# Denham Park – Ornamental Snake and Brigalow TEC Offset Area Management Plan: EPBC 2017-7957

**Stanmore SMC Pty Ltd**

BASE/

Client: Stanmore SMC

Reference: J0053.3

**Document Control**

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| Title: | Denham Park Offset Area Management Plan |
| Address: | Denham Park |
| Job Number: | J0053.3 Ornamental Snake and Brigalow Offsets |
| Client: | Stanmore |

**Document Issue**

| **Issue** | Date | Prepared By | Reviewed/Approved by |
|---|---|---|---|
| **Rev A – Draft** | 15/02/2024 | Isaac Witten | Dr Craig Streatfeild |
| **Rev B – Draft to Client for Review** | 15/04/2024 | Isaac Witten | Dr Craig Streatfeild |
| **Rev C – Response to comments from Client** | 24/04/2024 | Isaac Witten | Dr Craig Streatfeild |
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| **Rev 1 – Response to comments from DCCEEW** | 23/08/2024 | Dr Craig Streatfeild | Richard Oldham (Stanmore) |
| **Rev 2 – Response to comments from client on Rev 1** | 27/08/2024 | Dr Craig Streatfeild | Richard Oldham (Stanmore) |
| **Rev 3 – Response to additional comments from DCCEEW** | 26/11/2024 | Leigh Scott, Isaac Witten and Dr Craig Streatfeild | Ryan Pane (Stanmore) |

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## Approval Holder Declaration

I declare that:

1. To the best of my knowledge, all the information contained in, or accompanying this Biodiversity Offset Management Plan that was supplied by the proponent is complete, current and correct.

2. I am duly authorised to sign this declaration on behalf of the approval holder.

3. I am aware that:

a. section 490 of *the Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) makes it an offence for an approval holder to provide information in response to an approval condition where the person is reckless as to whether the information is false or misleading.

b. section 491 of the EPBC Act makes it an offence for a person to provide information or documents to specified persons who are known by the person to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* where the person knows the information or document is false or misleading.

c. The above offences are punishable on conviction by imprisonment, a fine or both.

Signed: [redacted]

Full name: [redacted]

Organisation: Stanmore SMC Pty Ltd

Date: 26 / 11 / 2024

# Abbreviations

| Abbreviation | Description |
|---|---|
| AU | Assessment Unit |
| Base | Base Consulting Group |
| DAF | Department of Agriculture and Fisheries |
| DAWE | Department of Agriculture, Water and the Environment |
| DCCEEW | Department of Climate Change, Energy, the Environment and Water |
| DES | Department of Environment and Science |
| DoEE | Department of the Environment and Energy |
| DoR | Department of Resources |
| EA | Environmental Authority |
| EAR | Environmental Assessment Report |
| EDL | Ecologically Dominant Layer |
| EIS | Environmental Impact Statement |
| ENSO | El Nino-Southern Oscillation |
| EPBC Act | *Environment Protection and Biodiversity Conservation Act 1999* |
| GIS | Geographic Information System |
| the Guide | *Guide to determining terrestrial habitat quality, V1.2* |
| Ha | Hectare |
| HQAP | Habitat Quality Assessment Plot |
| ML | Mining Lease |
| MNES | Matters of National Environmental Significance |
| MRA2C | Mulgrave Resource Access Stage 2C |
| MSES | Matters of State Environmental Significance |
| NC Act | *Nature Conservation Act 1992* |
| OAMP | Offset Area Management Plan |
| PA Act | *Planning Act 2016* |
| PMAV | Property Map of Assessable Vegetation |
| RE | Regional Ecosystem |
| SWCM | South Walker Creek Mine |
| SPRAT | Species Profile and Threats Database |
| Stanmore | Stanmore IP South Pty Ltd |
| TEC | Threatened Ecological Community |
| VDec | Voluntary Declaration |
| VM Act | *Vegetation Management Act 1999* |
| WoNS | Weed of National Significance |

# 1.0 Introduction

Stanmore SMC Pty Ltd (Stanmore SMC), a subsidiary Stanmore Resources Ltd (Stanmore) owns and operates South Walker Creek (SWC) Mine. The South Walker Creek Mulgrave Resource Access (MRA) Project (the Project) is a multi-stage progression of open cut mining of the Mulgrave Pit at SWC Mine. Stage 2 (MRA2C) involves the progression of the Mulgrave Pit in a south-westerly direction to access coal resources within the current mining lease. The MRA2C Project was referred under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and determined to be a controlled action which was approved on 30 October 2019 subject to conditions (EPBC Approval 2017/7957). Those conditions included the provision of environmental offsets under the EPBC Act for a number of matters of national environmental significance (MNES). Since the approval was granted, an additional disturbance area impacting habitat for MNES threatened species was identified, in which a variation of the conditions of the approval was sought to increase disturbance limits and deliver additional offsets to compensate for impacts. This variation of the conditions was approved on 27 November 2020. Further variations of the conditions were approved on 6 August 2021.

## 1.1 Project Background

The MRA2C project for the Mulgrave Pit consists of two main phases:

Preparation Phase:

- This phase includes various tasks such as fencing and stock removal, clearing vegetation and topsoil for infrastructure, installing supporting infrastructure like roads and relocating powerlines, conducting geotechnical investigations and cultural heritage surveys, constructing water management facilities including two new dams, and diverting Walker Creek.
- Vegetation and topsoil clearance will be limited to areas necessary for infrastructure installation, with measures in place for vegetation relocation and topsoil salvage.
- Walker Creek diversion will be permanent, utilizing an existing tributary and involving the construction of a diversion channel approximately 8 km long to meet regulatory standards.
- Infrastructure like overland flow bunds and levees will be constructed to manage water flow and retain the functionality of the diversion.

Continuation of Mining in the Mulgrave Pit:

- This phase involves the ongoing mining activities in a south-west direction from the existing highwall, with the rate of advancement adjusted according to resource characteristics.
- Approximately 753 ha of land will be disturbed for mining activities, with allowances for infrastructure, spoil, and overburden placement, totaling 1,279 ha.
- Mining will proceed until the economically viable coal resource has been extracted, adhering to existing environmental regulations and approved operational plans.
- Activities will include topsoil stripping before overburden removal, progressive backfilling of the pit, and rehabilitation of spoil dumps as per approved guidelines.

## 1.2 Scope and Purpose of Report

An assessment of significant residual impacts on MNES was prepared for the MRA2C's Environmental Impact Statement (EIS) (ELA, 2018). The conditions of approval identified MNES that require offsets as follows:

- Brigalow threatened ecological community (TEC)

- Potential habitat for threatened fauna: Ornamental Snake (*Denisonia maculata*), koala (*Phascolarctos cinereus*), Greater glider (*Petauroides volans*), Black Ironbox (*Eucalyptus raveretiana*) and Squatter Pigeon (southern) (*Geophaps scripta scripta*).

Two of the subject MNES that required offsetting are habitat for the Ornamental Snake (*Denisonia maculata*) and Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC). Condition 1 of the EPBC Act approval (variation of conditions, dated 6 August 2021) limits the area of impact to Ornamental Snake habitat to 33.7 hectares (ha) and Brigalow TEC to 32.7 ha. Condition 2 requires offsets for these impacts.

For the purpose of offsets, the conditions of approval have been separated into Stage 1 and Stage 2 of the Project. Condition 5 related to Stage 1 offsets and required an Offset Area Management Plan (OAMP) for 44.53% of Ornamental Snake habitat (15.01 ha) and 37.26% of Brigalow TEC (12.18 ha). Condition 8, related to Stage 2 offsets, requires a revised OAMP for the balance of the offsets.

A previous OAMP was developed for Stage 1 impacts to provide offsets for Ornamental Snake habitat and Brigalow TEC, with offsets acquitted on the Clive property (Lot 6 RP860051; (BHP, 2020)). That OAMP was approved by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on 25/05/2021 and provided a minor surplus of offsets to those required by acquitting offsets for 44.99% of impacts to Ornamental Snake habitat (15.16 ha) and 37.57% of Brigalow TEC (12.29 ha). The offset area on the Clive property has been protected through a Voluntary Declaration (VDec) as an area of high conservation value under the *Vegetation Management Act 1999* (Qld), with approval of the VDecs received from the Department of Resources (DoR) on 10/03/2022.

This OAMP has been developed to provide offsets for SWC MRA2C Stage 2 impacts to Ornamental Snake habitat and Stage 2 Impacts to Brigalow TEC. A suitable offset site for Ornamental Snake habitat and Brigalow TEC, with offset area sufficient to provide offsets, has been identified on the Denham Park property (Lot 23 SP262530), located 39 km North of Moranbah, and approximately 53 km west of the MRA2C Project site (Figure 1). Denham Park is owned by a Stanmore Resources subsidiary and leased as a cattle property and located in the Brigalow Belt bioregion and the Isaac Regional local government area. This property will acquit the remaining impacts to 18.7 ha of Ornamental Snake habitat and 20.5 ha of Brigalow TEC for the remainder of required offsets for these MNES from the SWC MRA2C Project.

Stanmore have previously secured a 1020 ha offset area on the Denham Park property for impacts to the Ornamental Snake from activities associated with the Isaac Downs mine (BASE, 2022). The approval for this offset area was granted in 2023. This approved offset area is located approximately 2 km to the west of the Proposed Offset Area (the subject of this OAMP) and incorporates similar vegetation structures and habitats as the Proposed Offset Area.

