracticus torquatus</i> (Grey Butcherbird)			
Cuculidae				
249.	42307 <i>Cacomantis pallidus</i> (Pallid Cuckoo)			
250.	24431 <i>Chrysococcyx basalis</i> (Horsfield's Bronze Cuckoo)			
251.	24434 <i>Chrysococcyx osculans</i> (Black-eared Cuckoo)			
Culicidae				
252.	<i>Anopheles annulipes</i> s.l.			
253.	<i>Culex</i> (<i>Culex</i>) <i>annulirostris</i>			
254.	<i>Culex crinicauda</i>			
255.	<i>Culex</i> nr. <i>crinicauda</i> (PSW)			
256.	<i>Culex palpalis</i>			
257.	<i>Culicidae</i> sp.			
Cyclopidae				
258.	<i>Mesocyclops brooksi</i>			
259.	<i>Metacyclops</i> sp. P2 (PSW)			
260.	<i>Microcyclops varicans</i>			
261.	<i>Thermocyclops decipiens</i>			
Cynoglossidae				
262.	<i>Cynoglossus maculipinnis</i>			
263.	<i>Cynoglossus</i> sp.			
264.	<i>Paraplagusia guttata</i>			Y
Cypridae				
265.	<i>Bennelongia minimus</i>			
266.	<i>Cyprretta</i> ? <i>lutea</i>			
267.	<i>Cyprretta seurati</i>			
268.	<i>Cyprretta</i> sp PSW074			
269.	<i>Cypricercus salinus</i>			
270.	<i>Cypricercus</i> sp. 422 (CB)			
271.	<i>Hemicypris megalops</i>			
272.	<i>Heterocypris</i> sp.			
273.	<i>Heterocypris tatei</i>			
274.	<i>Ilyodromus</i> sp BOS25			
275.	<i>Ilyodromus</i> sp. PB			
276.	<i>Isocypris williamsi</i> (ex <i>Ilyodromus</i> sp. 413)			
277.	<i>Zonocyprretta kalimna</i>			
Cyzicidae				
278.	<i>Ozestheria packardii</i>			
Daphniidae				
279.	<i>Ceriodaphnia cornuta</i>			
280.	<i>Ceriodaphnia</i> n. sp. a (Berner sp.#3) (SAP)			
281.	<i>Ceriodaphnia</i> n. sp. c (Berner sp.#1) (SAP)			
Dasyuridae				
282.	24091 <i>Dasykaluta rosamondae</i> (Little Red Kaluta)			
283.	24093 <i>Dasyurus hallucatus</i> (Northern Quoll)			
284.	24095 <i>Ningaiu timealeyi</i> (Pilbara Ningaiu)			T
285.	<i>Planigale</i> sp. nov.			
286.	24105 <i>Pseudantechinus roryi</i> (Rory's Pseudantechinus)			
287.	24106 <i>Pseudantechinus woolleyae</i> (Woolley's Pseudantechinus)			
288.	24116 <i>Sminthopsis macroura</i> (Stripe-faced Dunnart)			
Delphinidae				
289.	24057 <i>Lagenodelphis hosei</i> (Fraser's Dolphin)			
290.	48114 <i>Stenella longirostris</i> (Spinner Dolphin)			P4
291.	30954 <i>Tursiops aduncus</i> (Indo-Pacific Bottlenose Dolphin)			
Diatom Family				
292.	<i>Achnanthyrium minutissima</i> (Kütz.) Czarnecki			
293.	<i>Caloneis silicula</i> (Ehr.) Cl.			
294.	<i>Cymbella delicatula</i> Kütz.			
295.	<i>Hantzschia amphioxys</i> (Ehr.) Grun.			
296.	<i>Luticola mutica</i> (Kütz.) Mann			
297.	<i>Nitzschia microcephala</i> Grun.			
298.	<i>Nitzschia perminuta</i> (Grun.) M. Peragallo			
299.	<i>Nitzschia sigma</i> (Kütz.) W. Sm.			

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300.	<i>Pinnularia divergens</i> W. Sm.			
301.	<i>Pinnularia subrostrata</i> (A. Cl.) Cl.-Euler			
302.	<i>Stauroneis anceps</i> Ehr.			
303.	<i>Stauroneis phoenicenteron</i> (Nitz.) Ehr.			
Dicaeidae				
304.	25607 <i>Dicaeum hirundinaceum</i> (Mistletoebird)			
Dicruridae				
305.	24443 <i>Grallina cyanoleuca</i> (Magpie-lark)			
306.	48096 <i>Rhipidura albiscapa</i> (Grey Fantail)			
307.	25614 <i>Rhipidura leucophrys</i> (Willie Wagtail)			
308.	24454 <i>Rhipidura leucophrys</i> subsp. <i>leucophrys</i> (Willie Wagtail)			
309.	24457 <i>Rhipidura phasiana</i> (Mangrove Grey Fantail)			
Diffugiidae				
310.	<i>Diffugia</i> sp. P1			
Diplodactylidae				
311.	25456 <i>Crenadactylus ocellatus</i> (Clawless Gecko)			
312.	24919 <i>Crenadactylus ocellatus</i> subsp. <i>horni</i> (Clawless Gecko)			
313.	24926 <i>Diplodactylus conspicillatus</i> (Fat-tailed Gecko)			
314.	41404 <i>Diplodactylus galaxias</i> (Northern Pilbara Beak-faced Gecko)			
315.	24937 <i>Diplodactylus mitchelli</i>			
316.	24944 <i>Diplodactylus savagei</i> (Southern Pilbara Beak-faced Gecko)			
317.	30933 <i>Lucasium stenodactylum</i>			
318.	24976 <i>Oedura marmorata</i> (Marbled Velvet Gecko)			
319.	24982 <i>Rhynchoedura ornata</i> (Western Beaked Gecko)			
320.	24924 <i>Strophurus ciliaris</i> subsp. <i>aberrans</i>			
321.	24927 <i>Strophurus elderi</i>			
322.	24932 <i>Strophurus jeanae</i>			
323.	24949 <i>Strophurus wellingtonae</i>			
Dugongidae				
324.	24084 <i>Dugong dugon</i> (Dugong)		S	
Dytiscidae				
325.	<i>Allodessus bistrigatus</i>			
326.	<i>Cybister tripunctatus</i>			
327.	<i>Dytiscidae</i> sp.			
328.	<i>Eretes australis</i>			
329.	<i>Hydroglyphus grammopterus</i> (=trilineatus)			
330.	<i>Hydroglyphus leai</i>			
331.	<i>Hydroglyphus orthogrammus</i>			
332.	<i>Hyphydrus elegans</i>			
333.	<i>Hyphydrus lyratus</i>			
334.	<i>Hyphydrus</i> sp.			
335.	<i>Laccophilus sharpi</i>			
336.	<i>Limbodessus compactus</i>			
Ecnomidae				
337.	<i>Ecnomidae</i> sp.			
338.	<i>Ecnomus pilbarensis</i>			
Elapidae				
339.	<i>Acanthophis wellsei</i>			
340.	25332 <i>Acanthophis wellsi</i> (Pilbara Death Adder)			
341.	25355 <i>Aipysurus laevis</i> (Olive Seasnake)			
342.	25331 <i>Brachyurophis approximans</i> (North-western Shovel-nosed Snake)			
343.	25468 <i>Demansia psammophis</i> (Yellow-faced Whipsnake)			
344.	25295 <i>Demansia psammophis</i> subsp. <i>cupreiceps</i> (Yellow-faced Whipsnake)			
345.	25296 <i>Demansia psammophis</i> subsp. <i>reticulata</i> (Yellow-faced Whipsnake)			
346.	25297 <i>Demansia rufescens</i> (Rufous Whipsnake)			
347.	25362 <i>Ephalophis greyae</i>			
348.	25301 <i>Furina ornata</i> (Moon Snake)			
349.	25363 <i>Hydrelaps darwiniensis</i>			
350.	25261 <i>Pseudechis australis</i> (Mulga Snake)			
351.	42416 <i>Pseudonaja mengdeni</i> (Western Brown Snake)			
352.	25263 <i>Pseudonaja modesta</i> (Ringed Brown Snake)			
353.	25264 <i>Pseudonaja nuchalis</i> (Gwardar, Northern Brown Snake)			
354.	25269 <i>Suta fasciata</i> (Rosen's Snake)			
355.	25307 <i>Suta punctata</i> (Spotted Snake)			
Eleotridae				
356.	<i>Bostrychus sinensis</i>			

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Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Elopidae				
357.	<i>Elops hawaiiensis</i>			Y
Emballonuridae				
358.	24175 <i>Taphozous georgianus</i> (Common Sheath-tailed Bat)			
Enchytraeidae				
359.	<i>Enchytraeidae</i> sp.			
Ephydriidae				
360.	<i>Ephydriidae</i> sp.			
361.	<i>Ephydriidae</i> sp. 12 (PSW)			
Epistylididae				
362.	<i>Epistylis</i> sp			
Estrilidae				
363.	24631 <i>Emblema pictum</i> (Painted Finch)			
364.	24633 <i>Heteromunia pectoralis</i> (Pictorella Mannikin)			
365.	25685 <i>Neochmia ruficauda</i> (Star Finch)			
366.	<i>Taeniopygia castanotis</i>			
367.	30870 <i>Taeniopygia guttata</i> (Zebra Finch)			
Euchlanidae				
368.	<i>Euchlanis dilatata</i>			
369.	<i>Euchlanis lyra</i>			
Euglyphidae				
370.	<i>Euglypha</i> sp.			
Exocoetidae				
371.	<i>Cheilopogon arcticeps</i>			
372.	<i>Paraexocoetus brachypterus</i>			Y
Falconidae				
373.	25621 <i>Falco berigora</i> (Brown Falcon)			
374.	24471 <i>Falco berigora</i> subsp. <i>berigora</i> (Brown Falcon)			
375.	25622 <i>Falco cenchroides</i> (Australian Kestrel, Nankeen Kestrel)			
376.	25623 <i>Falco longipennis</i> (Australian Hobby)			
377.	25624 <i>Falco peregrinus</i> (Peregrine Falcon)		S	
378.	24475 <i>Falco peregrinus</i> subsp. <i>macropus</i> (Australian Peregrine Falcon)		S	
379.	24476 <i>Falco subniger</i> (Black Falcon)			
Felidae				
380.	24041 <i>Felis catus</i> (Cat)	Y		
Flosculariidae				
381.	<i>Lacinularia flosculosa</i>			
Fregatidae				
382.	24478 <i>Fregata ariel</i> (Lesser Frigatebird)		IA	
Gallieniellidae				
383.	<i>Meedo houstoni</i>			
Gekkonidae				
384.	24956 <i>Gehyra pilbara</i>			
385.	24958 <i>Gehyra punctata</i>			
386.	24959 <i>Gehyra variegata</i>			
387.	25232 <i>Hemidactylus frenatus</i> (Asian House Gecko)	Y		
388.	24961 <i>Heteronotia binoei</i> (Bynoe's Gecko)			
Gerreidae				
389.	<i>Gerres filamentosus</i>			
390.	<i>Gerres subfasciatus</i>			
Ginglymostomatidae				
391.	<i>Nebrius ferrugineus</i>			Y
Glareolidae				
392.	24481 <i>Glareola maldivarum</i> (Oriental Pratincole)		IA	
393.	24482 <i>Sillitia isabella</i> (Australian Pratincole)			
Gobiesocidae				
394.	<i>Diademichthys lineatus</i>			
395.	<i>Discotrema lineata</i>			Y
396.	<i>Lepadichthys sandaracatus</i>			