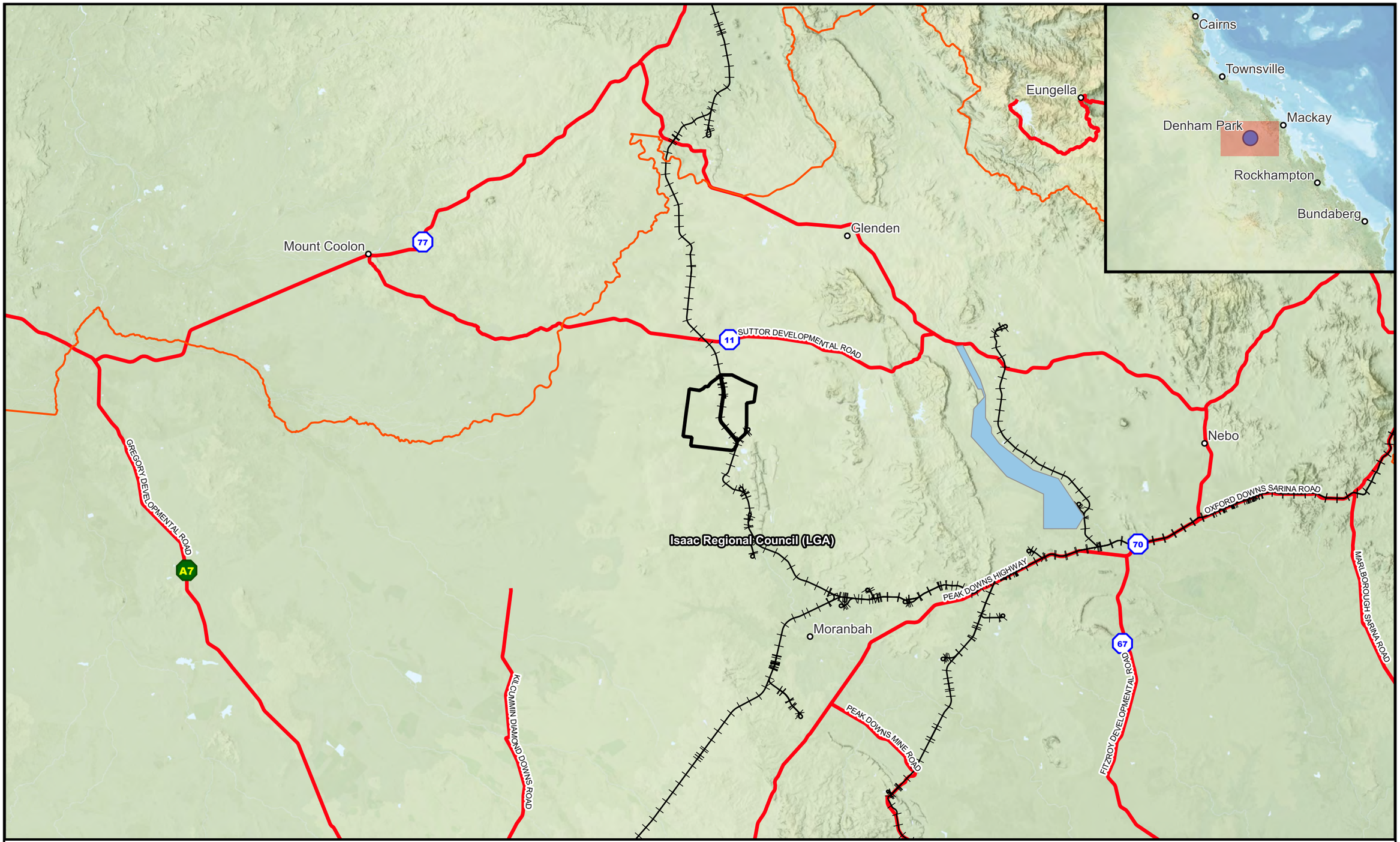
Offsets for impacts to the MNES (Ornamental Snake habitat and Brigalow TEC – refer to Table 1) under this OAMP are proposed to be co-located within Denham Park (Figure 2), for residual impacts to 18.7 ha of Ornamental Snake habitat and 20.5 ha of Brigalow TEC. Refer to section 4.1 for the calculation of the impact area requiring offsets. Ongoing management and monitoring of the offset area is proposed to satisfy the requirements of the Commonwealth's Offset Policy and approval conditions. In accordance with the approval conditions, management of the offset area in accordance with this plan is for the period of effect of the approval.

**Table 1: MNES impacted by the Project for which offsets will be delivered.**

| MNES | EPBC Act Status | Impact area requiring offsets (ha)[1] |
|---|---|---|
| Ornamental Snake (*Denisonia maculate)* | Vulnerable | 33.7*(1-0.4453) (condition 5) = 18.7 |
| Brigalow TEC | Endangered | 32.7*(1-0.3726) (condition 5) = 20.5 |

Detailed ecological assessments of the impact area have been undertaken to support the MRA2C approvals process (i.e. as part of the preapprovals). As part of these investigations, habitat quality assessments were undertaken to inform the offset requirements for the MRA2C Project (ELA, 2018).

[1] The Stage 1 OAMP acquitted a greater area than required under Condition 5 of the EPBC approval (44.99% for the Ornamental Snake and 37.57% for Brigalow). This OAMP used the remainder of the impacts to be offset as per Condition 5 of the EPBC approval which equated to 62.74% of the Brigalow impact area of 32.7 ha (20.5ha) and 55.47% of the Ornamental Snake impact area of 33.7 ha (18.7 ha). This method resulted in an offset area of 109 ha for the Ornamental Snake and 102 ha for Brigalow. However, as both offsets are co-located and as such, the proposed Brigalow offset area is increased to that of the Ornamental Snake (109 ha) and acquits 107.7% of the remaining Brigalow offset.




# Figure 1: Site Context

0 10 20 km

N

Scale @ A3: 1:500000
Date: 29/02/2024
Job: J0053.3
Drawn: Isaac Witten

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- MRA2C Project Area
- Isaac Regional Council (LGA)
- Cities and Towns
- State Controlled Road
- Rail

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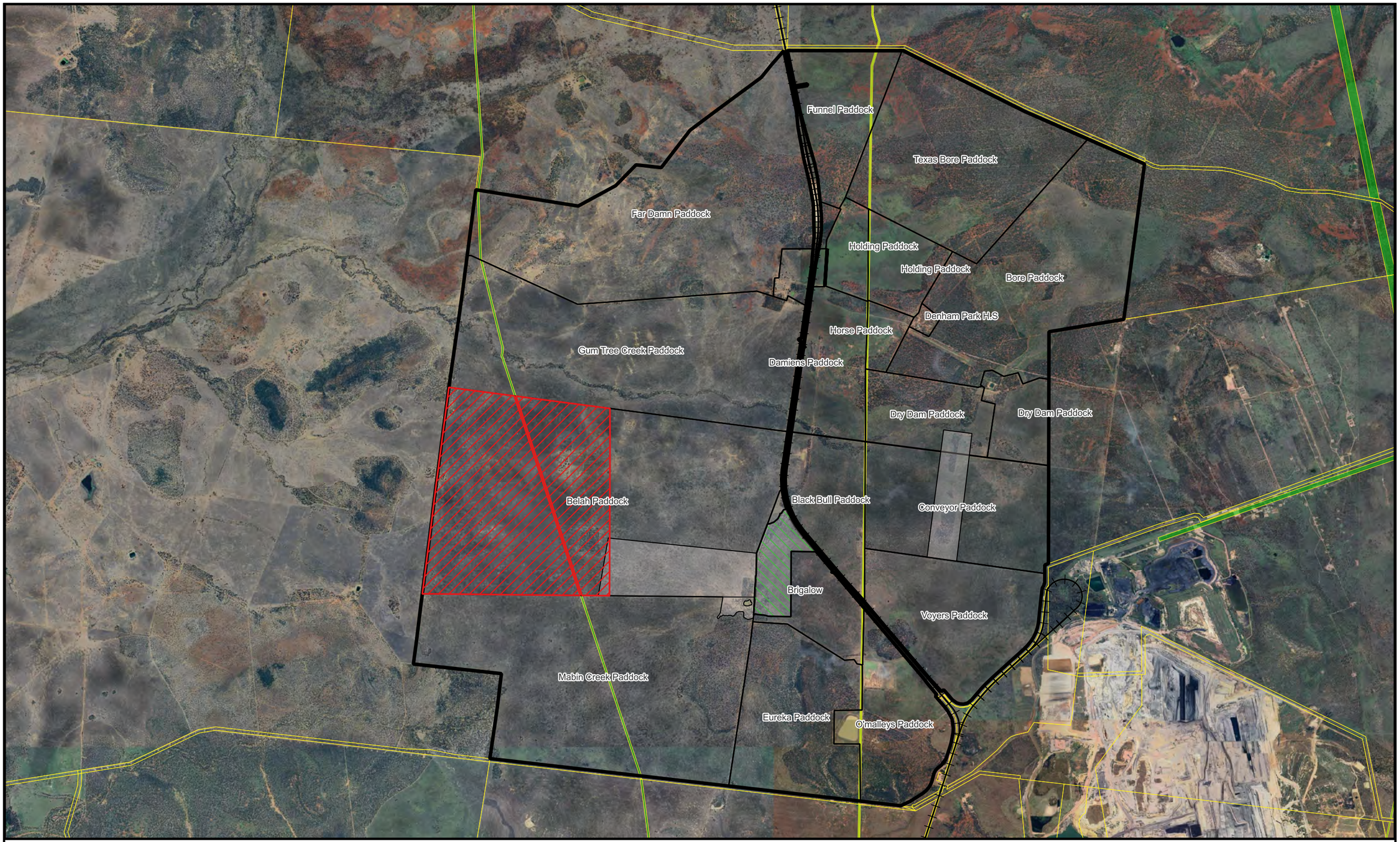


# Figure 2: Proposed Offset Area

0 1000 2000 m

Scale @ A3: 1:50000
Date: 15/04/2024
Job: J0053.3
Drawn: Isaac Witten

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DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Existing Offset Area
- Proposed Offset Area
- Investigation Area
- DCDB
- Easement
- Road
- Rail

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# 2.0 Regulatory Requirements and Policy Framework

## 2.1 *Environment Protection and Biodiversity Conservation Act*

The EPBC Act is the Commonwealth Government's principal piece of environmental legislation and is administered by the DCCEEW. The EPBC Act is designed to protect MNES, which include threatened species of flora and fauna, threatened ecological communities (TECs), migratory species as well as other protected matters. The Act includes EPBC categories of threat for threatened flora and fauna, identifies key threatening processes to their survival and provides for the preparation of recovery plans for threatened flora and fauna.

### 2.1.1 Conditions of Approval

The EPBC approval decision (EPBC 2017-7957) for the MRA2C Project was received on 30 October 2019 and varied on 27 November 2020 and 6 August 2021. Conditions 1, 2, 3, 4, 8, 9, and 10 of the EPBC Act approval are relevant to the development of this revised OAMP and are detailed in section 2.1.1.1. Condition 11 of the EPBC Act approval relates to the requirements of this Ornamental Snake and Brigalow TEC Offset Area Management Plan and are discussed in Table 3.

Condition 1, varied on 27 November 2020, outlines the approved clearing limits for all impacted MNES, including those where offsets have been addressed elsewhere. For the Brigalow TEC, no more than 32.7 ha is to be impacted, whilst no more than 33.7 ha of Ornamental Snake habitat is to be impacted.

The responses to the relevant approval conditions as outlined in the following sections have been revised and updated in this revision of the OAMP to address comments from DCCEEW.

#### 2.1.1.1 Conditions 1, 2, 3, and 4

Conditions 1, 2, 3, and 4 of the EPBC Act approval relate to the requirements concerning the environmental offset area and the legal mechanism securing the offset area. Additionally, they mandate that clearing of habitat in stage 2 shall not commence until the approval of this Offset Area Management Plan (OAMP). Offsets have either been approved or are being sought elsewhere for the other MNES species listed in Condition 1, namely the Koala, Greater Glider, Squatter Pigeon and Black Ironbox and are not the subject of this OAMP. Approval conditions relevant to the Ornamental Snake and Brigalow TEC only are outlined in Table 2, and throughout the entirety of this OAMP. The conditions and location where they have been addressed in this OAMP are outlined in Table 2.

**Table 2: EPBC Act approval conditions 1, 2, 3, 4 addressed as part of this OAMP**

| Condition | Summary of condition | Relevant section |
|---|---|---|
| Condition 1 | The approval holder must not impact more than 32.7 ha of Brigalow (*Acacia harpophylla dominant and co-dominant*) TEC and 33.7 ha of Ornamental Snake (*Denisonia maculata*) habitat. | Refer to sections 1.2, 0 (Ornamental Snake) and 3.2.2 (Brigalow TEC) and Table 1. |
| Condition 2 | The approval holder must provide environmental offsets for Brigalow TEC and the Ornamental Snake (*Denisonia maculate*), consistent with the EPBC Act Environmental Offsets Policy (2012), for impacts identified in Condition 1(b) & (e) (32.7 ha of Brigalow TEC & 33.7 ha of Ornamental Snake habitat respectively). | Refer to sections 0 and 3.2.2 and Table 1. |

| Condition | Summary of condition | Relevant section |
|---|---|---|
| Condition 3 | The approval holder must not commence Stage 2 until the revised Offset Area Management Plan (OAMP) required under condition 8 has been approved by the Minister in writing | Noted. |
| Condition 4 | Legal mechanisms used to legally secure the offset areas required by Condition 2 must remain in place until the end of the period of effect of this approval at a minimum.<br>It is the approval holders responsibility to ensure that DCCEEW are notified within 5 business days of the legal mechanisms being executed, and the commencement of Stage 2. | Refer to section 4.7 |

#### 2.1.1.2 Condition 11

Condition 11 of the EPBC Act approval relates to the requirements of this Ornamental Snake and Brigalow TEC Offset Area Management Plan. These conditions and where they have been addressed in the OAMP are outlined in Table 3.