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Gobiidae				
397.	<i>Acentrogobius gracilis</i>			
398.	<i>Acentrogobius</i> sp.			
399.	<i>Amblyeleotris gymnocephala</i>			
400.	<i>Amblygobius bynoensis</i>			
401.	<i>Asterropteryx semipunctatus</i>			
402.	<i>Bathygobius cocosensis</i>			
403.	<i>Bathygobius fuscus</i>			
404.	<i>Bathygobius laddi</i>			
405.	<i>Bathygobius</i> sp.			
406.	<i>Bryaninops loki</i>			
407.	<i>Callogobius</i> sp. 2			Y
408.	<i>Drombus</i> sp.			
409.	<i>Eviota queenslandica</i>			
410.	<i>Eviota</i> sp.			
411.	<i>Eviota zebrina</i>			
412.	<i>Favonigobius melanobranchus</i>			
413.	<i>Favonigobius</i> sp.			
414.	<i>Glossogobius giuris</i>			
415.	<i>Glossogobius</i> sp.			
416.	<i>Gnatholepis argus</i>			
417.	<i>Gobiodon histrio</i>			
418.	<i>Gobiodon quinquestrigatus</i>			
419.	<i>Gobiodon rivulatus</i>			
420.	<i>Gobiodon</i> sp.			
421.	<i>Istigobius nigroocellatus</i>			
422.	<i>Istigobius ornatus</i>			
423.	<i>Oxyurichthys</i> sp.			
424.	<i>Pandaka lidwilli</i>			
425.	<i>Parachaeturichthys</i> sp.			Y
426.	<i>Periophthalmus argentilineatus</i>			
427.	<i>Pleurosicya</i> sp.			
428.	<i>Priolepis nuchifasciata</i>			
429.	<i>Valenciennesa muralis</i>			
430.	<i>Yongeichthys nebulosus</i>			
Gobioididae				
431.	<i>Clenotrypauchen microcephalus</i>			
Gomphidae				
432.	<i>Gomphidae</i> sp.			
Gruidae				
433.	24484 <i>Grus rubicunda</i> (Brolga)			
Gyrinidae				
434.	<i>Dineutus australis</i>			
Haematopodidae				
435.	25627 <i>Haematopus fuliginosus</i> (Sooty Oystercatcher)			
436.	24487 <i>Haematopus longirostris</i> (Pied Oystercatcher)			
437.	<i>Haematopus ostralegus</i>			Y
Haemulidae				
438.	<i>Pomadasys kaakan</i>			
439.	<i>Pomadasys maculatus</i>			
Halacaridae				
440.	<i>Actacarus pacificus</i>			
441.	<i>Agauopsis arborea</i>			Y
442.	<i>Agauopsis dasyderma</i>			Y
443.	<i>Agauopsis moorea</i>			Y
444.	<i>Agauopsis obtusa</i>			Y
445.	<i>Anomalohalacarus dampierensis</i>			Y
446.	<i>Copidognathus lutarius</i>			Y
447.	<i>Copidognathus meridianus</i>			
448.	<i>Copidognathus piger</i>			Y
449.	<i>Halacaridae</i> sp.			
450.	<i>Isobactrus australiensis</i>			Y
451.	<i>Isobactrus obesus</i>			Y
452.	<i>Rhombognathus dispar</i>			Y
453.	<i>Rhombognathus ocularis</i>			Y
454.	<i>Rhombognathus scutulatus</i>			
455.	<i>Scaplognathides hawaiiensis</i>			

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456.	<i>Scaptognathides ornatus</i>			Y
457.	<i>Simognathus platyaspis</i>			Y
458.	<i>Simognathus salebrosus</i>			Y
459.	<i>Simognathus tener</i>			Y
Halcyonidae				
460.	25547 <i>Dacelo leachii</i> (Blue-winged Kookaburra)			
461.	25548 <i>Todiramphus chloris</i> (Collared Kingfisher)			
462.	24306 <i>Todiramphus chloris</i> subsp. <i>pilbara</i> (Pilbara Collared Kingfisher)			
463.	42351 <i>Todiramphus pyrrhopygius</i> (Red-backed Kingfisher)			
464.	25549 <i>Todiramphus sanctus</i> (Sacred Kingfisher)			
465.	24309 <i>Todiramphus sanctus</i> subsp. <i>sanctus</i> (Sacred Kingfisher)			
Hebridae				
466.	<i>Hebridae</i> sp.			
Hemicorduliidae				
467.	<i>Hemicordulia</i> sp.			
Hemiramphidae				
468.	<i>Hemiramphus</i> sp.			
Hexarthridae				
469.	<i>Hexarthra cf brandorffi</i> (PSW)			
470.	<i>Hexarthra</i> sp P3 5-2/5-2 (PSW)			Y
Hipposideridae				
471.	43368 <i>Rhinonictes aurantia</i> (Orange Leaf-nosed bat)		P4	
Hirundinidae				
472.	24491 <i>Hirundo neoxena</i> (Welcome Swallow)			
473.	25630 <i>Hirundo rustica</i> (Barn Swallow)		IA	
474.	48060 <i>Petrochelidon ariel</i> (Fairy Martin)			
475.	48061 <i>Petrochelidon nigricans</i> (Tree Martin)			
Holocentridae				
476.	<i>Myripristis berndti</i>			
477.	<i>Myripristis hexagona</i>			
478.	<i>Sargocentron rubrum</i>			
Hydrachnidae				
479.	<i>Hydrachna</i> sp. 4/5 (PSW)			
Hydraenidae				
480.	<i>Hydraena</i> sp.			
481.	<i>Hydraenidae</i> sp.			
Hydrobatidae				
482.	24497 <i>Oceanites oceanicus</i> (Wilson's Storm-petrel)		IA	
Hydrobiidae				
483.	<i>Hydrobiidae</i> sp P1 (not <i>assimineid</i>) (PSW)			
Hydrometridae				
484.	<i>Hydrometridae</i> sp.			
Hydrophilidae				
485.	<i>Berosus pulchellus</i>			
486.	<i>Enochrus deserticola</i>			
487.	<i>Enochrus</i> sp.			
488.	<i>Hydrochus obscuroaeus</i>			
489.	<i>Hydrophilidae</i> sp.			
490.	<i>Paracymus pygmaeus</i>			
491.	<i>Paracymus spenceri</i>			
492.	<i>Regimbartia attenuata</i>			
493.	<i>Stemolophus australis</i>			
Hydropsychidae				
494.	<i>Cheumatopsyche wellsae</i>			
Hydroptilidae				
495.	<i>Helyethira</i> sp.			
496.	<i>Hydroptilidae</i> sp.			
Hylidae				
497.	25371 <i>Cyclorana australis</i> (Giant Frog)			
498.	25373 <i>Cyclorana cultripes</i> (Knife-footed Frog)			
499.	25375 <i>Cyclorana maini</i> (Sheep Frog)			

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500.	25392 <i>Litoria rubella</i> (Little Red Tree Frog)			
Hypsimetopodidae				
501.	<i>Pilbarophreatoicus platyarthricus</i>			
Ilyocypridae				
502.	<i>Ilyocypris australiensis</i>			
Ixodidae				
503.	<i>Amblyomma triguttatum</i>			
Labridae				
504.	<i>Choerodon cyanodus</i>			
505.	<i>Choerodon vitta</i>			
506.	<i>Coris</i> sp.			
507.	<i>Halichoeres melanochir</i>			
508.	<i>Halichoeres nigrescens</i>			
509.	<i>Halichoeres</i> sp.			
510.	<i>Labroides dimidiatus</i>			
511.	<i>Scarus ghobban</i>			
512.	<i>Stethojulis interrupta</i>			
Lamponidae				
513.	<i>Lampona ampeinna</i>			
514.	<i>Lampona cylindrata</i>			
515.	<i>Lamponina scutata</i>			
Laridae				
516.	24505 <i>Anous stolidus</i> subsp. <i>pileatus</i> (Common Noddy)		IA	
517.	41332 <i>Chlidonias leucopterus</i> (White-winged Black Tern, white-winged tern)		IA	
518.	<i>Chroicocephalus novaehollandiae</i>			
519.	48587 <i>Hydroprogne caspia</i> (Caspian Tern)		IA	
520.	25637 <i>Larus novaehollandiae</i> (Silver Gull)			
521.	25638 <i>Larus pacificus</i> (Pacific Gull)			
522.	41347 <i>Onychoprion anaethetus</i> (Bridled Tern)		IA	
523.	24521 <i>Sterna bengalensis</i> (Lesser Crested Tern)			
524.	25640 <i>Sterna dougallii</i> (Roseate Tern)		IA	
525.	25642 <i>Sterna hirundo</i> (Common Tern)		IA	
526.	25643 <i>Sterna hybrida</i> (Whiskered Tern)			
527.	48593 <i>Sternula albigriva</i> (Little Tern)		IA	
528.	48594 <i>Sternula nereis</i> (Fairy Tern)			
529.	<i>Thalasseus bengalensis</i>			
530.	48597 <i>Thalasseus bergii</i> (Crested Tern)		IA	
Latidae				
531.	<i>Psammoperca waigiensis</i>			
Lecanidae				
532.	<i>Lecane bifastigata</i>			Y
533.	<i>Lecane bulla</i>			
534.	<i>Lecane cf. ludwigii</i> (PSW)			
535.	<i>Lecane cf. rhenana</i> (SAP)			
536.	<i>Lecane luna</i>			
537.	<i>Lecane papuana</i>			
538.	<i>Lecane punctata</i>			
539.	<i>Lecane thalera</i>			
540.	<i>Lecane unguata</i>			
Leiognathidae				
541.	<i>Leiognathus</i> sp.			
542.	<i>Secutor insidiator</i>			
Lepadellidae				
543.	<i>Lepadella patella</i>			
Leporidae				
544.	24085 <i>Oryctolagus cuniculus</i> (Rabbit)	Y		
Leptoceridae				
545.	<i>Leptoceridae</i> sp.			
Libellulidae				
546.	<i>Diplacodes bipunctata</i>			
547.	<i>Diplacodes haematodes</i>			
548.	<i>Libellulidae</i> sp.			
549.	<i>Orthetrum caledonicum</i>			
550.	<i>Pantala flavescens</i>			

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551.	<i>Tramea stenoloba</i>			
Limnadiidae				
552.	<i>Eulimnadia dahli</i>			Y
553.	<i>Eulimnadia</i> sp. P1 (PSW)			Y
554.	<i>Limnadopsis "pilbarensis" (ex P2)(PSW)</i>			Y
555.	<i>Limnadopsis birchii</i>			
Limnocytheridae				
556.	<i>Limnocythere dorsosicula</i>			
Limnodynastidae				
557.	25422 <i>Neobatrachus aquilonius (Northern Burrowing Frog)</i>			
558.	25430 <i>Notaden nichollsi (Desert Spadefoot)</i>			
Lutjanidae				
559.	<i>Lutjanus argentimaculatus</i>			
560.	<i>Lutjanus carponotatus</i>			
561.	<i>Lutjanus fulviflamma</i>			
562.	<i>Lutjanus malabaricus</i>			
563.	<i>Lutjanus russellii</i>			
Lycosidae				
564.	<i>Hogna crispipes</i>			
565.	<i>Knoelle clara</i>			
566.	<i>Venatrix arenaris</i>			
Lymnaeidae				
567.	<i>Lymnaeidae</i> sp.			
Macropodidae				
568.	25489 <i>Macropus robustus (Euro, Biggada)</i>			
569.	24135 <i>Macropus robustus subsp. erubescens (Euro, Biggada)</i>			
570.	24136 <i>Macropus rufus (Red Kangaroo, Marlu)</i>			
571.	48034 <i>Osphranter robustus (Euro, Biggada)</i>			
572.	24144 <i>Petrogale rothschildi (Rothschild's Rock-wallaby)</i>			
Macrotrichidae				
573.	<i>Macrotrich</i> sp.			
Maluridae				
574.	25651 <i>Malurus lamberti (Variegated Fairy-wren)</i>			
575.	25652 <i>Malurus leucopterus (White-winged Fairy-wren)</i>			
Megadermatidae				
576.	24180 <i>Macroderma gigas (Ghost Bat)</i>		T	
Melanotaeniidae				
577.	<i>Melanotaenia australis</i>			
Meliphagidae				
578.	24568 <i>Epthianura aurifrons (Orange Chat)</i>			
579.	24570 <i>Epthianura tricolor (Crimson Chat)</i>			
580.	42314 <i>Gavicalis virescens (Singing Honeyeater)</i>			
581.	25661 <i>Lichmera indistincta (Brown Honeyeater)</i>			
582.	24582 <i>Lichmera indistincta subsp. indistincta (Brown Honeyeater)</i>			
583.	24583 <i>Manorina flavigula (Yellow-throated Miner)</i>			
584.	24589 <i>Melithreptus gularis subsp. laetior (Black-chinned Honeyeater)</i>			
585.	42344 <i>Purnella albifrons (White-fronted Honeyeater)</i>			
Meropidae				
586.	24598 <i>Merops ornatus (Rainbow Bee-eater)</i>			
Mesoveliidae				
587.	<i>Mesovelia hungerfordi</i>			
588.	<i>Mesoveliidae</i> sp.			
Moinidae				
589.	<i>Moina micrura</i> s.l.			
Molossidae				
590.	24181 <i>Chaerephon jobensis (Greater Northern Freetail-bat, Northern Mastiff Bat)</i>			
591.	<i>Mormopterus (Ozimops) cobourgiensis</i>			
592.	24183 <i>Mormopterus loriae (Little Northern Freetail-bat)</i>			
Monacanthidae				
593.	<i>Monacanthus chinensis</i>			
594.	<i>Paramonacanthus choirocephalus</i>			

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Monodactylidae				
595.	<i>Monodactylus argenteus</i>			
Motacillidae				
596.	25670 <i>Anthus australis</i> (Australian Pipit)			
597.	24599 <i>Anthus australis</i> subsp. <i>australis</i> (Australian Pipit)			
Mugilidae				
598.	<i>Liza alata</i>			
599.	<i>Liza subviridis</i>			
600.	<i>Liza vaigiensis</i>			
601.	<i>Mugil cephalus</i>			
602.	<i>Mugilid sp.</i>			
603.	<i>Valamugil buchanani</i>			
604.	<i>Valamugil seheli</i>			
Mullidae				
605.	<i>Upeneus sulphureus</i>			
Muraenidae				
606.	<i>Gymnothorax pseudothyroideus</i>			
607.	<i>Gymnothorax pseudothyroideus</i>			
608.	<i>Gymnothorax thyroideus</i>			
609.	<i>Gymnothorax undulatus</i>			
Muridae				
610.	24215 <i>Hydromys chrysogaster</i> (Water-rat, Rakali)		P4	
611.	24217 <i>Leggadina lakedownensis</i> (Northern Short-tailed Mouse, Lakeland Downs Mouse, Kerakenga)		P4	
612.	24223 <i>Mus musculus</i> (House Mouse)	Y		
613.	24224 <i>Notomys alexis</i> (Spinifex Hopping-mouse)			
614.	24233 <i>Pseudomys chapmani</i> (Western Pebble-mound Mouse, Ngadjil)		P4	
615.	24234 <i>Pseudomys delicatulus</i> (Delicate Mouse)			
616.	24237 <i>Pseudomys hermannsburgensis</i> (Sandy Inland Mouse)			
617.	24245 <i>Rattus rattus</i> (Black Rat)	Y		
618.	24246 <i>Rattus tunneyi</i> (Pale Field-rat)			
619.	24248 <i>Zyzomys argurus</i> (Common Rock-rat)			
Muscidae				
620.	<i>Muscidae sp. P1</i>			
Myobatrachidae				
621.	41428 <i>Uperoleia saxatilis</i> (Pilbara Toadlet)			
Naididae				
622.	<i>Naididae (ex Tubificidae)</i>			
Nematoda				
623.	<i>Nematoda sp. P2/P4 (PSW)</i>			
Nemesiidae				
624.	<i>Aname mainae</i>			
625.	<i>Aname mellosa</i>			
Nemipteridae				
626.	<i>Nemipterus celebicus</i>			
627.	<i>Pentapodus porosus</i>			
628.	<i>Pentapodus sp.</i>			
629.	<i>Pentapodus vitta</i>			
630.	<i>Scolopsis bilineatus</i>			
631.	<i>Scolopsis taenioptera</i>			
Nepidae				
632.	<i>Nepidae sp.</i>			
Notommatidae				
633.	<i>Cephalodella biungulata</i>			
634.	<i>Cephalodella cf forficula</i>			
635.	<i>Cephalodella gibba</i>			
636.	<i>Monommata sp.</i>			
Notonectidae				
637.	<i>Anisops canaliculatus</i>			
638.	<i>Anisops hackeri</i>			
639.	<i>Anisops nasutus</i>			
640.	<i>Anisops sp.</i>			
641.	<i>Notonectidae sp.</i>			

Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Ogcocephalidae				
642.	<i>Halieutaea brevicaudata?</i>			
Oligochaeta				
643.	<i>Oligochaeta sp.</i>			
Olpidae				
644.	<i>Indolpium sp.</i>			
Ophichthidae				
645.	<i>Muraenichthys sp.</i>			
646.	<i>Ophichthus celebicus?</i>			
647.	<i>Pisodonophis cancrivorus</i>			
648.	<i>Scolecenchelys macroptera</i>			
649.	<i>Yirkkala lumbricoides</i>			
650.	<i>Yirkkala sp.</i>			
Ophichinidae				
651.	? ?			
Opisthophora				
652.	<i>Opisthophora sp.</i>			
Opistognathidae				
653.	<i>Opistognathus darwiniensis</i>			
Ostracoda				
654.	<i>Ostracoda (unident.)</i>			
Otididae				
655.	24610 <i>Ardeotis australis (Australian Bustard)</i>			
Oxyopidae				
656.	<i>Oxyopes variabilis</i>			
Pachycephalidae				
657.	24620 <i>Pachycephala lanioides (White-breasted Whistler)</i>			
658.	25678 <i>Pachycephala melanura (Mangrove Golden Whistler)</i>			
659.	24621 <i>Pachycephala melanura subsp. melanura (Mangrove Golden Whistler)</i>			
660.	25680 <i>Pachycephala rufiventris (Rufous Whistler)</i>			
Paradoxosomatidae				
661.	<i>Boreoheesperus undulatus</i>			
662.	<i>Orthomorpha coarctata</i>			
Paralichthyidae				
663.	<i>Pseudorhombus argus</i>			
664.	<i>Pseudorhombus arsius</i>			
665.	<i>Pseudorhombus elevatus</i>			
666.	<i>Pseudorhombus sp.</i>			
Pardalotidae				
667.	24627 <i>Pardalotus rubricatus (Red-browed Pardalote)</i>			
668.	48053 <i>Pardalotus rubricatus subsp. rubricatus (Red-browed Pardalote)</i>			Y
669.	25682 <i>Pardalotus striatus (Striated Pardalote)</i>			
Passeridae				
670.	25687 <i>Passer domesticus (House Sparrow)</i>	Y		
671.	24642 <i>Passer montanus (Eurasian Tree Sparrow)</i>	Y		
Pegasidae				
672.	<i>Pegasus volitans</i>			
Pelecanidae				
673.	24648 <i>Pelecanus conspicillatus (Australian Pelican)</i>			
Pempheridae				
674.	<i>Pempheris ypsilychnus</i>			
Petroicidae				
675.	24653 <i>Eopsaltria pulverulenta (Mangrove Robin)</i>			
676.	<i>Peneoenanthe pulverulenta</i>			
Phalacrocoracidae				
677.	<i>Microcarbo melanoleucos</i>			
678.	25697 <i>Phalacrocorax carbo (Great Cormorant)</i>			
679.	25698 <i>Phalacrocorax melanoleucos (Little Pied Cormorant)</i>			
680.	24667 <i>Phalacrocorax sulcirostris (Little Black Cormorant)</i>			
681.	25699 <i>Phalacrocorax varius (Pied Cormorant)</i>			