**Table 3: EPBC Act approval for condition 11 addressed as part of this OAMP**

| Condition | Summary of condition | Relevant section |
|---|---|---|
| Condition 11 | The approval holder must ensure that the revised OAMP required under condition 8 meets the following requirements to the written satisfaction of the Minister. | This document. |
| Condition 11 (a) | Provide relevant baseline information regarding the offset areas, including field validation survey results, and quantifiable ecological data on habitat quality for the Brigalow TEC and the Ornamental Snake. | Refer to see, section 0, section 3.2.2, section 4.2, section 4.4.1, section 7.2, section 7.3 and Appendix A |
| Condition 11 (b) | Outline how the offset areas will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the impact identified in Condition 1. | Refer to Appendix A. |
| Condition 11 (c) | Provide a description and appropriate maps (including shapefiles) to clearly define the location and boundaries of the offset areas, accompanied by the offset attributes (including physical address of the offset areas, coordinates of the boundary points in decimal degrees that the environmental offset areas compensate for the Brigalow TEC and the Ornamental Snake, and the size of the environmental offsets in hectares. | Refer to section 4.4and Figure 2<br>Relevant shapefiles to be DCCEEW following approval. |
| Condition 11 (d) | Provide a commitment to measurable, defined ecological outcomes to improve upon the habitat quality for the Brigalow TEC and the Ornamental Snake for which the offset areas are being provided, and the timeframes in which these will be achieved. | Refer to section 0 |

| Condition | Summary of condition | Relevant section |
|---|---|---|
| Condition 11 (e) | Offset completion criteria that demonstrates:<br>i. How the ecological outcomes will be achieved.<br>ii. For the offset percentages stated in Condition 5, that the below minimum increases to the habitat quality score as determined in accordance with Condition 11(a) for the Brigalow TEC and Ornamental Snake, have been achieved within 20 years of commencement of action and maintained appropriately over the period of effect of this approval:<br>- Brigalow TEC = 2 unit increase in habitat quality score<br>- Ornamental Snake = 1 unit increase in habitat quality score<br>iii. That increases to the habitat quality scores required in 11(e)(ii) will result in future habitat quality scores which are at least the same value as the impact site habitat quality scores outlined in the EPBC Act approval, stated as 7/10 for Brigalow TEC and 7/10 for the Ornamental Snake.<br>iv. For the offset percentages required by condition 5, that increases to the habitat quality scores are consistent with the requirements of the Environmental Offsets Policy (2012) over the duration of this approval. | Refer to section 0, section 8.2 and Table 17 |
| Condition 11 (f) | Provide performance criteria that set targets at 5-yearly intervals for expected progress towards the completion criteria outlined in 11(e).[2] | Refer to section 0 and Table 18 |
| Condition 11 (g) | Outline management measures that will be implemented to achieve the following:<br>i. The ecological outcomes for the protection of the Brigalow TEC and the Ornamental Snake<br>ii. The increase to the habitat quality scores specified in conditions 11(e)(ii) and 11(e)(iv) for the Brigalow TEC and the Ornamental Snake<br>Management measures must specify activities that will be prohibited in the offset area(s). | Refer to section 0 and section 6.0 |
| Condition 11 (h) | Provide evidence demonstrating the management measures proposed in accordance with Condition 11(g) are consistent with the Department's Environmental | Refer to section 5.0 and 6.0 |

[2] Following review of Revision 2 of this OAMP, DCCEEW requested annual performance criteria targets for Brigalow for the first five years. This has been added to Revision 3 of the OAMP.

| Condition | Summary of condition | Relevant section |
|---|---|---|
| | Management Plan Guidelines and relevant conservation advices, recovery plans and threat abatement plans. | |
| Condition 11 (i) | Perform a risk analysis of the potential risks to the offset areas that may prevent them from achieving the performance and completion criteria required by Condition 11(e) and 11(f). | Refer to section 0 and section 9.0 |
| Condition 11 (j) | A monitoring program designed to detect triggers for corrective actions and track progress against performance criteria in a timely manner. | Refer to section 0 and section 0 |
| Condition 11 (k) | Monitoring and evaluating the effectiveness of management measures and progress against performance criteria and completion criteria. | Refer to section 0 and section 0 |
| Condition 11 (l) | Criteria for triggering corrective actions and the proposed time-bound corrective actions or processes for determining these. | Refer to Table 16 and Table 27 |
| Condition 11 (m) | The legal mechanism that will be used for legally securing the offset area(s), such that legal security remains in force over the offset area for at least the period of effect of this approval. | Refer to section 4.7 |

#### 2.1.1.3 Condition 11 (a)

Condition 11(a) states that the OAMP must include relevant baseline data and other supporting evidence, including results from field validation surveys and quantifiable ecological data, that documents the presence or likely presence of the Brigalow TEC and the Ornamental Snake, and the quality of the habitat of the offset areas. Data relating to this condition is outlined in section 0, section 3.2.2, section 4.1, section 4.4.1 and section 7.3 of this document.

#### 2.1.1.4 Conditions 7, 8, 9, 10 and 12

Conditions 7, 8, 9, and 10 of the EPBC Act approval relate to the requirements concerning the legal mechanism securing the offset area. Condition 12 of the EPBC Act approval relates to reporting on the offset area in reaching the interim performance targets criteria, and notification to the Department of commencement of actions These conditions and where they have been addressed are outlined in Table 4.

**Table 4 EPBC Act approval conditions 7, 8, 9, 10, and 12 addressed as part of this OAMP.**

| Condition | Summary of condition | Relevant sections |
|---|---|---|
| Condition 7 | The approval holder must implement the approved OAMP until a revised OAMP is approved by the Minister in writing. | The revised OAMP is this document. Refer to section 5.0, 6.0, and 0 |
| Condition 8 | The approval holder must submit a revised OAMP for the written approval of the Minister that addresses the residual | This document and section 4.7, section |

| Condition | Summary of condition | Relevant sections |
|---|---|---|
| | environmental offsets required to address the impacts identified in Condition 1. | 8.2, section 8.3 and Table 23 |
| Condition 9 | Within 12 months of the Minister's approval of the revised OAMP, the approval holder must legally secure the approved offset areas for the impacts identified in Condition 1. | Same principles as outlined in section 4.7; refer also to Table 23 |
| Condition 10 | The approval holder must implement the approved revised OAMP for the period of effect of this approval. The approved revised OAMP must be attached to the mechanism used to legally secure the approved offset areas. | Refer to section 4.7, section 8.3 and Table 23 |
| Condition 12 | The approval holder must submit a report prepared by a suitably qualified ecologist to the Department within 3 months of the 5 year anniversary of an approved offset area being legally secured, for each approved offset area, for the written approval of the Minister that:<br>a. Describes the habitat quality of each approved offset area for the Brigalow TEC and the Ornamental Snake, and provides evidence demonstrating that the performance criteria required under Condition 11(f) for each approved offset area has been achieved; and<br>b. To the extent that it cannot be demonstrated that the performance criteria required under Condition 11(f) have been achieved, the report must:<br>i. Include a review of the effectiveness of relevant management practices;<br>ii. Specify commitments as to the additional actions that will be implemented to ensure the performance criteria are achieved;<br>iii. Set out the timeframe within which any unmet performance criteria will be achieved; and<br>iv. Specify commitments to provide further offsets if the performance criteria cannot be achieved for the approved offset area(s) required under condition 5. | This report has been prepared based on information deemed relevant at the time of report, as well as section 4.0, section 0, section 6.0, section 0, Table 23, Appendix A and Appendix B. |

Under the EPBC Act Environmental Offsets Policy, offsets are required where a residual impact is likely to occur after avoidance, mitigation and management measures have been undertaken. For this project, offsets for residual impacts are to be legally secured for the Ornamental Snake and Brigalow TEC as outlined in Table 1.

## 2.2 Policy Principles

The EPBC Act Environmental Offsets Policy (October 2012), has five key aims that involve:

- Ensuring the use of offsets are efficient, effective, timely, transparent and scientifically robust.
- Providing all stakeholders with greater certainty on how offsets are determined and provided.
- Delivering improved environmental outcomes.
- Outlining the appropriate nature and scale of offsets.
- Providing guidance on acceptable offsets and their delivery.

The Policy also provides eight key principles that are applied in determining the suitability of offsets as follows. These principles are addressed in further detail in section 4.8.

- Deliver an overall conservation outcome that improves or maintains the viability of the MNES in question.
- Be primarily built around direct offsets but may also include other compensatory measures.
- Be in proportion to the level of statutory protection that applies to the MNES.
- Be of a size and scale proportionate to the residual impacts on the protected matter.
- Account for and manage the risks of the offset not succeeding.
- Be additional to what is already required under law or regulations.
- Be efficient, effective, timely, transparent, scientifically robust and reasonable.
- Have transparent governance arrangements including management actions, monitoring and auditing.

Denham Park is a cattle station north of Moranbah, which has approximately 7123 ha of remnant and non-remnant vegetation that has the potential to provide offsets for impacts to the Ornamental Snake. Of the 7123 ha, 1020 ha has already been secured as an Ornamental Snake offset leaving a potential offset area of 6103 ha. The Denham Park property is split into two (2) lot and plans, Lot 11 on SP262530 and Lot 23 on SP262530. The Proposed Offset Area is in the southern Lot (Lot 23 SP262530) (Figure 2).

The identified 109 ha Proposed Offset Area, to which this OAMP applies, is located on the western section of the property, and excludes a dam in the central section of the area. The identified offset area (Figure 2) has the potential to provide offsets that offer additional environmental values over and above those required. Offsets for both stated MNES are to be co-located within the 109 ha Proposed Offset Area, and it is the intent of Stanmore to manage the total offset area as a whole.

# 3.0 Biodiversity Values Requiring Offsets

To support the Project's State and Commonwealth approvals process, detailed ecological surveys and assessments have been undertaken across the MRA2C Project area and include studies undertaken as part of the MRA2C approval process in 2016, 2017, and 2018 (ELA, 2018) (Appendix C). As well as collecting data to assess the significance of impacts to MNES, surveys also involved habitat quality assessments for the those impacted MNES. Habitat quality assessments are discussed further in section 4.4.1 and 7.2. The results of the detailed ecological assessments and baseline habitat quality of the impact site are outlined in Eco Logical Australia's (2018).