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Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
Phasianidae				
682.	25701 <i>Coturnix ypsilophora</i> (Brown Quail)			
683.	24673 <i>Coturnix ypsilophora</i> subsp. <i>australis</i> (Brown Quail)			
684.	24672 <i>Coturnix ypsilophora</i> subsp. <i>cervina</i> (Brown Quail)			
Pholcidae				
685.	<i>Trichocyclops nigropunctatus</i>			
Phreodrilidae				
686.	<i>Phreodrilid with dissimilar ventral chaetae</i>			
687.	<i>Phreodrilid with similar ventral chaetae</i>			
Pinguipedidae				
688.	<i>Parapercis diplospilus</i>			
Pittidae				
689.	24677 <i>Pitta moluccensis</i> (Blue-winged Pitta)			
Planorbidae				
690.	<i>Glyptophysa</i> sp.			
691.	<i>Isidorella egraria</i>			
692.	<i>Planorbidae</i> sp.			
Platycephalidae				
693.	<i>Cymbacephalus bosschei</i>			
694.	<i>Cymbacephalus nematophthalmus</i>			
695.	<i>Inegocia japonica</i>			
696.	<i>Onigocia pedimacula</i>			
697.	<i>Onigocia pedimacula?</i>			
698.	<i>Platycephalus endrachtensis</i>			
699.	<i>Platycephalus</i> sp.			
700.	<i>Sorsogona tuberculata</i>			
701.	<i>Suggrundus macracanthus</i>			
Pleididae				
702.	<i>Pleididae</i> sp.			
Plotosidae				
703.	<i>Euristhmus microceps</i>			
704.	<i>Euristhmus sandrae</i>			Y
705.	<i>Neosilurus hyrtlil</i>			
706.	<i>Paraplotosus albilabris</i>			
707.	<i>Paraplotosus butleri</i>			
708.	<i>Paraplotosus muelleri</i>			
709.	<i>Plotosus lineatus</i>			
Podargidae				
710.	25703 <i>Podargus strigoides</i> (Tawny Frogmouth)			
711.	24679 <i>Podargus strigoides</i> subsp. <i>brachypterus</i> (Tawny Frogmouth)			
Podicipedidae				
712.	24681 <i>Poloiocephalus poloiocephalus</i> (Hoary-headed Grebe)			
713.	25705 <i>Tachybaptus novaehollandiae</i> (Australasian Grebe, Black-throated Grebe)			
Polynemidae				
714.	<i>Eleutheronema tetractylum</i>			
715.	<i>Polydactylus multiradiatus</i>			
Pomacanthidae				
716.	<i>Pomacanthus sexstriatus</i>			
Pomacentridae				
717.	<i>Abudefduf bengalensis</i>			
718.	<i>Chromis fumea</i>			
719.	<i>Dischistodus darwiniensis</i>			
720.	<i>Neoglyphidodon nigroris</i>			
721.	<i>Neopomacentrus azyron</i>			
722.	<i>Neopomacentrus cyanomos</i>			
723.	<i>Neopomacentrus filamentosus</i>			
724.	<i>Pomacentrus milleri</i>			
725.	<i>Pristotis obtusirostris</i>			
Pomatostomidae				
726.	25706 <i>Pomatostomus temporalis</i> (Grey-crowned Babbler)			
727.	24684 <i>Pomatostomus temporalis</i> subsp. <i>rubeculus</i> (Grey-crowned Babbler)			
Pontarachnidae				

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728.	<i>Litarachna bartschae</i>			Y
729.	<i>Pontarachne australis</i>			Y
Priacanthidae				
730.	<i>Priacanthus hamrur</i>			
Pristinidae				
731.	<i>Pristina longiseta</i>			
Procellariidae				
732.	48573 <i>Ardenna pacifica</i> (Wedge-tailed Shearwater)		IA	
733.	24716 <i>Puffinus pacificus</i> (Wedge-tailed Shearwater)		IA	
Prodidomidae				
734.	<i>Cryptoerithus halli</i>			
735.	<i>Cryptoerithus occultus</i>			
736.	<i>Prodidomus woodleigh</i>			
737.	<i>Wesmaladra nixaut</i>			
738.	<i>Wydundra kennedy</i>			
739.	<i>Wydundra nixaut</i>			Y
Psettodidae				
740.	<i>Psettodes erumei</i>			
Pseudochromidae				
741.	<i>Blennodesmus scapularis</i>			
742.	<i>Congrogadus spinifer</i>			
743.	<i>Congrogadus subducens</i>			
744.	<i>Pseudochromis wilsoni</i>			
Psittacidae				
745.	<i>Barnardius zonarius</i>			
746.	25715 <i>Cacatua roseicapilla</i> (Galah)			
747.	25716 <i>Cacatua sanguinea</i> (Little Corella)			
748.	24727 <i>Cacatua sanguinea</i> subsp. <i>westralensis</i> (Little Corella)			
749.	24736 <i>Melopsittacus undulatus</i> (Budgerigar)			
750.	<i>Neopsephotus bourkii</i>			
751.	24742 <i>Nymphicus hollandicus</i> (Cockatiel)			
752.	25721 <i>Platyercus zonarius</i> (Australian Ringneck, Ring-necked Parrot)			
Pteropodidae				
753.	24172 <i>Pteropus alecto</i> (Black Flying-fox)			
754.	24173 <i>Pteropus scapulatus</i> (Little Red Flying-fox)			
Ptilonorhynchidae				
755.	<i>Chlamydera guttatus</i>			Y
756.	<i>Ptilonorhynchus guttatus</i>			
Pygopodidae				
757.	24996 <i>Delma borea</i>			
758.	25001 <i>Delma nasuta</i>			
759.	25002 <i>Delma pax</i>			
760.	25004 <i>Delma tincta</i>			
761.	25005 <i>Lialis burtonis</i>			
Pyralidae				
762.	<i>Pyralidae</i> sp.			
Rallidae				
763.	25727 <i>Fulica atra</i> (Eurasian Coot)			
764.	25730 <i>Gallirallus philippensis</i> (Buff-banded Rail)			
765.	24765 <i>Gallirallus philippensis</i> subsp. <i>mellori</i> (Buff-banded Rail)			
766.	25731 <i>Porphyrio porphyrio</i> (Purple Swamphen)			
767.	25732 <i>Porzana pusilla</i> (Baillon's Crane)			
768.	24771 <i>Porzana tabuensis</i> (Spotless Crane)			
769.	48141 <i>Tribonyx ventralis</i> (Black-tailed Native-hen)			
Recurvirostridae				
770.	24774 <i>Cladorhynchus leucocephalus</i> (Banded Stilt)			
771.	25734 <i>Himantopus himantopus</i> (Black-winged Stilt)			
772.	24776 <i>Recurvirostra novaehollandiae</i> (Red-necked Avocet)			
Salticidae				
773.	<i>Grayenulla waldockae</i>			
774.	<i>Ornoedus orbiculatus</i>			
775.	<i>Simaetha tenuior</i>			
776.	<i>Zenodorus orbiculatus</i>			



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Scarabaeidae				
777.	<i>Heteronyx mimus</i>			
778.	<i>Heteronyx tepperi</i>			
Scatophagidae				
779.	<i>Scatophagus argus</i>			
780.	<i>Selenotoca multifasciata</i>			
781.	<i>Selenotoca</i> sp.			Y
Sciaenidae				
782.	<i>Protonibea diacanthus</i>			
Scincidae				
783.	25015 <i>Carlia munda</i> (Shaded-litter Rainbow Skink)			
784.	25017 <i>Carlia triacantha</i> (Desert Rainbow Skink)			
785.	30893 <i>Cryptoblepharus buchananii</i>			
786.	25020 <i>Cryptoblepharus plagiocephalus</i>			
787.	30892 <i>Cryptoblepharus ustulatus</i>			
788.	25024 <i>Ctenotus angusticeps</i> (Airlie Island Ctenotus, Northwestern coastal Ctenotus)		P3	
789.	25027 <i>Ctenotus australis</i>			
790.	25036 <i>Ctenotus duricola</i>			
791.	25039 <i>Ctenotus fallens</i>			
792.	25462 <i>Ctenotus grandis</i>			
793.	25043 <i>Ctenotus grandis</i> subsp. <i>titan</i>			
794.	25045 <i>Ctenotus helenae</i>			
795.	25052 <i>Ctenotus leonhardii</i>			
796.	25463 <i>Ctenotus pantherinus</i> (Leopard Ctenotus)			
797.	25060 <i>Ctenotus pantherinus</i> subsp. <i>acripes</i> (Leopard Ctenotus)			
798.	25064 <i>Ctenotus pantherinus</i> subsp. <i>ocellifer</i> (Leopard Ctenotus)			
799.	25070 <i>Ctenotus robustus</i>			
800.	25072 <i>Ctenotus rubicundus</i>			
801.	25073 <i>Ctenotus saxatilis</i> (Rock Ctenotus)			
802.	25074 <i>Ctenotus schomburgkii</i>			
803.	25077 <i>Ctenotus serventyi</i>			
804.	25466 <i>Cyclodomorphus melanops</i> (Slender Blue-tongue)			
805.	25090 <i>Cyclodomorphus melanops</i> subsp. <i>melanops</i> (Slender Blue-tongue)			
806.	41406 <i>Egernia cygnitos</i> (Western Pilbara Spiny-tailed Skink)			
807.	25092 <i>Egernia depressa</i> (Southern Pygmy Spiny-tailed Skink)			
808.	25101 <i>Egernia pilbarensis</i> (Pilbara Skink)			
809.	42404 <i>Eremiascincus isolepis</i>			
810.	41409 <i>Eremiascincus musivus</i> (Mosaic Desert Skink)			
811.	25125 <i>Lerista bipes</i>			
812.	30928 <i>Lerista clara</i>			
813.	30929 <i>Lerista jacksoni</i>			
814.	25155 <i>Lerista muelleri</i>			
815.	30925 <i>Lerista verhmens</i>			
816.	41417 <i>Liopholis striata</i> (Night Skink)			
817.	25184 <i>Menetia greyii</i>			
818.	25491 <i>Menetia surda</i>			
819.	25187 <i>Menetia surda</i> subsp. <i>surda</i>			
820.	25495 <i>Morethia ruficauda</i>			
821.	25193 <i>Morethia ruficauda</i> subsp. <i>exquisita</i>			
822.	25196 <i>Notoscincus butleri</i> (lined soil-crevice skink (Dampier))		P4	
823.	25197 <i>Notoscincus ornatus</i> subsp. <i>ornatus</i>			
824.	25202 <i>Tiliqua multifasciata</i> (Central Blue-tongue)			
Scirtidae				
825.	<i>Scirtidae</i> sp.			
Scolopacidae				
826.	41323 <i>Actitis hypoleucos</i> (Common Sandpiper)		IA	
827.	25736 <i>Arenaria interpres</i> (Ruddy Turnstone)		IA	
828.	24779 <i>Calidris acuminata</i> (Sharp-tailed Sandpiper)		IA	
829.	24780 <i>Calidris alba</i> (Sanderling)		IA	
830.	25738 <i>Calidris canutus</i> (Red Knot, knot)		IA	
831.	24784 <i>Calidris ferruginea</i> (Curllew Sandpiper)		T	
832.	24788 <i>Calidris ruficollis</i> (Red-necked Stint)		IA	
833.	24789 <i>Calidris subminuta</i> (Long-toed Stint)		IA	
834.	24790 <i>Calidris tenuirostris</i> (Great Knot)		T	
835.	24793 <i>Gallinago stenura</i> (Pin-tailed Snipe)		IA	
836.	25739 <i>Limicola falcinellus</i> (Broad-billed Sandpiper)		IA	
837.	30932 <i>Limosa lapponica</i> (Bar-tailed Godwit)		IA	

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838.	25741 <i>Limosa limosa</i> (Black-tailed Godwit)		IA	
839.	24798 <i>Numenius madagascariensis</i> (Eastern Curlew)		T	
840.	24799 <i>Numenius minutus</i> (Little Curlew, Little Whimbrel)		IA	
841.	25742 <i>Numenius phaeopus</i> (Whimbrel)		IA	
842.	24803 <i>Tringa brevipes</i> (Grey-tailed Tattler)		P4	
843.	24806 <i>Tringa glareola</i> (Wood Sandpiper)		IA	
844.	24808 <i>Tringa nebularia</i> (Common Greenshank, greenshank)		IA	
845.	24809 <i>Tringa stagnatilis</i> (Marsh Sandpiper, little greenshank)		IA	
846.	41351 <i>Xenus cinereus</i> (Terek Sandpiper)		IA	
Scolopendridae				
847.	<i>Arthrorhabdus paucispinus</i>			
848.	<i>Ethmostigmus curtipes</i>			
849.	<i>Scolopendra laeta</i>			
850.	<i>Scolopendra morsitans</i>			
Scombridae				
851.	<i>Rastrelliger kanagurta</i>			
Scorpaenidae				
852.	<i>Parascorpaena picta</i>			
853.	<i>Pterois volitans</i>			
Scutigeridae				
854.	<i>Pilbarascutigera incola</i>			
Serranidae				
855.	<i>Cephalopholis boenak</i>			
856.	<i>Chromileptes altivelis</i>			
857.	<i>Epinephelus bilobatus</i>			
858.	<i>Epinephelus coioides</i>			
859.	<i>Epinephelus corallicola</i>			
860.	<i>Epinephelus fasciatus</i>			
861.	<i>Epinephelus malabaricus</i>			
862.	<i>Epinephelus quoyanus</i>			
863.	<i>Epinephelus sexfasciatus</i>			
Sididae				
864.	<i>Diaphanosoma excisum</i>			
865.	<i>Latonopsis australis</i>			
Sillaginidae				
866.	<i>Sillago burrus</i>			
867.	<i>Sillago lutea</i>			
Simuliidae				
868.	<i>Simulium ornatipes</i>			
Soleidae				
869.	<i>Dexillus muelleri</i>			
870.	<i>Soleichthys heterorhinos</i>			
871.	<i>Zebrias quagga</i>			
Sparassidae				
872.	<i>Isopedella gibsandi</i>			
873.	<i>Isopedella tindalei</i>			
874.	<i>Pediana horni</i>			
875.	<i>Pediana tenuis</i>			
Sparidae				
876.	<i>Acanthopagrus latus</i>			
Sphyraenidae				
877.	<i>Sphyraena barracuda</i>			
878.	<i>Sphyraena sp.</i>			
Stratiomyidae				
879.	<i>Stratiomyidae sp.</i>			
Strigidae				
880.	48016 <i>Ninox boobook</i> (Boobook Owl)			
881.	25747 <i>Ninox connivens</i> (Barking Owl)			
Sturnidae				
882.	47954 <i>Gelochelidon nilotica</i> (Gull-billed Tern)		IA	
Sulidae				
883.	25754 <i>Sula leucogaster</i> (Brown Booby)		IA	



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Sylviidae				
884.	25755 <i>Acrocephalus australis</i> (Australian Reed Warbler)			
885.	24837 <i>Eremiornis carteri</i> (Spiniflex-bird)			
Synanceiidae				
886.	<i>Mincus versicolor</i>			
887.	<i>Synanceia horrida</i>			
Synchaetidae				
888.	<i>Polyarthra dolichoptera</i>			
Syngnathidae				
889.	<i>Festucalex</i> sp.			
890.	<i>Hallichthys taeniophorus</i>			
891.	<i>Hippichthys penicillus</i>			
892.	<i>Hippocampus</i> sp.			
893.	<i>Micrognathus micronotopterus</i>			
Tabanidae				
894.	<i>Tabanidae</i> sp.			
Tachyglossidae				
895.	24207 <i>Tachyglossus aculeatus</i> (Short-beaked Echidna)			
Terapontidae				
896.	<i>Amniataba caudavittata</i>			
897.	<i>Amniataba percooides</i>			
898.	<i>Leiopotherapon unicolor</i>			
899.	<i>Terapon jarbua</i>			
Testudinellidae				
900.	<i>Testudinella patina</i>			
Tetraodontidae				
901.	<i>Chelonodon patoca</i>			
Tetrarogidae				
902.	<i>Cottapistus cottoides</i>			
903.	<i>Liocranium praepositum</i>			
904.	<i>Paracentropogon vespa</i>			
Tettigoniidae				
905.	<i>Antipodectes bituberculatus</i>			Y
Theridiidae				
906.	<i>Latrodectus geometricus</i>			
Thiaridae				
907.	<i>Thiaridae</i> sp.			
Threskiornithidae				
908.	24842 <i>Platalea regia</i> (Royal Spoonbill)			
909.	24843 <i>Plegadis falcinellus</i> (Glossy Ibis)		IA	
910.	24845 <i>Threskiornis spinicollis</i> (Straw-necked Ibis)			
Triacanthidae				
911.	<i>Triacanthus</i> sp.			
Trichocercidae				
912.	<i>Trichocerca similis</i>			
Trichonotidae				
913.	<i>Trichonotus setiger</i>			
Trichotriidae				
914.	<i>Macrochaetus</i> sp.			
Triglidae				
915.	<i>Lepidotrigla</i> sp.			
Trigoniulidae				
916.	<i>Austrostrophus stictopygus</i>			
Triopsidae				
917.	<i>Triops australiensis australiensis</i>			
918.	<i>Triops nr australiensis</i> (PSW) (?nsp BVT)			Y
Tripterygiidae				
919.	<i>Enneapterygius gracilis</i>			
920.	<i>Enneapterygius larsonae</i>			

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921.	<i>Enneapterygius philippinus</i>			
922.	<i>Enneapterygius</i> sp.			
923.	<i>Enneapterygius tutuilae</i>			
924.	<i>Helcogramma striata</i>			
925.	<i>Norfolkia brachylepis</i>			
Trombidiformes				
926.	<i>Acariformes</i> sp.			
Turbellaria				
927.	<i>Turbellaria</i> sp.			
Turnicidae				
928.	24851 <i>Turnix velox</i> (Little Button-quail)			
Tytonidae				
929.	<i>Tyto delicatula</i>			
Unionicolidae				
930.	<i>Encentridophorus sarasini</i>			
Urodacidae				
931.	<i>Urodacus armatus</i>			
Varanidae				
932.	25209 <i>Varanus acanthurus</i> (Spiny-tailed Monitor)			
933.	25210 <i>Varanus brevicauda</i> (Short-tailed Pygmy Monitor)			
934.	25212 <i>Varanus eremius</i> (Pygmy Desert Monitor)			
935.	25216 <i>Varanus giganteus</i> (Perentie)			
936.	25218 <i>Varanus gouldii</i> (Bungarra or Sand Monitor)			
937.	25524 <i>Varanus panoptes</i> (Yellow-spotted Monitor)			
938.	25223 <i>Varanus panoptes</i> subsp. <i>rubidus</i>			
939.	25224 <i>Varanus pilbarensis</i> (Pilbara Rock Monitor, Northern Pilbara Rock Goanna)			
940.	25526 <i>Varanus tristis</i> (Racehorse Monitor)			
941.	25227 <i>Varanus tristis</i> subsp. <i>tristis</i> (Racehorse Monitor)			
Veliferidae				
942.	<i>Metavelifer multiradiatus</i>			
Veliidae				
943.	<i>Microvelia</i> (<i>Austromicrovelia</i>) <i>peramoena</i>			
944.	<i>Veliidae</i> sp.			
Vespertilionidae				
945.	24192 <i>Nyctophilus arnhemensis</i> (Arnhem Land Long-eared Bat)			
946.	42365 <i>Nyctophilus daedalus</i> (Northwestern Long-eared Bat, Pallid Long-eared Bat)			
947.	24194 <i>Nyctophilus geoffroyi</i> (Lesser Long-eared Bat)			
948.	<i>Nyctophilus geoffroyi</i> subsp. <i>pallidus</i>			
949.	24205 <i>Vespadelus finlaysoni</i> (Finlayson's Cave Bat)			
Zodariidae				
950.	<i>Minasteron minusculum</i>			
Zosteropidae				
951.	24857 <i>Zosterops luteus</i> (Yellow White-eye)			

Conservation Codes
 T - Rare or likely to become extinct
 X - Presumed extinct
 IA - Protected under international agreement
 S - Other specially protected fauna
 1 - Priority 1
 2 - Priority 2
 3 - Priority 3
 4 - Priority 4
 5 - Priority 5

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



EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 14/03/19 17:12:27

[Summary](#)

[Details](#)

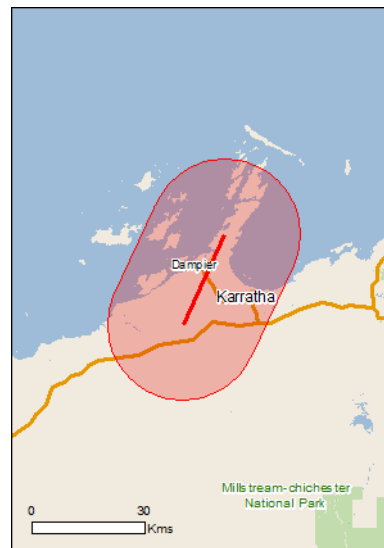
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

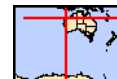
[Acknowledgements](#)



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[Coordinates](#)

[Buffer: 20.0Km](#)



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	31
Listed Migratory Species:	60

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Land:	2
Commonwealth Heritage Places:	None
Listed Marine Species:	101
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

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

State and Territory Reserves:	6
Regional Forest Agreements:	None
Invasive Species:	17
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

National Heritage Properties		[Resource Information]
Name	State	Status
Indigenous		
Dampier Archipelago (including Burrup Peninsula)	WA	Listed place

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding known to occur within area

Name	Status	Type of Presence
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Macrotis lagotis Greater Bilby [282]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Rhinonictis aurantia (Pilbara form) Pilbara Leaf-nosed Bat [82790]	Vulnerable	Species or species habitat may occur within area
Reptiles		
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus angusticeps Northwestern Coastal Ctenotus, Airlie Island Ctenotus [25937]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Liasis olivaceus barroni Olive Python (Pilbara subspecies) [66699]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat may occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus		
Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna pacifica		
Wedge-tailed Shearwater [84292]		Breeding known to occur within area
Calonectris leucomelas		
Streaked Shearwater [1077]		Species or species habitat may occur within area
Fregata ariel		
Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Hydroprogne caspia		
Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus		
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Onychoprion anaethetus		
Bridled Tern [82845]		Breeding known to occur within area
Sterna dougallii		
Roseate Tern [817]		Breeding likely to occur within area
Migratory Marine Species		
Anoxypristis cuspidata		
Narrow Sawfish, Knifetooth Sawfish [68448]		Species or species habitat likely to occur within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias		
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon		
Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area

Name	Threatened	Type of Presence
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Migratory Terrestrial Species		
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Thalasseus bergii Crested Tern [83000]		Breeding known to occur

Name	Threatened	Type of Presence
Tringa brevipes Grey-tailed Tattler [851]		within area Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [\[Resource Information \]](#)

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Defence - KARRATHA TRAINING DEPOT

Listed Marine Species [\[Resource Information \]](#)

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Species or species habitat known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area
Calidris alba Sanderling [875]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Species or species habitat known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Species or species habitat known to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Species or species habitat known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Species or species habitat known to occur within area
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat known to occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat known to occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat known to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Species or species habitat known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Species or species habitat known to occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur

Name	Threatened	Type of Presence
Limicola falcinellus Broad-billed Sandpiper [842]		within area Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius phaeopus Whimbrel [849]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Species or species habitat known to occur within area
Pluvialis squatarola Grey Plover [865]		Species or species habitat known to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area

Name	Threatened	Type of Presence
Sterna dougallii Roseate Tern [817]		Breeding likely to occur within area
Stiltia isabella Australian Pratincole [818]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Species or species habitat known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Species or species habitat known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Species or species habitat known to occur within area
Fish		
Bulbonaricus brauni Braun's Pughead Pipefish, Pug-headed Pipefish [66189]		Species or species habitat may occur within area
Campichthys tricarinatus Three-keel Pipefish [66192]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]		Species or species habitat may occur within area
Choeroichthys suillus Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
Doryrhamphus janssi Cleaner Pipefish, Janss' Pipefish [66212]		Species or species habitat may occur within area
Doryrhamphus negrosensis Flagtail Pipefish, Masthead Island Pipefish [66213]		Species or species habitat may occur within area
Festucalex scalaris Ladder Pipefish [66216]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus brocki Brock's Pipefish [66219]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Haliichthys taeniophorus Ribboned Pipehorse, Ribboned Seadragon [66226]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus angustus Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
Hippocampus histrix Spiny Seahorse, Thorny Seahorse [66236]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Micrognathus micronotopterus Tidepool Pipefish [66255]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Trachyrhamphus longirostris Straightstick Pipefish, Long-nosed Pipefish, Straight Stick Pipefish [66281]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus apraefrontalis Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Aipysurus eydouxi Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Aipysurus tenuis Brown-lined Seasnake [1121]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Ephalophis greyi North-western Mangrove Seasnake [1127]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrelaps darwiniensis Black-ringed Seasnake [1100]		Species or species habitat may occur within area
Hydrophis czebalukovi Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis mcdowellii null [25926]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat likely to occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat known to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves		[Resource Information]
Name	State	
Murujuga	WA	
Unnamed WA36907	WA	
Unnamed WA36909	WA	
Unnamed WA36910	WA	
Unnamed WA36915	WA	
Unnamed WA38287	WA	

Invasive Species [\[Resource Information \]](#)

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

Name	Status	Type of Presence
Birds		
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species

Name	Status	Type of Presence
<p>Ramphotyphlops braminus Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]</p>		<p>habitat likely to occur within area</p> <p>Species or species habitat known to occur within area</p>

Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

Coordinates

-20.799064 116.682674,-20.596088 116.78361,-20.596088 116.782924,-20.596088 116.782924

Acknowledgements

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

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

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

Please feel free to provide feedback via the [Contact Us](#) page.

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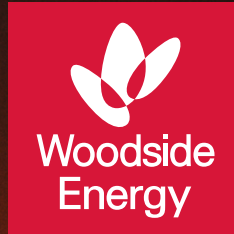
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WOODSIDE SOLAR FACILITY WEED MANAGEMENT PLAN



Woodside Solar Facility Weed Management Plan



Woodside Solar Facility Weed Management Plan

September 2022
Revision 0

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1. Context, Scope and Rationale

1.1 Proposal Overview

Woodside Power Pty Ltd (Woodside) is proposing to develop a Woodside Solar Facility, approximately 15 kilometres (km) southwest of Karratha, Western Australia (WA). This will generate electricity from a large scale solar photovoltaic farm (Solar PV Farm), complemented by energy storage (battery) infrastructure (the Proposal). The

The Solar PV Farm will be located immediately east of the Maitland Strategic Industrial Estate (MSIA), within the MSIA Buffer Area and former Karratha Station pastoral lease (Figure 1).

Key elements of the Proposal will involve the installation of solar panels and inverters with output of up to 500 MW(AC) in total, across multiple expansion phases. This will result in the installation of approximately 1,000,000 solar panels, each approximately 1 m by 2 m attached to mounting structures positioned 0.5 – 4 m above ground. There will be unsealed access roads between PV panel rows created for construction and retained for maintenance. The Solar PV Farm will likely have an access track from the North West Coastal Highway. The Solar PV farm will be complemented by supporting infrastructure such as a battery energy storage system and electrical substation.

The Solar PV Farm will comprise parallel rows of solar panels, with panels either on single axis tracking frames or fixed tilt frames. An optimised panel layout will be determined during the detailed design phase. The access tracks will be paved with crushed aggregate and at grade, including at crossings of drainage lines. Major drainage lines will not be infilled to construct solar panels, to maximise natural drainage patterns and minimise disturbance to more sensitive habitats.

A perimeter security fence will be installed around any installed infrastructure but located at sufficient distance from the solar panels to allow maintenance and fire response vehicles to move freely within the Solar PV Farm.

1.2 Scope & Applicability of this plan

This WMP has been developed to manage introduction or spread of weeds attributable to the construction and operation (including maintenance) of the Proposal, in particular potential impacts on uninfested P1 and P3 PECs within and adjacent to the Development Envelope. This WMP presents management criteria, monitoring and reporting requirements to be implemented to minimise potential impacts on the environment. This WMP has been developed in accordance with the *Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plans (EPA, 2021)*. A summary table is provided in Table 1

The Solar PV Farm will be developed within a Development Envelope of approximately 943 ha, with an initial capacity of up to 100 MW. Future expansions may expand solar generation capacity to 500 MW, within the defined DE.

Vegetation disturbance will only occur as expansion of each phase of the Solar PV Farm is commercially sanctioned. Most of the area within the DE is currently used for grazing cattle but is generally unfenced with little restriction on movement within the area. For this reason, it is important to define areas in which weed management activities will apply, as certain areas will be outside of the control of the Woodside Solar Facility. Definition of project phases and areas to which this plan apply are therefore defined below.

Table 1 WMP Summary Table

Title of Proposal	Woodside Solar Facility
Proponent Name	Woodside Power Pty Ltd
Purpose of the CHMP	Manage introduction or spread of weeds attributable to the Proposal, in particular potential impacts to uninfested P1 and P3 PECs within and adjacent to the Development Envelope.
Key Environmental Factor/s and Objective/s	Key Environmental Factor: Flora and Vegetation EPA Objective: To protect flora and vegetation so that biological diversity and ecological integrity are maintained
Key Provisions in the WMP	Management of any: <ul style="list-style-type: none"> • Spread of existing weeds within the Development Envelope to areas beyond • Minimisation of spread and where possible elimination of weeds within construction and operational areas Through the implementation of the following key provisions: <ul style="list-style-type: none"> • Regularly surveys of weed infested areas • Regular weed treatment • Communication of weed management objectives and procedures to staff and contractors • Auditing, monitoring and reporting against the requirements of this plan.

1.3 Project Phasing Overview

Construction phases

There is space within the Development Envelope for up to 500 MW of solar panels however the solar farm is expected to be initially constructed/expanded in phases of around 50 – 100MW. Each 50MW of solar PV is expected to require disturbance (either temporary or permanent) to around 100 hectares of land.

At the completion of each construction phase, any temporary construction/laydown areas will be rehabilitated. The only permanent disturbance associated with the Proposal will be where infrastructure such as roads, inverters, batteries or solar panel mounting hardware is installed. Low vegetation will regrow amongst the rows of Solar PV panels, but due to shading the composition of the vegetation may be different to that which currently is in place.

Operations/Maintenance phases

During the operational phase, there will be minimal activity within the site, limited to light vehicle travel around the project area to conduct inspections or maintenance as required. This WMP will apply to these activities, but only within defined project areas (i.e. within fenced areas of the site or areas within the development envelope within a 100m distance of which infrastructure has been installed unless being conducted specifically in support of the Woodside solar PV facility)

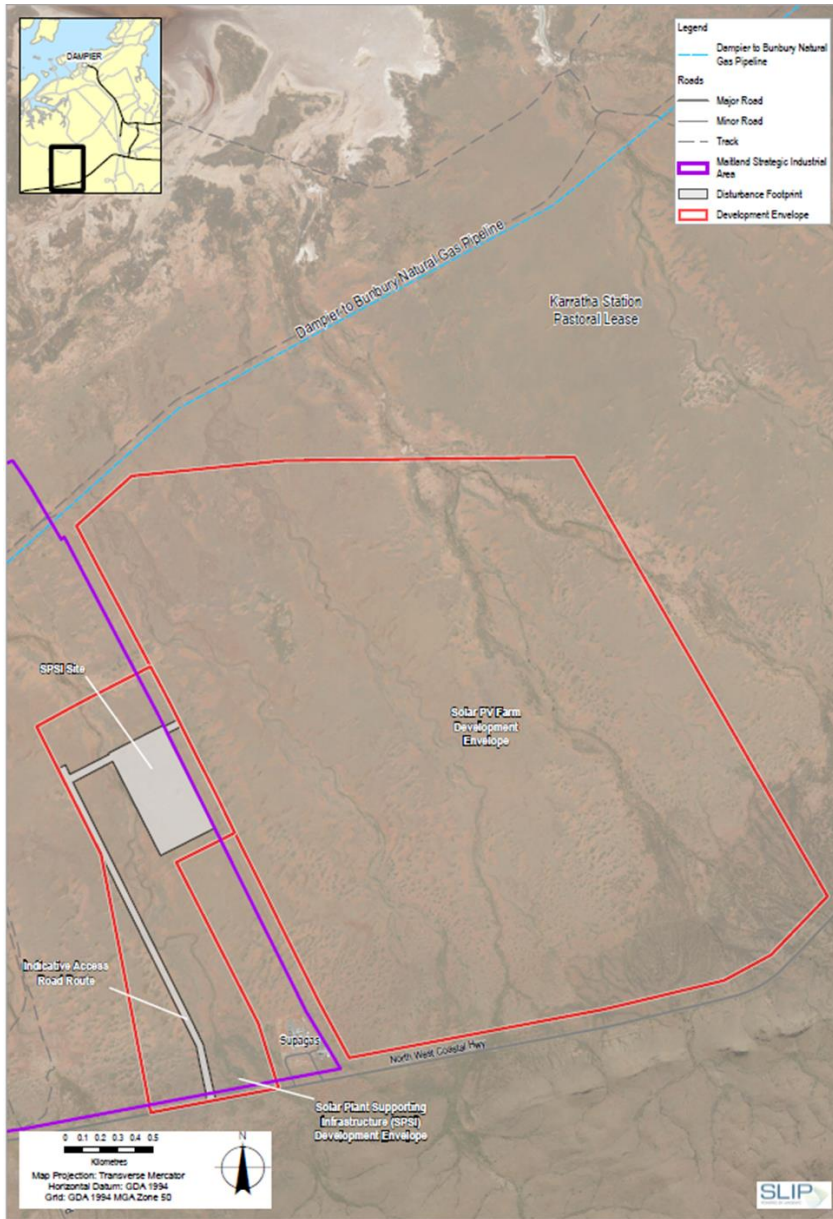


Figure1 - Proposal Location

1.4 Purpose

This Weed Management Plan (WMP) has been prepared to provide the control measures required to manage the potential spread and impact of weeds within the Proposal's footprint.