Collectively, these surveys and assessments were undertaken, in order to:

- Determine the presence/absence of listed flora and fauna species within the Project area.
- Assess the vegetation characteristics and the presence of ecological communities within the MRA2C Project area.
- Describe the likely adverse impacts on MNES within the MRA2C Project area.
- Describe measures that would be implemented to avoid and mitigate impacts on those MNES.
- Assess the baseline habitat quality of the impact area for the MNES requiring offsets.

## 3.1 Impact Assessment Ecological Survey Effort

A variety of flora and fauna survey methods were used to detect MNES during the assessment surveys (ELA, 2018) (Appendix C). Three separate survey events occurred within the study area of MRA2C, the results over these surveys informed the significant residual impacts of the MNES occurring on the site.

In 2016, a field survey was conducted from May 4th to May 8th with the purpose of addressing information gaps identified during desktop analysis, including updates to threatened species listings, specifically focusing on flora, TEC, and targeted habitat assessments. Subsequent surveys were undertaken in 2017 from April 20th to 21st to assess additional impact areas for flora, TEC, and targeted habitat assessments. In 2018, from February 9th to 13th, targeted threatened fauna surveys were conducted.

### 3.1.1 Flora Impact Assessment

Site condition assessments, guided by the BioCondition Assessment Manual 'A Condition Assessment Framework for Terrestrial Biodiversity in Queensland' (Eyre, et al., 2015), were conducted at 25 sites across 16 assessment units identified on site. These assessment units were delineated based on ground-truthed vegetation communities in the study area, which were associated with MNES values. The assessments involved gathering data on eight site-based attributes within a nested sampling plot measuring 100 meters by 50 meters. These attributes included large trees, tree canopy height, recruitment of dominant canopy species, native species richness, tree canopy cover, native shrub cover, coarse woody debris, and ground cover encompassing native shrub, grass, forbs, non-native cover, and organic litter cover.

Quaternary surveys were executed to verify the extent, classification, and condition of ground-truthed vegetation communities and habitat types within the study area, while also expanding the spatial coverage of the survey. These surveys adhered to the 'Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland' (Nalder, et al., 2020). At every survey point, data on RE classification and vegetation status (remnant, high-value regrowth, or non-remnant) were recorded. In total, 191 quaternary surveys were conducted across the study area to ensure comprehensive data collection and analysis.

Terrestrial Ecological Community assessments were specifically carried out to evaluate the condition of Brigalow patches, aiming to determine whether they met the criteria for classification as TEC, which had not been previously documented. These assessments followed the condition thresholds outlined in the Approved Conservation Advice for the Brigalow (dominant or co-dominant) Ecological Community (DOE, 2013). These thresholds considered factors such as the species composition of patches (including the dominance or co-dominance of *Acacia harpophylla*) and the overall condition of the species, including patch size and the percentage of exotic perennial grass cover. A total of nine TEC assessments were conducted across the study area to comprehensively evaluate these ecological communities.

### 3.1.2 Fauna Impact Assessment

To assess the presence of threatened fauna species in the impact area, targeted habitat assessments were conducted for the Squatter Pigeon (*Geophaps scripta scripta*), Koala (*Phascolarctos cinereus*), Greater Glider (*Petauroides volans*) and Ornamental Snake (*Denisonia maculata*) to quantify the extent of suitable habitat within the study boundaries. These assessments were tailored to each species and included evaluating habitat condition (e.g., remnant or regrowth), the presence of foraging resources, proximity to water sources, soil type, occurrence of species-specific habitat features (like deep cracking clays or gilgai), percentage of bare ground, native vegetation cover, and species-specific threats. For further information on the species-specific habitat condition variables see ELA (2018) (Appendix C).

## 3.2 MNES Requiring Offsets

The impact area ecological assessments identified four fauna species (Koala, Greater Glider, Squatter Pigeon and Ornamental Snake), one flora species (Black Ironbox) and one TEC (Brigalow) under the EPBC Act as requiring offsets. This OAMP addresses residual (stage 2) offsets for the Ornamental Snake and Brigalow TEC (Table 5). Offsets for the four remaining MNES are located elsewhere.

A portion of previous offset for the Ornamental Snake and Brigalow TEC have been approved on a separate property (BHP, 2020). As such, this OAMP includes the remaining offset requirements for these species as outlined in (Table 5).

**Table 5: MNES impacted by the Project for which offsets will be required**

| MNES | EPBC Act status | Impact area requiring offsets (ha) | Offsets being provided (ha) |
|---|---|---|---|
| Ornamental Snake *(Denisonia maculata)* | Vulnerable | 33.7*(1-0.4453) (condition 5) = **18.7** | 109 |
| Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC | Endangered | 32.7* (1-0.3726) (condition 5) = **20.5** | 109[3] |

[3] The proposed Brigalow offset area of 109 ha acquits ~107% of the impact area and this is due to co-location of the Ornamental Snake and Brigalow offset. If Brigalow was offset in isolation, the offset area would be 102 ha.

### 3.2.1 Ornamental Snake (*Denisonia maculata*)

Approximately 33.7 hectares of habitat suitable for the Ornamental Snake has been identified within the MRA2C Project area, of which approximately 45% has been offset at an alternate property (BHP, 2020) leaving 18.7 ha to be addressed in this OAMP. This calculation was informed by habitat assessments that recognise the known ecological needs of the species (ELA, 2018) (Appendix C). Despite no previous documentation of the species in the MRA2C Project area during ecological survey, records indicate its presence in the broader South Walker Creek Mine (SWCM) site, specifically three instances recorded 2 to 5 km southeast of the study area within remnant Brigalow habitat.

#### 3.2.1.1 General Habitat Preferences

Ornamental Snakes are found in close association with frogs, which form much of its prey, and are known to favour woodlands and open forests associated with moist areas, particularly gilgais with clay soils but are also known from lake margins, wetlands and waterways. This species is associated with Brigalow vegetation communities and commonly found in brigalow (*Acacia harpophylla*), gidgee (*Acacia cambagei*), blackwood (*Acacia argyrodendron*) or coolabah (*Eucalyptus coolabah*) – dominated vegetation communities or pure grassland associated with gilgais (DCCEEW, 2022).

Ornamental Snakes tend to shelter in logs, under coarse woody debris and in ground litter and seem to prefer a diversity of gilgai size and depth, with some fringing groundcover vegetation and timber debris, where soils are of a high clay content with deep-cracking characteristics. Habitat patches greater than 10 ha and connected to larger areas of remnant vegetation are preferred and higher abundance of the species has been found in shallow water where aquatic vegetation is present or where fringing groundcover is inundated, such as shallow wetlands (DCCEEW, 2022). Further, the Draft Referral guidelines for the nationally listed Brigalow Belt reptiles describes gilgai depressions and mounds as being important habitat with habitat connectivity between gilgai and other suitable habitats also being important (DSEWPC, 2011b).

#### 3.2.1.2 Foraging and Refuge Habitat

Soil cracks on the high ground of gilgai development provide shelter for Ornamental Snakes during dry periods, and an abundance of frogs in gilgai areas provide food resources during wet. Ornamental Snakes prefer areas with ground cover such as logs and coarse woody debris, and ground litter, which it uses for shelter (TSSC, 2014).

#### 3.2.1.3 Suitable Habitat within the Offset Area (Ornamental Snake)

Desktop assessment including a review of the DES WildNet and Atlas of Living Australia (ALA) historic records, show multiple records of the Ornamental Snake occurring within the Proposed Offset Area, the wider Denham Park property and surrounds (Figure 3). The records running linearly north to south along the western edge of Denham Park were recorded during construction of a gas pipeline in 2004, whilst the other records towards the eastern side of the property were recorded in 2006. Ornamental Snakes have also been recorded from 2003 through to 2024 (refer to Figure 3). Recent surveys (2022) undertaken by EMM for a potential gas pipeline (for a third-party), recorded the species within the Denham Park property (Figure 3) (EMM, 2022). Spotlighting during the EMM (2022) surveys following heavy rainfall identified nine Ornamental Snakes on the first survey night and a further thirty on the second night of surveys.

Surveys were also undertaken over four nights in early February 2023 by BASE Consulting Group for a separate project which was approved in 2023. This survey observed four Ornamental Snakes in areas of regrowth 11.4.9 and one individual was found in an area of low regrowth Brigalow mapped as a non-remnant to the west of the Proposed Offset Area (BASE, 2024). All of the Ornamental Snakes were in close proximity to inundated gilgai depressions, which was expected given the timing of the survey and

their propensity to favour these areas during the wet season. Targeted surveys conducted in October 2023 and February 2024, confirmed the presence of the Ornamental Snake within the Proposed Offset Area Appendix A.

On-ground ecological assessments determined an abundance of suitable habitat for the Ornamental Snake including shelter habitat in the form of woody debris, leaf litter and cracking clay soils, and foraging habitat in the form of interconnected gilgais of varying size and structure. Furthermore, the vegetation communities on site are known to support the Ornamental Snake when the full spectrum of habitat requirements are considered. Further, these habitats are also known to support their prey species. A full account of on ground vegetation communities and habitat values is in (BASE, 2022) and Appendix A

#### 3.2.1.4 Key Threats

The primary threats to the Ornamental Snake are historical broad-scale habitat clearing for grazing and habitat degradation by cattle, particularly around gilgai habitats (Cogger, 2000; TSSC, 2014; Cogger, et al., 1993) combined with ongoing habitat loss for agriculture and development (Cogger, et al., 1993). Feral pigs are also of great concern, given their degradation of wet areas, competition for frog prey (TSSC, 2014) and potential predation on snakes they encounter. Additional threats include alteration of landscape hydrology and water quality in gilgai environments (which affect the primary prey species of the Ornamental Snake), invasive weeds, and predation by feral predators (Foxes and cats) (ELA, 2015).

### 3.2.2 Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC

Four patches of Brigalow (dominant or co-dominant) TEC were identified within the MRA2C study area, comprising of a total area of 32.7 ha, of which approximately 37% has been offset at an alternate property (BHP, 2020) leaving 20.5 ha to be addressed in this OAMP. These patches met all key diagnostic criteria and condition thresholds for the TEC (ELA (2018). Three of the Brigalow TEC patches within the impact area are only small occurrences encompassing a total area of less than 1.5 ha. The majority of Brigalow TEC occurs in one large patch located in the western portion of the MRA2C impact area.

#### 3.2.2.1 Species profile

The Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (the Brigalow ecological community) occurs within Queensland (Qld) and New South Wales (NSW). *Acacia harpophylla*, known as brigalow, is easily recognisable with its silver-foliaged appearance, and it typically thrives as the primary species in various open forests and woodlands collectively known as brigalow woodlands.

This ecological community is distinguished by the prevalence of *Acacia harpophylla*, which often stands as the most abundant tree species (DOE, 2013). Within the community, *A. harpophylla* can either dominate the tree layer or share dominance with other species such as *Casuarina cristata* (belah), different Acacia species, or various Eucalyptus species. Occasionally, these other species may surpass *A. harpophylla* in prevalence within the broader spectrum of brigalow woodlands vegetation. Despite this variability, the Brigalow ecological community exhibits a diverse range of vegetation structures and compositions, characterized by a commonality of species that thrive in acidic and saline clay soils (DCCEEW, 2024).

#### 3.2.2.2 Suitable Habitat within the Offset Area (Brigalow TEC)

Desktop assessment of the Proposed Offset Area including review of the Queensland Regional Ecosystem Mapping and Preclear mapping (Queensland Herbarium, 2024), found that the Proposed Offset Area was compiled of the following REs (Figure 4 and Figure 5):

- RE 11.3.4
- RE 11.4.9
- RE 11.4.11/11.4.8/11.4.9
- RE 11.5.3
- Non remnant

On-ground ecological surveys conducted within the Proposed Offset Area found the vegetation structure to support a dominant canopy of *Acacia harpophylla*. Following the surveys, the Proposed Offset Area was remapped based on the field verified extent of vegetation communities which shows the area consists of vegetation consistent with RE 11.4.9 and alongside paddocks with regrowth Brigalow to varying degrees. The species composition observed suggests that, with suitable management practices, the regrowth Brigalow will gradually transition back to remnant RE 11.4.9 (Figure 6). Regional Ecosystem 11.4.9 described as "*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains" is strongly associated with Brigalow TEC (DOE, 2013).

# Figure 3: Ornamental Snake Records

0 1 2 km

Scale @ A3: 1:50000
Date: 15/04/2024
Job: J0053.3
Drawn: Isaac Witten

N

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Existing Offset Area
- Proposed Offset Area
- DCDB
- Easement
- Rail

**Historic Ornamental Snake Sightings**

- Ornamental Snake (WildNet)
- Ornamental Snake (EMM) (2022)
- Ornamental Snake Sighting (February 2023)
- Ornamental Snake Sighting (October 2023)
- Ornamental Snake Sighting (February 2024)

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# Figure 4: State Mapped Regional Ecosystems

0 200 400 m

N

Scale @ A3: 1:7000
Date: 26/03/2024
Job: J0053.3
Drawn: Isaac Witten

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Proposed Offset Area
- DCDB
- Easement
- Rail

**Vegetation management regional ecosystem - all**

- Category A or B area containing endangered
- Category A or B area containing of concern
- Category A or B area that is least concern
- Category C or R area containing endangered
- Category C or R area that is of least concern
- Non-remnant

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# Figure 5: Pre-clear Regional Ecosystems

0 200 400 m

N

Scale @ A3: 1:7000
Date: 26/03/2024
Job: J0053.3
Drawn: Isaac Witten

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Proposed Offset Area
- DCDB
- Easement
- Rail

**Pre-clear regional ecosystems**

- Pre-clear endangered RE 11.4.9
- Pre-clear endangered RE 11.4.1 / 11.4.8 / 11.4.9 (70/20/10)
- Pre-clear area containing of-concern RE
- Pre-clear area containing least-concern RE

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# Figure 6: Field Verified Assessment Units (RE)

0 200 400 m

N

Scale @ A3: 1:7000
Date: 26/03/2024
Job: J0053.3
Drawn: Isaac Witten

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

Denham Park
DCDB
Easement
Rail

**Assessment Units**

Assessment Unit 1: Cleared paddock / Regrowth 11.4.9
Assessment Unit 2: Remnant 11.4.9

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# 4.0 Proposed Offset

## 4.1 Habitat Quality Methodology and Scoring for the Impact Site

As part of the Project's approvals process, detailed ecological assessments were undertaken to determine the presence/absence of listed fauna species within the Project (impact) area and to assess and determine the level of residual impacts for listed species that had the potential to require offsets ELA (2018). As outlined in ELA (2018), assessments for the purposes of determining habitat quality were undertaken using the methods outlined in (Eyre, et al., 2015) which is consistent with the methods described in version 1.3 of the *Guide to Determining Terrestrial Habitat Quality* (2020) (the Guide). However, this scoring method, did not incorporate species stocking rates or weighted scoring in the habitat quality calculation. This discrepancy contrasts with the methodology outlined in the *How to Use the Offsets Assessment Guide* (DCCEEW, 2024).

To ensure compliance with the methodology outlined in the *How to Use the Offsets Assessment Guide*, which stresses the significance of incorporating three specific attributes of habitat quality scoring (site condition, site context, and species stocking rates), weighted scoring, and maintaining consistency in methodology across both impacted and offset sites, the scoring system for the impact site was modified. The modification aligns with both the *How to Use the Offsets Assessment Guide* and the Guide (DES, 2020). The integration of species stocking rates and weighted scores into the revised scoring of the impact site, eliminates the restricted approach of solely relying on site condition and context to assess habitat quality for the offset site.

The amended scoring methodology achieves several important outcomes. Firstly, it aligns with current best practices for determining offset obligations under the EPBC Act as defined in the *How to Use the Offsets Assessment Guide*. Secondly, it ensures the use of best practices throughout the 20-year offset liability period, with habitat quality scoring serving as a key metric for assessing offset success. Adhering to best practices from the outset ensures consistent and reliable evaluations throughout the offsets lifespan. Lastly, it brings our approach in line with habitat quality assessment methods used in other Offset Area Management Plans (OAMPs) overseen by Stanmore.

## 4.2 Revised Habitat Quality Methodology and Scoring

The assessment of the revised habitat quality scoring for both the impact and offset sites utilised a blend of attributes including the species stocking rate derived from the *How to Use the Offsets Assessment Guide* (DCCEEW, 2024), alongside the site condition and site context attributes outlined in the Guide (DES, 2020). These attributes are derived from the Queensland BioCondition survey methodology (Eyre, et al., 2015), and employ various habitat indicators to measure the ecological viability and habitat values of a site, as well as its capability to sustain fauna.

This process used for assessing habitat quality is designed so that it is repeatable and relatively simple and uses a combination of field attributes associated with vegetative structure, GIS assessment of the site in reference to its location in the landscape and species-specific habitat requirements.

As stated in the Guide, the assessment must measure habitat quality at the impact site and the offset site in order to quantify and compare the scores. Three indicators are utilised in this methodology: site condition, site context, and species habitat index. For the purposes of providing inputs into the EPBC offsets calculator for the Ornamental Snake, the majority of the attributes from the three indicators were used but partitioned differently with the species habitat index attributes being partitioned between site condition and site context, shown as bolded text in the below list of attributes.

- **Site Condition (15 attributes):**
    - Recruitment of woody perennial species in Ecologically Dominant Layer (EDL)
    - Native plant species richness - trees

- Native plant species richness - shrubs
- Native plant species richness - grasses
- Native plant species richness - forbs
- Tree canopy height
- Tree canopy cover
- Shrub canopy cover
- Native perennial grass cover
- Organic litter
- Large trees
- Coarse woody debris
- Non-native plant cover
- **Quality and availability of food and foraging habitat**
- **Quality and availability of shelter**

The first 13 attributes listed above are generated from direct measurements taken in the field within a standardised habitat quality plot. While these attributes are not a direct or specific measurement of the habitat value for a certain species, they do provide an indication of the overall ecological condition of the community. Ecological condition requirements that are specific to a fauna species are captured by the assessment of the quality and availability of food/foraging habitat and shelter attributes in line with the Habitat Quality Guide. Scoring for these attributes were based on the methods from a previously approved Ornamental Snake OAMP (BASE, 2022) that was based on the Modified Queensland Habitat Quality methods and was used to assess habitat quality of the impact site and Proposed Offset Area. The methodology for scoring these attributes is provided in Appendix D

- **Site Context (5 attributes):**
  - Size of patch
  - Connectedness
  - Context
  - **Threat to Species**
  - **Species mobility capacity**

In line with the Guide, the first three attributes above are calculated using Geographic Information System (GIS) spatial analysis. Site context requirements that are specific to a species are captured by the assessment of the threats to species and species mobility capacity attributes of the Habitat Quality Guide. The methodology for scoring these attributes is provided in Appendix D..

Species stocking rate was calculated as per the method outlined in the *How to Use the Offsets Assessment Guide* and the tables (Table 6 and Table 7) within the species stocking rate spreadsheet provide by DCCEEW and as included in Appendix E. This method replaces species habitat index as a measure of the presence of a species at the impact and offset site. Species stocking rate was assessed using the methods provided by DCCEEWW (refer to Table 6 and Table 7 for examples of the calculation method used).

Species stocking rate does not apply to the habitat quality score of Brigalow TEC, nor are the species-specific attributes that are added to site condition and site context scoring.

**Table 6: Species stocking rate calculation**

| Species Stocking Rate (SSR) | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | |
| | | No | Yes - adjacent | | Yes - on site | |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | |
| | | Not habitat | Dispersal | Foraging | Breeding | |
| Role/importance of species population on site* | Score (*Total from supplementary table below*) | 0 | 5 | 10 | 15 | |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 40) | | | | | 40 | |
| **SRR Score (out of 4)** | | | | | | |

**Table 7: Species stocking rate supplementary table**

| *SSR Supplementary Table | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | |
| | | No | Yes/ Possibly | |
| *Key source population for dispersal | Score | 0 | 5 | |
| | | No | Yes/ Possibly | |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | |
| | | No | Yes/ Possibly | |
| *Near the limit of the species range | Score | 0 | 15 | |
| | | No | Yes | |

To achieve an overall habitat quality score out of 10 for the Ornamental Snake, site condition and site context are multiplied by a weighting factor of 3 out 10 based on the level of importance attributed to site condition, site context and stocking rate for the MNES in question. Weighting factors for the Ornamental Snake will be 30% for site condition, 30% for site context and 40% for species stocking rate (Appendix E).

For Brigalow, offsets were calculated in accordance with the Guide but for REs. Weighting factors for the Brigalow are 80% for site condition and 20% for site context (Appendix E).

## 4.3 Impact Area Assessments

It was noted that the initial habitat quality score of 7/10 for Ornamental Snake habitat at the impact site did not include species stocking rate, which is a crucial factor in determining species-specific habitat quality. As a result, a reassessment of scores for the impact site was undertaken using methodologies

described in Section 4.1 and further elaborated in Appendix A The revised habitat quality scoring resulted in a decrease in the overall habitat quality score from 7/10 to 5/10.

Although crucial factors for measuring habitat quality for fauna species was missing in the initial habitat quality scoring at the impact site for the Ornamental Snake, the scoring methodology used to determine habitat quality of Brigalow TEC within the impact area was correct and in accordance with the methodology used in the Guide. Therefore, re-evaluation of habitat quality for the Brigalow TEC at the impact site was not required.

The MRA2C impact area habitat quality scores for the Ornamental Snake and Brigalow TEC are outlined in Table 8 and Table 9.

**Table 8: Impact area habitat quality scores and habitat descriptions for the Ornamental Snake**

| Offset attribute | Value | Description |
|---|---|---|
| Ornamental Snake Habitat Quality | 7/10 using ELA) and 5/10 using BASE. | Habitat within the study area considered to support Ornamental Snake includes gilgai relief areas on cracking clays. Targeted habitat assessments identified three areas of this habitat within the study area. The habitat was found to contain a structurally complex ground layer comprising extensive amounts of woody debris, wide soil cracks, as well as deep ephemeral gilgai. Given the abundance and high variety of essential microhabitat features, coupled with the predominantly low presence of threats, it is likely that the species would be utilising the study area for breeding, feeding and sheltering. As such the study area is considered to contain important habitat for the species. |

**Table 9: Impact area habitat quality scores and habitat descriptions for Brigalow TEC**

| Offset Attribute | Value | Description |
|---|---|---|
| Brigalow TEC Habitat Quality | 7/10 | Four patches of Brigalow (dominant or co-dominant) TEC were identified within the MRA2C study area, comprising of a total area of approximately 32.7 ha. These patches met all key diagnostic criteria and condition thresholds for the TEC (ELA (2018). Three of the Brigalow TEC patches within the study area are only small occurrences encompassing a total area of less than 1.5 ha. The majority of Brigalow TEC occurs in one large patch located in the western portion of the MRA2C study area. |

## 4.4 Overview of the Property and Proposed Offset Area

Denham Park is owned by a Stanmore SMC and leased as a cattle property and located in the Brigalow Belt bioregion and the Isaac Regional local government area. The property is located within an area that is classified as a fragmented landscape which reflects higher levels of historic disturbance and habitat fragmentation due to historic and ongoing agricultural production and mining. Cattle grazing has been undertaken on Denham Park for over 100 years and based on the first instance of published records, Ornamental Snakes have co-existed with cattle grazing for at least approximately 20 years within Denham Park and the Proposed Offset Area.