This WMP:

- Describes the environmental values potentially impacted by the spread of weeds
- Lists the regulations and/or legislation informing procedures and protocols.
- Provides guidance on protocols and procedures to minimise the spread of weeds

1.5 Risks

Construction and operation of the solar facility has the potential to spread existing weeds introduce new species into areas that are currently weed free. The activities that have the potential to spread weeds include:

- Vegetation clearing;
- Ground disturbance;
- Construction of infrastructure;
- Vehicle movement;
- Rehabilitation.

The WMP prepared for this Proposal has taken into account:

- The occurrence of known weed populations within the development envelope;
- The activities likely to cause the spread of weeds; and
- Legal obligations to manage the spread of weeds.

1.6 Vegetation within Project area

Two flora surveys were completed for the Woodside Solar Facility . These surveys found that entire area consists of the Roebourne plains grassland and contains both Priority 1 and Priority 3 Ecological Communities (PECs), with vegetation communities identified shown in Figure 2. (Vicki Long & Associates, 2019; Vicki Long and Associates 2020).

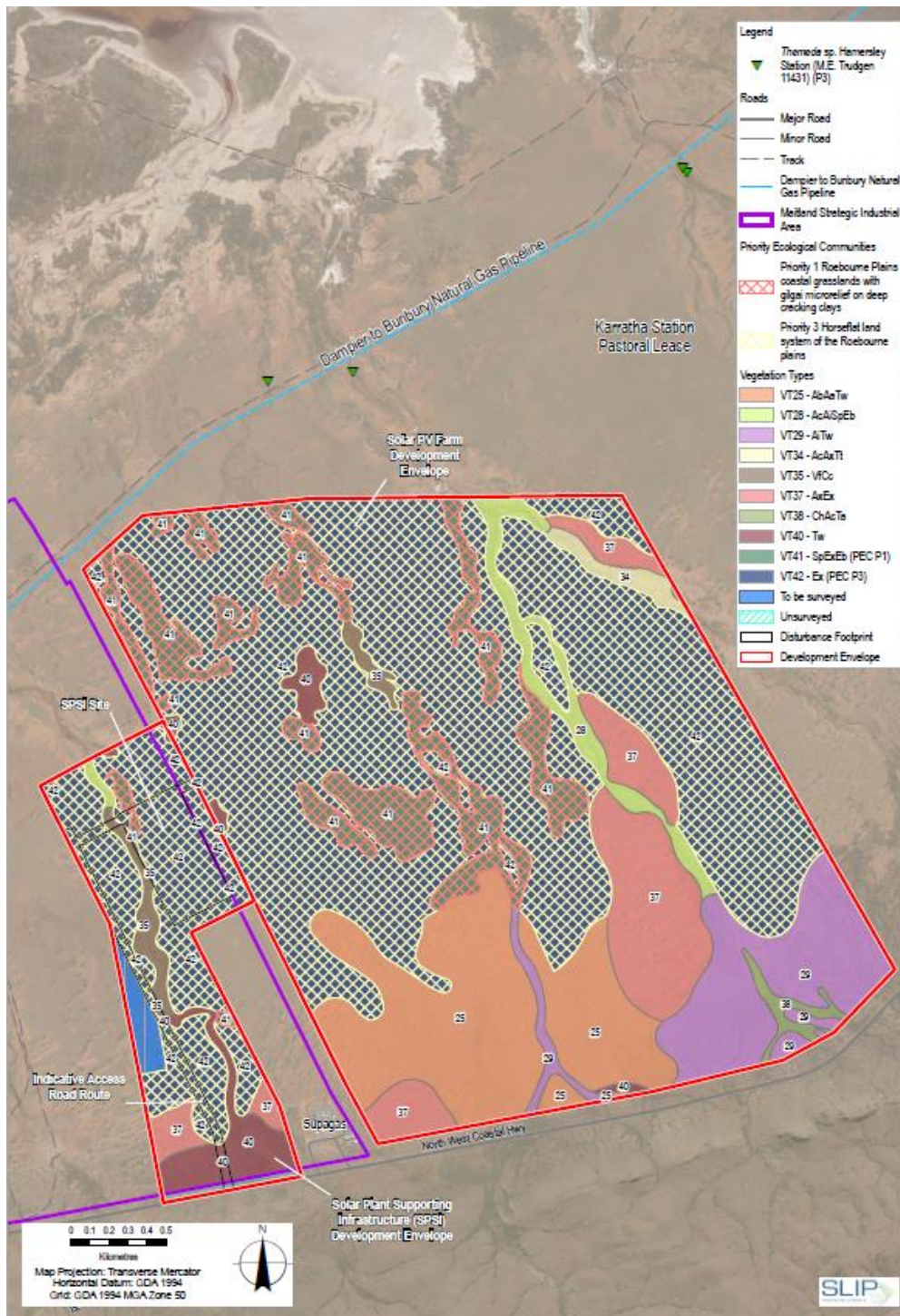


Figure 1 Vegetation Types within the Development Envelope

2. Background - Weeds

Weeds can be exotic or native species that colonise and persist in ecosystems in which they did not previously exist (Australian Government, 2013). Weeds can impact the natural environment in several ways including changes to soil nutrient loadings, increased competition for water and sunlight and limiting seeding recruitment of native plant species.

2.1.1 Weeds of National Significance (WoNS) (Commonwealth)

The Australian Government identified 32 WoNS based on their invasiveness, potential for spread and environmental, social and economic impacts. A list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012 (Australian Government, 2013) Individual landowners and managers are ultimately responsible for managing WoNS, however, state and territory governments are responsible for overall legislation and administration.

No WONS are known to occur within the Solar Facility Development Envelope.

The list of WONS can be found at the following website.

<http://www.environment.gov.au/biodiversity/invasive/weeds.weeds.lists/wons.html>

2.1.2 Declared plants (State)

Declared plants are weeds which have, or may have, an adverse effect on another organism, humans, the environment, agricultural or related commercial activities, and are listed under the *Biosecurity and Agriculture Management Act 2007* (BAM Act). Declared plants must be managed in accordance with their class which is stipulated in the *Agriculture and Related Resources Protection Act 1976*.

All declared plants are identified according to their category. These categories are:

- C1 Exclusion - Plants which should be excluded from part or all of Western Australia
- C2 Eradication - Plants which should be eradicated from part of or all of Western Australia
- C3 Management - Plants that should have some form of management applied that will alleviate the harmful impact of the plant, reduce the numbers or distribution of the plant or prevent or contain the spread of the plant.

Landholders, managers and occupiers of land are responsible for the management of declared pests on their land.

The Western Australian Organism List (WAOL) contains information on the area(s) in which a plant is declared and the control and keeping categories to which it has been assigned (DAFWA 2016).

2.1.3 Environmental Weeds (State)

The Weed Prioritisation Process for the Department of Biodiversity, Conservation and Attractions (DBCA) (formerly the Department of Parks and Wildlife, DPaW) prioritise weeds in each Parks and Wildlife region, termed 'environmental weeds'. These are weeds that may impact on natural, rather than agricultural or horticultural values and are assessed based on ecological impact (low, medium, high or unknown) and invasiveness (slow, moderate, rapid or unknown), potential and current distribution and the feasibility for control. Within each region, each weed species has been ranked by risk and management objectives assigned, Table 3.

Table 2 Weed prioritisation ranking and management objectives assigned by DPaW 2015

Ranking	Management objective
Very high	Eradication
High	Eradication or control

Ranking	Management objective
Medium	Control to reduce or containment
Low	Containment at key sites only
Negligible	No action to be undertaken but may include monitoring only

2.2 Weeds identified within the Project area

The biological surveys covering the proposed development envelope (Vicki Long & associates, 2020; Vicki Long & associates, 2019) identified several species classified as having high ecological impact and rapid invasiveness (DBCA, 2013). These are:

- **Aerva javanica* (Kapok)
- **Cenchrus ciliaris* (Buffel Grass)
- **Cenchrus setiger* (Birdwood Grass)
- **Passiflora foetida* (Stinking Passion Flower)
- **Vachellia farnesiana* (Mimosa Bush)




The Survey found that weeds were mostly confined to disturbed and semi-disturbed areas within the Proposal' footprint and surrounds. Three weed species were recorded during the detailed survey undertaken in the southern area. The species recorded are:

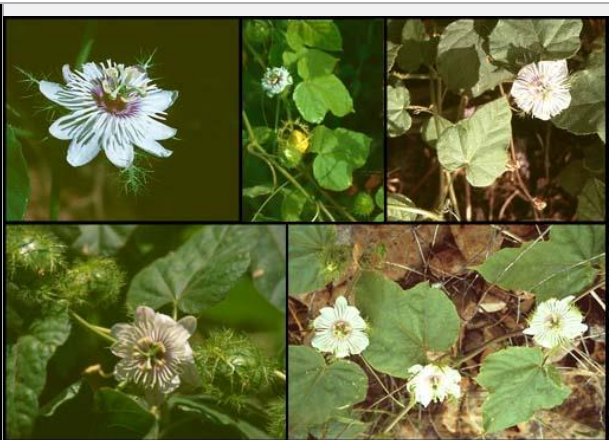


- **Cenchrus ciliaris* occurs along most creek lines but is generally in equal proportions to other native tussock grasses found in these areas.
- **Tribulus terrestris* (caltrop) was relatively common throughout the survey area. It is a nuisance weed, but is too widespread in the area to attempt any control.
- **Vachellia farnesiana* (mimosa bush) was not abundant, but was widespread. It was found in low numbers along creek lines and in small, but not dense populations within the Solar PV and Power Plant sites. This species has historically been recorded in the area for a long time and conditions within the survey area do not encourage proliferation of this shrub.

Each of the weeds are classified as having high ecological impact and rapid invasiveness (DPAW 2013). As the project is associated with P1 and P3 PEC areas, it is important that the introduction and spread of weeds is prevented. Areas of high weed abundance should only be worked after the areas containing PECs. The Survey recommended that a site-specific weed management plan (WMP) must consider weed density as mapped in this report, direction of work movement and location of vehicle and machine clean down areas.

The following photographs should be used to assist with the identification of weed species specific to this Proposal.

Table 3 Weed Species: Photo Identification

<p><i>Aerva javanica</i> (Kapok)</p>	 <p><i>Aerva javanica</i> Photos: G. Byrne</p>	
<p><i>Cenchrus ciliaris</i> (Buffel Grass)</p>	 <p><i>Cenchrus ciliaris</i> Photos: G.F. Craig, R. & M. Long & L. Wallis</p>	
<p><i>Cenchrus setiger</i> (Birdwood Grass)</p>	 <p><i>Cenchrus setiger</i> Photos: G. Byrne</p>	

<p><i>Passiflora foetida</i> (Stinking Passion Flower)</p>	 <p><i>Passiflora foetida</i> Photos: B.J. Carter, A.S. George, R. Robson, T. Tapper & WA Herbarium</p>	
<p><i>Vachellia farnesiana</i> (Mimosa Bush)</p>	 <p><i>Vachellia farnesiana</i> Photos: J. English, S.D. Hopper & E. Wajon</p>	
<p><i>Tamarix aphylla</i> (Tamarisk, Athel pine)</p>	 <p><i>Tamarix aphylla</i> Photos: K.C. Richardson</p>	

3. Weed Management Approach

Weed management measures are aimed at minimising the impacts of the Proposal and complying with all legal obligations, Ministerial conditions and project commitments.