Denham Park encompasses approximately 11,800 ha of which approximately 2,460 ha is currently mapped as remnant vegetation with the remainder non-remnant vegetation. Ecological assessments

have been undertaken within Denham Park in 2021 and 2022 to initially field verify the vegetation communities (included in Base, 2021) and in 2022 and 2023 to examine the extent of Ornamental Snake habitat and the presence of the species (included in Base, 2022). These initial surveys determined the presence of Brigalow and the Ornamental Snake and indicated approximately 7,100 ha of the Denham Park property is suitable habitat for the Ornamental Snake and Brigalow TEC offsets. Of the approximately 7,100 ha, 1,020 ha has already been secured as an Ornamental Snake offset (BASE, 2022).

Targeted surveys were undertaken in October 2023 and February 2024 to further assess the presence of the Ornamental Snake and Brigalow TEC to support this OAMP (refer Appendix A). These surveys determined suitable habitat for both MNES and confirmed the presence of the Ornamental Snake within Proposed 109 ha Offset Area. This assessment also determined suitable habitat to allow both the Ornamental Snake and the Brigalow TEC to be co-located within the Proposed Offset Area. Of the 109 ha, approximately 102 ha is required to offset impacts to Brigalow. However, it is the intent of Stanmore to manage the total offset area as a whole. The identified 109 ha Proposed Offset Area occurs within a larger Offset Investigation Area that covered approximately 440 ha (refer to Figure 2) that was investigated as potentially suitable areas for the required offsets. The Proposed Offset Area covers approximately 2 % of the wider Denham Park property and is in the western section of the southern lot (Lot 23 SP262530) (Figure 2).

Stanmore have previously secured a 1,020 ha offset area on Denham Park for impacts to the Ornamental Snake for a separate project (BASE, 2022). The approval for this offset area was granted in 2023. This offset area is located approximately 2 km to the west of the Proposed Offset Area and incorporates similar vegetation structures and habitats as the Proposed Offset Area.

### 4.4.1 Offset Area Habitat Availability and Quality

Surveys confirmed the presence of suitable Ornamental Snake habitat within the broader Denham Park property. Denham Park and the Proposed Offset Area support a mix of vegetation communities comprising; cleared paddocks with low regrowth brigalow, and remnant brigalow (Table 10). All of the vegetation communities provide habitat features that are suitable for Ornamental Snakes and their prey species while also supporting a vegetation structure that complies with the definition of Brigalow TEC.

Ornamental Snakes, like all fauna species, require a range of habitat types and values for shelter, breeding, foraging and dispersal between core habitats. The Draft Referral Guidelines (DSEWPC, 2011b) states that Brigalow Belt reptiles, including Ornamental Snakes, occur in a wide variety of vegetation types with a variety of microhabitats. These vegetation types and microhabitats are included in the vegetation types within the offset area. The Proposed Offset Area includes RE 11.4.9 and this vegetation community is recognised as commonly associated with the presence of the species (DSEWPC, 2011b).

The February 2024 survey determined the baseline habitat quality of the Proposed Offset Area in accordance with the Guide to determining terrestrial habitat quality V1.3 (DES, 2020). Species stocking rate (presence) of the Ornamental Snake was assessed during the field assessments in tandem with the desktop assessment of historical records, connectivity, and previous surveys (Appendix A and (BASE, 2022)). The habitat quality in addition to the microhabitat data and desktop assessment of historic records, allowed robust assessment of the quality of habitat within the Proposed Offset Area (Appendix A and (BASE, 2022)). Furthermore, presence of the Ornamental Snake was confirmed within the Proposed Offset Area in February 2024 (Appendix A).

Denham Park contains numerous previous occurrences of the Ornamental Snake (Figure 3). Although many of these records are from 2004 during construction of the gas pipeline through the area, targeted surveys undertaken in October 2023 and February 2024 by BASE confirmed the presence of the species with two occurrences of the Ornamental Snake within the Proposed Offset Area (refer to Appendix A). In addition, surveys undertaken by EMM in March 2022 recorded the species within the Denham Park

property (EMM, 2022) with 39 occurrences of the species over two nights (EMM, 2022) and BASE (2021) also confirmed the presence of Ornamental Snakes in February 2023 (BASE, 2022).

Habitat quality within Denham Park was determined from eight habitat quality assessment plots (HQAP) within two assessment units (AU) or vegetation communities (refer to Figure 7) that contain a variety of habitat types that are either preferred Ornamental Snake habitat or habitat that is likely to be important for all lifecycle stages of the species or their prey (DSEWPC, 2011b; DCCEEW, 2022) (Table 10). Additionally, these areas support a vegetation structure that correlates to Brigalow TEC (the dominant/co-dominated species being *Acacia harpophylla*). The offset boundary presented in this OAMP was determined based on the offset area required as determined from the EPBC Offset Calculator (Offsets Assessment Guide) and in consultation with the land manager.

**Table 10: Assessment units and corresponding area within the investigated area and Proposed Offset Area.**

| AU | AU definition | BioCondition Benchmark RE used | Total area (ha) within Proposed Offset Area | Number of HQAPs in Proposed Offset Area |
|---|---|---|---|---|
| 1 | Cleared paddock/regrowth brigalow | 11.4.9 | 79.9 | 4 |
| 2 | Remnant brigalow | 11.4.9 | 29.4 | 4 |
| **Total** | | | **109.3 (ha)** | **8** |

Habitat quality score metrics and the area-weighted habitat quality score of the Proposed Offset Area for the Ornamental Snake are summarised in Table 11. Individual scores from each of the HQAPs are further outlined in Appendix A The Proposed Offset Area habitat quality descriptions are provided in Table 14. For further information on the condition and habitat values of the vegetation communities and representative photos of the Proposed Offset Area, refer to Appendix A. Brigalow TEC does not utilise species stocking rate in the habitat quality calculation instead using only site condition and site context, the habitat quality scores for Brigalow TEC and summarised in Table 12.

**Table 11: Habitat quality within the Proposed Offset Area (Ornamental Snake)**

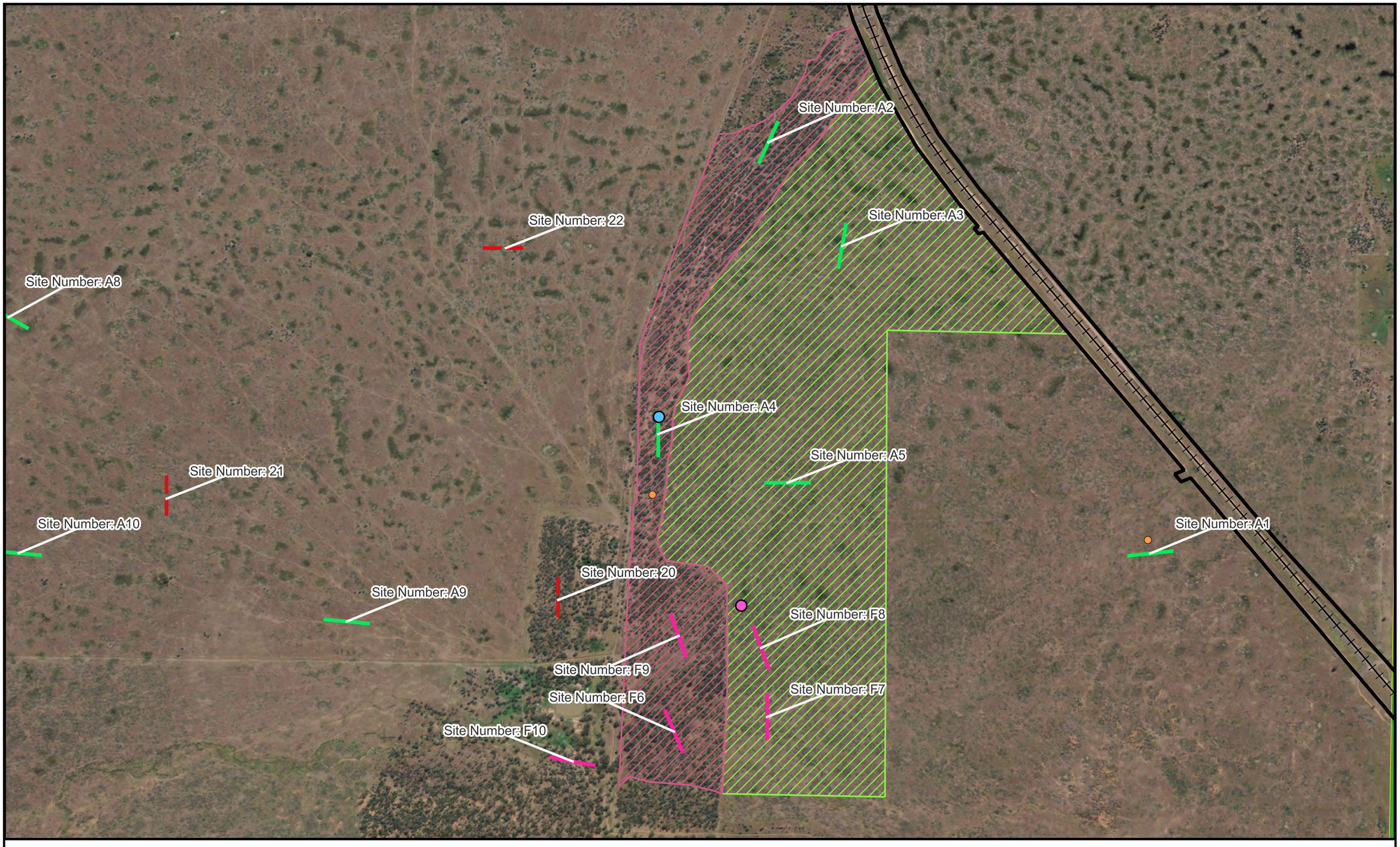
| Final habitat quality score (weighted) | AU1 | AU2 | Average/Final |
|---|---|---|---|
| Site Condition (out of 3) | 1.48 | 1.82 | |
| Site Context (out of 3) | 0.82 | 1.73 | |
| Species Stocking Rate (out of 4) | 3 | 3 | |
| Habitat Quality Score (unweighted) | 5.3 | 6.5 | |
| AU Area (ha) | 79.91 | 29.37 | |
| Total Proposed Offset Area (ha) | 109.3 | | |

| Final habitat quality score (weighted) | AU1 | AU2 | Average/Final |
|---|---|---|---|
| Size weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | **3.88** | **1.76** | **5.6 (6)** |

**Table 12: Habitat quality within the Proposed Offset Area (Brigalow TEC)**

| Final habitat quality score (weighted) | AU1 | AU2 | Average/Final |
|---|---|---|---|
| Site Condition | 2.81 | 4.17 | |
| Site Context | 0.20 | 1.45 | |
| Habitat Quality Score (unweighted) | 3.0 | 5.6 | |
| AU Area (ha) | 79.9 | 29.37 | |
| Total Proposed Offset Area (ha)[4] | 109.3 | | |
| Size weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | **2.20** | **1.51** | ***3.7 (4)*** |

[4] The required offset area is 102 ha. However, this will be co-located within the 109 ha offset area for the Ornamental Snake.




# Figure 7: Assessment Units and Habitat Quality Plots

0 200 400 m

Scale @ A3: 1:7000
Date: 26/03/2024
Job: J0053.3
Drawn: Isaac Witten

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- DCDB
- Easement
- Rail

**Assessment Units**
- Assessment Unit 1: Cleared paddock / Regrowth 11.4.9
- Assessment Unit 2: Remnant 11.4.9

**Habitat Quality Assessment Plots**
- HQAPs (February 2024)
- HQAPs (October 2023)
- HQAPs (September 2022)

**Historic Ornamental Snake Sightings**
- Ornamental Snake (EMM) (2022)
- Ornamental Snake Sighting (October 2023)
- Ornamental Snake Sighting (February 2024)

BASE/

BASE Dropbox\BASE Project Folder\Job Folder\J0053.3 Stanmore (Ornamental Snake Offsets)\Reports\1. Figures
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### 4.4.2 EPBC Offset Area Calculator Attributes

In accordance with the EPBC Act Environmental Offsets Policy, the results of field surveys and calculation of habitat quality, were used to provide inputs into the EPBC Offset Assessment Guide calculator to determine the offset area required and the percent of impact that could be offset within the Proposed Offset Area for the Ornamental Snake. Based on the results of these analyses, Table 13 outlines the impact area, the offset area required to be secured, the habitat quality score and the percent of the impact that is offset. The habitat quality scores for the impact site and the Proposed Offset Area are available in Appendix E

The input values used for the calculation are provided below and reflect a realistic assessment of the area to provide offsets into the future as well as the likely future habitat quality in the absence of offsets. Importantly, the increase in habitat quality of three units for Brigalow TEC is conservative given the starting habitat quality and the breadth of management actions as outlined in section 6.0 that will improve the current quality of the Proposed Offset Area. The enhancement of habitat quality demonstrates a notably cautious approach, particularly when assessing the quality of habitat in the impact area. Notably, no Ornamental Snakes were detected within the impact area, in contrast to the notable presence of Ornamental Snakes within and around the Proposed Offset Area.

The EPBC Offset Assessment Guide calculator results indicate that the proposed 109.3 ha offset area will fully meet offset requirements for the co-located Ornamental Snake and Brigalow TEC. While the offset area exhibits vegetation and habitat conducive to supporting the Ornamental Snake, it is important to acknowledge the presence of various threatening processes within the area. These factors could potentially diminish the habitat suitability for both the Ornamental Snake and Brigalow TEC, particularly given that the majority of the Proposed Offset Area is classified as non-remnant, permitting legal clearing of the area. The description of the input values and the output worksheets from the EPBC Offset Assessment Guide calculator are included in Appendix F

**Table 13: Summary of the offset area to be secured on Denham Park**

| MNES | Impact Area (ha) | Impact area habitat quality score | Proposed Offset Area (ha) | Baseline habitat quality score | Future habitat quality with management | Percent acquitted |
|---|---|---|---|---|---|---|
| Ornamental Snake | 33.7*(1-0.4453) (condition 5) = 18.7 | 5/10 | 109.3 ha | 6/10 | 7/10 | 100.8 % |
| Brigalow TEC | 32.7*(1-0.6243) (condition 5) = 20.5 | 7/10 | 109.3 ha | 4/10 | 7/10 | 107.7 % |

**Table 14: Offset calculator metrics and habitat details (Ornamental Snake)**

| Offset calculator input | Score | Comment |
|---|---|---|
| Quality of the impact area | 7 (ELA calculation) and 5 (BASE calculation using species stocking rate as outlined in section 4.1 and 4.2) | Ornamental Snake has been previously recorded in Brigalow habitat within the wider mine site. Queensland Essential Habitat Mapping also identifies three records within a 2 – 5 km radius of the study area. Targeted Ornamental Snake habitat assessments across the Brigalow / Belah woodland habitat revealed varying values for the species. Only three of the seven patches of Brigalow / Belah habitat were found to contain the essential microhabitat features necessary to support the species. This includes a structurally complex ground layer comprising extensive amounts of woody debris, wide soil cracks, as well as deep ephemeral gilgai (ELA, 2018). |
| Starting quality of the Proposed Offset Area | 6 | The Proposed Offset Area of 109.3 ha is a mix of young regrowth brigalow and degraded remnant brigalow, all of which are known to support Ornamental Snakes. The young regrowth brigalow and degraded remnant brigalow exhibits flora species composition analogous with RE 11.4.9.<br><br>These vegetation communities are considered suitable habitat for the Ornamental Snake as they support a range of habitat types that provide shelter (cracking clay soils, leaf litter, and fallen timber) and foraging habitat (gilgais) as well as habitat for their preferred prey species.<br><br>Although evidence of recruitment of canopy trees was observed in the offset area, this did not equate to establishment of large canopy trees which showed low abundance relative to the impact area and benchmark sites of the associated REs. A low abundance of large trees has flow on effects for refuge habitat by providing less leaf litter and large woody debris for use as shelter habitat. Therefore, the offset site has a lower level of foraging and shelter habitat relative to the benchmark.<br><br>The Proposed Offset Area is currently used for livestock grazing and has moderate levels of disturbance caused by feral pigs with indications of pig digs and ground compaction reducing shelter and foraging habitat quality.<br><br>Past fire practices and incursion by pastural grasses and invasive weed species has resulted in a habitat that is moderately degraded with low species richness, throughout all vegetation strata. Areas subject to recently clearing events (AU1), exhibited a very low diversity of tree species.<br><br>The quality of the Ornamental Snake offset area was assessed in accordance with the Habitat Quality Guide which identified a |

| Offset calculator input | Score | Comment |
|---|---|---|
| | | habitat quality score of 6/10 and scored slightly higher than the impact site. |
| Future quality of the offset area without offset management | 6 | An assessment of the future likely habitat quality of the offset area was undertaken considering the current habitat quality as determined by and assessed in accordance with, the DES Guide, the threatening processes to the Ornamental Snake and the effect these processes may have on the future habitat quality.<br><br>In addition, Queensland's *Planning Act 2016* (PA Act) includes a range of exemptions for landholders to manage vegetation including establishing new infrastructure, fences, roads, tracks, fire management lines and firebreaks. Approval to thin vegetation can also be sought. The implementation of these actions will not result in the entire removal of vegetation; however, coupled with cattle stocking rates has the potential to degrade woodland habitats, such as a further reduction in habitat quality associated with the ground and mid-canopy layers.<br><br>As shown in the Ecological Assessment Report in Appendix A historical aerial imagery indicates the current land management practices in terms of vegetation management within the Proposed Offset Area are similar with no discernible difference over the last approximately 30 years. In particular, minimal changes in vegetative cover, vegetation management and land management have occurred between the time of historical Ornamental Snake records in 2004, and the present. As such, the probability of the Ornamental Snake occurring within the Proposed Offset Area remains unchanged from the early 2000s (refer to Appendix A.<br><br>The current land management practices and the presence of listed weed species including, *Parthenium hysterophorus, Harrisia martinii, Opuntia tomentosa* and *Senecio madagascariensis* observed during field surveys could continue to have a detrimental impact on tree species recruitment (and establishment), and native species richness for grasses, shrubs, and forbs, and a decrease in native grass cover and an increase in non-native plant cover.<br><br>Habitat degradation by feral animals including Feral pigs and European Hare/Rabbits is likely to include increased erosion and compaction of soils which can lead to a reduction of shelter habitat for the Ornamental Snake. This increases vulnerability to predation by other feral animals known to occur within the offset area, including feral cats, feral pigs and wild dogs.<br><br>Taking into consideration the above threatening processes, the predicted effects of these processes, current management practices and obligations on all landowners under Queensland biosecurity legislation to appropriately control invasive weeds and |

| Offset calculator input | Score | Comment |
|---|---|---|
| | | pest animals, no decrease in habitat quality is anticipated for the offset site without the offset being in place. |
| Future quality of the offset area with offset management | 7 | The quality of Ornamental Snake habitat will improve through the establishment of the Proposed Offset Area. Future habitat quality of the offset area represents the ecological gain that can be achieved over 20 years of active land management aimed at improving the ecological condition of habitat specifically for the Ornamental Snake.<br><br>Detailed management actions are outlined in section 6.0 and are specifically targeted towards providing enhanced habitat values for the Ornamental Snake. The management actions will reduce pest animal abundance, enhance recruitment of large canopy trees in wooded areas and in doing so will increase the quality of foraging and shelter habitat encouraging the Ornamental Snake to inhabit the area. Management actions include:<br><br>A pest management control program to reduce the number of pest animals, including Feral pigs and the European Hare/Rabbits which may degrade the area, particularly wetland areas crucial for foraging habitat of the Ornamental Snake. The pest control program will also focus on predator species including Wild Dogs, Foxes, and Feral Cats which can prey on Ornamental Snakes.<br><br>Cattle grazing will be excluded during the wet season and following heavy rainfall events (refer to section 6.4) to avoid disturbance to wetland and gilgai habitats but permitted during the dry season as a tool to manage weed groundcover abundance and to promote improved tree and shrub recruitment.<br><br>Weed management to reduce the infestation of weeds that currently out-compete native flora species.<br><br>Strategic fire management to maximise recruitment and establishment of large canopy trees and increase canopy cover. Maximising the establishment of canopy trees will increase shelter habitat through an increase in leaf litter and large woody debris.<br><br>Properly managed fire regimes will promote cooler fires and avoid hot and intense fires which are known to destroy fauna habitat, including shelter and food resources. Refraining from introducing fire to the regrowth brigalow until the canopy reaches a height that can safely sustain cool fires, will prevent undue harm to the ecosystem. |
| Confidence in the offset achieving the predicted quality score | 90% | Implementing the actions outlined in this OAMP provides a high degree of confidence that the highly conservative increase in future habitat quality of one (1) unit from the current condition can be achieved. |