This WMP is part of an integrated management program for Woodside and should be considered in conjunction with the following other management plans, which also relate to weed management:

- Construction Environmental Management Plan – addresses dust suppression and management

3.1.1 Objective-based EMP – risk-based approach

An adaptive risk based management approach has been developed in the preparation of this WMP to adapt to any changes, as well as provide flexibility to any changes that may occur within the Development Envelope.

Weed management will comprise the following actions:

- Minimising the risk of introduction and spread of weeds by cleaning earth moving equipment of soil and vegetation prior to entering site for the first time or moving between disturbed and undisturbed areas of the site.
- Ensuring no weed affected soil or fill is introduced or moved around the site.
- Undertaking weed inspections within disturbed areas following the first wet season rainfall event post construction works to record the weed species that have become established and record percentage cover. This inspection will be targeted to be undertaken within six weeks of significant rainfall (>25mm) when plants are actively growing and are more likely to be identifiable
 - The weed inspection should give consideration to the pre-clearing weed density through assessment against the baseline flora survey results and comparable immediately adjacent vegetation. A like for like approach should be applied to determining weed presence in rehabilitation communities.
 - It is recommended that a trigger value of >10% total weed cover of the above listed high ecological impact species be applied as a threshold where weed control is required for the site to support rehabilitation efforts.
 - In vegetation types mapped as PECs <1% weed invasion will be maintained unless baseline data indicates weeds were present prior to disturbance.
- Manual (hand removal) or chemical (herbicide application) removal of high ecological impact weed species within rehabilitation areas as necessary. Optimal removal times may vary for weed species, however, within six weeks of significant rainfall or when plants are actively growing is recommended. Control should also be undertaken within this period to attempt to target plants prior to seed set
- Control of any Declared Pest Plants or Weed of National Significance identified by the weed inspection is required using techniques specific to that plant as recommended by State or Federal biosecurity protocols.

3.1.2 Audits

To ensure the management measures outlined in this WMP are being adequately implemented and comply with relevant design and environmental standards, periodic environmental audits/inspections will be undertaken of the solar PV site. Auditing of the commitments outlined in the Woodside Solar Facility EMP will be undertaken as follows:

- Prior to each construction phase commencing – review of contractor management plans and processes for compliance with environment/weed management plans and environmental conditions.
- At least once during each construction phase.
- At completion of each construction phase to identify and correct any non-conformances
- Annually as part of the Annual Environmental Review (during Operations).
- Persons responsible for environmental auditing will be suitably qualified

A progress and compliance report will be prepared following significant audit activities, to document the effectiveness of the environmental management measures that have been implemented. Any non-compliance will be highlighted and addressed. Where audit finds show environmental management actions are not effective, the audit may recommend changes to procedures.

3.1.3 Compliance Reporting

Woodside will undertake reporting in accordance with regulatory and legislative requirements. It is expected that this will involve preparation of an annual compliance report and annual environmental report to the DWER in accordance with ministerial condition requirements.

4. Site Specific WMP Components

This section aims to identify the management targets to prevent and/or delay spread of weeds and detect weed establishment on site. Weed control techniques specific to the Woodside Solar Facility include the following key measures discussed in further detail below and outlined in Table 5.

4.1 Environmental Objectives

4.1.1 Environmental outcome or management objective/s

The WMP has been prepared to meet the EPA's objective for Flora and Vegetation to manage potential direct and indirect impacts on flora and vegetation. Woodside is committed to:

- preventing the introduction and/or spread of Declared Pests pursuant to the *Biodiversity and Agriculture Management Act 2007 (BAM) Act* and aggressive weeds;
- minimising the spread of existing weeds within or adjacent to Solar facility;
- ensure that weed control measures are implemented during construction and ongoing maintenance activities to avoid any significant impacts weeds may have on flora and vegetation.

4.2 Management Actions

A detailed series of weed management actions is outlined in Table 3. These actions have been developed following the key principles described in this section.

4.2.1 Weed Mapping/Monitoring

The baseline mapping reporting the occurrence of weeds will be updated conducted prior to construction. The baseline mapping will confirm both known populations and any new weed populations within the development envelope. The weed control program will use this baseline map to determine weed control actions. Management actions will determine the following targets:

- No new weed infestations identified in PECs or known populations or habitat for priority flora adjacent to construction areas
- No new Declared weeds or WoNS identified within or adjacent to the Development Envelope as a result of construction or operational / maintenance activities.

4.2.2 Weed Area Signage

Install signage at designated entry/exit points within known declared weed infestations in the Project Areas. Signage will include the following text:

YOU ARE ENTERING A WEED RISK AREA – VEHICLES ENTERING MUST BE CLEAN ON EXIT

YOU ARE EXITING A WEED RISK AREA – VEHICLES MUST BE CLEAN PRIOR TO EXIT

4.2.3 Vehicle/Plant Weed Hygiene

1. Establish vehicle access points across the project's footprint

All heavy vehicles, equipment and mobile plant involved in earthworks and civil works will be inspected prior to entering the Development Envelope.

2. Installation of Washdown Points

Woodside will develop a wash down facility for washing down vehicles at all exit points from weed risk areas. The wash down facility will meet, as a minimum, the following requirements:

- The facility will enable a clear separation of vehicle / equipment wheels or tracks from the material that is being washed off;
- Ensure dirty wash down water drains effectively to a bunded sump;
- Use only water (no degreaser or detergent) for wash down;

Wash down facilities located at the site entry points are not to be used for cleaning vehicles or equipment entering the site, unless coming directly, without deviation, from another Project work site where it was engaged in Project works.

3. *Establishing Contract Conditions*

As part of the site entry process, Contractors will be informed of and required to comply with conditions of this WMP.

4. *Movement of Vehicles*

The movement of vehicles, equipment and personnel between disturbed and undisturbed areas will be minimised as much as possible, to reduce the risk of spreading/introducing weeds.

Table 4 Weed Management commitments

Management Targets		Management actions		Monitoring	Timing/Frequency of actions	Reporting
Baseline Information						
No new weed infestations identified in PECs or habitat for priority flora adjacent to project areas. No new Declared weeds or WoNS identified within or adjacent to the project areas as a result of construction or operations / maintenance of the solar PV facility.	Weed surveys shall be undertaken in areas in which construction/activities are planned prior to commencement. Survey shall map weed occurrence and percentage cover. High risk areas (e.g. areas identified as infested with of Declared Pests, WoNS, weeds identified as threats to PECs, weeds within 50 m of PECs / priority flora) to be demarcated on site maps. The known weed status of each section of the project area shall be clearly marked on the project site plans to inform entry procedures/requirements.	Pre-construction weed survey (ideally within wet season conditions) of construction areas within 50 m of PECs or known populations/habitat for priority flora, to inform risk assessment. Post-construction wet season weed survey of construction areas within 50 m of PECs or known populations or habitat for priority flora	Prior to ground disturbing activities in each construction phase.	Implement and maintain Weed Mapping (high risk areas) and Treatment records Annual Reporting Reporting on exceedance of management target Review management actions (and revise if required)		
	Prior and subsequent to each construction phase, weed treatment will be undertaken for declared pests and WoNS within the area (and 50m beyond) in which activity is planned or occurred. Australian biosecurity and quarantine requirements/procedures will be compiled with for imported project equipment.	Annual visual monitoring during construction for new weed infestations in: – PEC or known populations or habitat for priority flora adjacent to construction areas – High risk areas within construction areas Identify potential sources of weed infestation. Update mapped distribution of declared or environmental weed Review treatment and control methods seeking further advice from relevant authorities if required. Implement revised weed control methods.	Within six months of completion of each construction phase. Within 3 months prior and no more than 6 months post each construction phase. Continuously throughout project life.			

Management Targets		Management actions		Monitoring		Timing/Frequency of actions		Reporting	
Inductions and Procedures									
All staff and contractors on site are aware of their obligations in relation to minimising the risk of spread of weeds.		The site induction program will include hygiene training to ensure all staff and sub-contractors are aware of the requirements to avoid the spread and introduction of weeds. Inductions will include weed identification guides and maps.		Monitor construction activities to ensure they are consistent with the management plan.		Continuously throughout project life.		Training/Induction records Photographic Evidence	
		No complaints from adjacent stakeholders regarding weed introduction and spread.				At all times		Weed Control Records	
Compliance with all relevant requirements relating to biosecurity/quarantine management.		Australian biosecurity and quarantine requirements/procedures will be compiled with for imported project equipment.		Identify potential sources of weed infestation. Update mapped distribution of declared or environmental weed Review treatment and control methods seeking further advice from relevant authorities if required. Implement revised weed control methods.		Continuously throughout project life.		Evidence import requirements have been followed.	
Weed Control Techniques									
Minimise risk of weed spread through proactive weed management and control.		Weed control (chemical or physical) shall be undertaken to eradicate populations of declared and environmental weeds with particular emphasis in priority areas.		Site-specific risk assessment to be conducted for all construction areas within 50 m of PECs or known populations or habitat for priority flora, to determine site-specific weed control, hygiene and monitoring requirements		Construction		Evidence of weed control activity being conducted.	
Access and vehicular/machinery movement									
No spread of weeds attributable to onsite vehicle movement.		Any vehicles / plant planning to enter areas in which clearing is not planned are to be certified clean on entry.		Routine audits of Clean on Entry / Exit implementation		Continuously throughout project life.		Training/inductions records	
		Any vehicles / plant planning to enter construction areas in which weeds are present to the clean on exit.		Routine audits of Clean on Entry / Exit implementation		Prior to and During construction		Training/inductions records	

Management Targets	Management actions	Monitoring	Timing/Frequency of actions	Reporting
	Entry and exit points to/from the road reserve shall be reduced or avoided as far as practicable in weed infested areas.	Records site access rules denote restrictions around weed infested areas.	Continuously throughout project life.	Weed Monitoring Procedures
Construction Materials				
No introduction of weeds to project areas via imported materials.	Imported fill will be weed free. Accredited suppliers with weed free certification to be utilised.	Fill certifications to be acquired prior to fill usage.	When acquiring imported fill material.	Certifications of clean fill maintained.

5. References

- Australian Government 2013, Weeds In Australia, retrieved in August 2022, from <http://www.environment.gov.au/biodiversity/invasive/weeds/index.html>
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- Department of Primary Industries and Regional Development, (2022). Agriculture and Food. Declared Plants. <https://www.agric.wa.gov.au/pests-weeds-diseases/weeds/declared-plants>
- Long, Vicki 2019 Woodside Power Project Flora and Vegetation Surveys Desktop Assessment Report, Karratha, Western Australia
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- <https://florabase.dpaw.wa.gov.au/>

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