| Offset calculator input | Score | Comment |
|---|---|---|
| | | Biodiversity monitoring will also be conducted as part of the OAMP (refer to section 7.2) to measure the progress of the offset area and ensure the offset area achieves its required habitat quality. Annual reporting will be undertaken for compliance with the management action outlined in the OAMP. This will allow for timely identification of any corrective actions required.<br><br>An increase in future habitat quality of one (1) is conservative and is based on assessing the current habitat quality scores and those scores that could realistically be achieved through implementation of the management actions. An assessment has been undertaken and considered the current habitat score, the proposed management actions, and the resulting changes to the habitat quality scoring. The proposed management actions are predicted to increase the abundance of large trees in wooded areas, decrease non-native plant cover, increase species richness, increase canopy cover and height, increase abundance of large woody debris, increase quality and availability of food and foraging habitat, increase the quality and availability of shelter, and decrease threats to the species. |
| Risk of loss without the offset | 0% | Without the offset there is a zero (0) % risk that the vegetation communities will be lost and/or altered considering historical land management practices and restrictions implemented by the Queensland Government on vegetation clearing for agricultural purposes. Although there are several threatening processes occurring within the offset area, these processes are likely to result in a loss of habitat quality rather than a loss of habitat per se.<br><br>Based on these factors, zero (0) % is considered a reasonable estimate of the risk of loss without the offset |
| Risk of loss with the offset | 0% | Risk of loss with offset is estimated to be zero (0) %. The offset area is proposed to be protected (legal security mechanism) through a Voluntary Declaration which will prevent clearing. By definition, the risk of loss under a protection mechanism must be less than or equal to the risk of loss in the absence of such a mechanism. Therefore, a risk of loss with protection is also zero (0) %.<br><br>The offset area will be declared as an area of high nature conservation value under section 19F of the *Vegetation Management Act 1999* (VM Act). |
| Confidence in the risk of loss predictions | 90% | The legally binding Voluntary Declaration will be registered on the land title and will be binding on all current and future landowners to ensure that the habitat is protected in perpetuity. |

| Offset calculator input | Score | Comment |
|---|---|---|
| | | The legally binding mechanism precludes development unless the Queensland Government authorises an activity. However, for the activity to be authorised, offsets must be provided for the original offset obligation as well as any additional offsets that are required by the new activity. This process is very costly both economically and in time and provides a strong deterrent for development within a protected offset area. |
| Time over which the risk of loss is averted | 20 years | The offset area will be protected by a legally binding mechanism which will remain in effect in perpetuity as required by the applicable State and Commonwealth legislative requirements. Therefore, the time over which loss is averted is the maximum allowable time of 20 years as per the EPBC Offset Assessment Guide calculator. |
| Time until ecological benefit | 20 years | It is estimated that to achieve an improved habitat quality score of one (1) unit could take up to 20 years but improvements could occur in as little as 5 years. The improvement of habitat quality will be achieved by implementing a range of management actions (refer to section 6.0) aimed at managing the current threatening processes that are constraining habitat improvement. Such actions will involve managing fire, grazing, weed and pest management and are aimed at increasing recruitment and establishment of large canopy trees which will increase foraging and shelter habitat as well as decreasing potential threats from feral animals and weeds.<br><br>These management actions will result in an improvement in the habitat quality score within the 20-year timeframe. |

**Table 15: Offset calculator metrics and habitat details (Brigalow TEC)**

| Offset calculator input | Score | Comment |
|---|---|---|
| Quality of the impact area | 7 | Four patches of Brigalow (dominant or co-dominant) TEC were identified within the impact area, comprising of a total area of approximately 32.7 ha. The Brigalow woodland habitat occurs in discrete patches across the impact study area and was associated with the Cainozoic clay plains situated on the older alluvial terraces of Walker Creek. The habitat was found to have a high structural complexity consisting of a moderately dense canopy layer and a moderate shrub layer. This habitat also contains a relatively complex ground layer, with extensive woody debris and moderate organic litter cover. |

| Offset calculator input | Score | Comment |
|---|---|---|
| Starting quality of the Proposed Offset Area | 4 | The Proposed Offset Area of 102 ha (located within the 109.3 ha Ornamental Snake offset) is a mix of, young regrowth brigalow and degraded remnant brigalow. The young regrowth brigalow and degraded remnant brigalow exhibits flora species composition analogous with RE 11.4.9.<br><br>Although evidence of recruitment of canopy trees was observed in the offset area, this did not equate to establishment of large canopy trees which showed low abundance relative to the impact area and benchmark sites of the associated REs. This is specifically evident in the previously cleared areas associated with AU1.<br><br>The designated Proposed Offset Area is presently utilized for livestock grazing and experiences moderate levels of disturbance, primarily due to the presence of feral pigs. Signs of pig digs and ground compaction are evident, leading to adverse effects on the population dynamics of plants and animals. This disturbance significantly contributes to degradation by destroying young plants and disrupting soil integrity.<br><br>Historical clearing and fire practices, along with the encroachment of pasture grasses and invasive weed species, have led to moderate degradation across all vegetation layers in the habitat. Particularly, areas recently cleared (AU1) display a notable reduction in tree species diversity.<br><br>The quality of the Brigalow TEC offset area was assessed in accordance with the Habitat Quality Guide which identified an average habitat quality score of 4/10 for the remnant and regrowth Brigalow areas. |
| Future quality of the offset area without offset management | 4 | An assessment of the future likely habitat quality of the offset area was undertaken considering the current habitat quality as determined by and assessed in accordance with, the DES Guide, the threatening processes to Brigalow TEC and the effect these processes may have on the future habitat quality.<br><br>In addition, Queensland's *Planning Act 2016* (PA Act) includes a range of exemptions for landholders to manage vegetation including establishing new infrastructure, fences, roads, tracks, fire management lines and firebreaks. Approval to thin vegetation can also be sought. The implementation of these actions will not result in the entire removal of vegetation; however, coupled with cattle stocking rates has the potential to degrade woodland habitats, such as a further reduction in habitat quality associated with the ground and mid-canopy layers.<br><br>As shown in the Ecological Assessment Report in Appendix A historical aerial imagery indicates the current land management practices in terms of vegetation management within the Proposed |

| Offset calculator input | Score | Comment |
|---|---|---|
| | | Offset Area are similar with no discernible difference over the last approximately 30 years.<br><br>The current land management practices and the presence of listed weed species including, *Parthenium hysterophorus, Harrisia martinii,* and *Opuntia tomentosa* observed during field surveys could continue to have a detrimental impact on tree species recruitment (and establishment), and native species richness for grasses, shrubs, and forbs, and a decrease in native grass cover and an increase in non-native plant cover.<br><br>Habitat degradation by feral animals including feral pigs and European hare/rabbits is likely to include increased erosion and compaction of soils.<br><br>Taking into consideration the above threatening processes, the predicted effects of these processes, current management practices and obligations on all landowners under Queensland biosecurity legislation to appropriately control invasive weeds and pest animals, no decrease in habitat quality is anticipated for the offset site without the offset being in place. |
| Future quality of the offset area with offset management | 7 | The average starting habitat quality score for the offset area is 4/10 and comprises a mix of remnant and regrowth regional ecosystem RE 11.4.9 Brigalow vegetation community. The regrowth portion of the offset area and surrounds outside of the remnant vegetation patches have been previously cleared (pulled) with the most recent maintenance clearing event occurring in 2021. In the intervening 3 years, this area of Brigalow regrowth has increased from a habitat quality score of 0/10 to an average score of 3/10.<br><br>Peeters and Butler et. al. (2014), and references therein note that the potential for Brigalow to regrow after clearing is highly correlated with the clearing method and land use. When Brigalow is pulled (as is the case at Denham Park), and living stumps and roots are left (which occurred at Denham Park), the vegetation will resprout when further disturbances are negligible. Further, species composition of the regrowing Brigalow is strongly influenced by the suite of species present (i.e. pre-clearance vegetation community) prior to clearing such that the regrowth vegetation is similar to older and remnant areas.<br><br>Brigalow within the proposed offset site has assumed dominance in the area within approximately 3 years of clearing. This is in line with results obtained in Butler and Fairfax (2003) that showed that when Brigalow was dominant in the pre-clearance vegetation community, Brigalow assumed early dominance soon after clearing and dominated the successional process. Competition for resources between Brigalow plants resulted in self-thinning within the vegetation community. The natural successional process will |

| Offset calculator input | Score | Comment |
|---|---|---|
| | | result in increased leaf litter and coarse woody debris within the regrowth offset area as well as increased structural complexity. All these factors contribute to an increase in habitat quality score.<br><br>The regrowth portion of the offset area is located immediately adjacent to an existing stand of remnant Brigalow. The proximity of the mature stand of Brigalow adjacent to the regrowth Brigalow vegetation will enhance the restoration potential of the regrowth through recruitment/natural dispersal via seed rain and animal vectors to increase recruitment potential. In addition, restoration of the regrowth (reduction in invasive species through pest management actions as outlined in Section 6.0) will also help to improve habitat quality/scores of the adjacent remnant Brigalow. Active management such as exclusion and strategic cattle grazing and pest management will increase the potential of the regrowth Brigalow to reach remnant status in the required timeframe.<br><br>Brigalow growth rates vary and depend on a range of factors including but not limited to, vegetation community type and species diversity, climate, rainfall, soil type and land use. In the approximate 3 years since the previously cleared areas of regrowth were maintained, the maximum height of the tallest Brigalow plant was approximately 1.5 m. If growth is linear, this suggests a growth rate of approximately 50 cm/year equates to a maximum tree height of approximately 7.5 m over a 15 year period and approximately 10 m after 20 years. The typical average height of trees in remnant stands of 11.4.9 are 10 m which suggests the areas of regrowth Brigalow within the offset site are likely to reach remnant status within the 20 year period.<br><br>Under Queensland's *Vegetation Management Act 1999* (VM Act) for vegetation to be considered remnant the vegetation must satisfy two conditions based on canopy height and canopy cover. For Brigalow RE 11.4.9 to be considered remnant, Brigalow must be the dominant tree species and with a minimum average height of 6.2m AND a minimum average canopy cover greater than 11.3%. Therefore, based on the current height of the regrowth Brigalow and the projected increase in height over 20 years, as outlined above, and the current cover of 26%, the regrowth (as shown in appendix E of the OAMP) will reach remnant status within 20 years.<br><br>It is considered that through natural successional processes and with the application of the management actions outlined in the OAMP, the current regrowth state will transition to the remnant state with improvements over time in canopy height, canopy cover, woody debris and species diversity. Reductions in non-native plant cover will also lead to an increase in habitat quality and RE benchmark condition scoring. |

| Offset calculator input | Score | Comment |
|---|---|---|
| | | Over the next 20 years through the implementation of the OAMP it is considered achievable to raise the current score of 4/10 to a score of 7/10, which is considered of moderate quality.<br><br>Regrowth Brigalow that has not been cleared in the last 15 years is considered to exhibit structural characteristics and species composition of mature Brigalow (Environment Australia, 2001). Therefore, regrowth Brigalow older than 15 years is recommended to be referred to DCCEEW. This implies that a 15 year period is sufficient for Brigalow vegetation communities to reach mature status. Detailed management actions are outlined in section 6.0 and will reduce pest abundance, enhance recruitment of large canopy trees species in wooded areas, measure and support increased canopy cover and height over the OAMP timeframes. Management actions include:<br><br>A pest management control program to reduce the number of pest species, including; introduced plant species, feral pigs, European hare/rabbits and feral deer which are known to degrade native habitats within the area, and particularly wetland areas.<br><br>Cattle grazing will be excluded at least during the wet season and following heavy rainfall events (refer to section 6.4) to avoid disturbance to wetland and gilgai habitats. Following monitoring of the regrowth Brigalow area, the cattle exclusion period may be to be increased, or cattle excluded completely.<br><br>Where cattle can be used effectively in reducing weed cover abundance, they may be permitted during the dry season as a tool to manage weed groundcover abundance, to improved tree and shrub recruitment through reduced competition with introduced species.<br><br>Weed management to reduce the infestation of weeds that currently out-compete native flora species.<br><br>Strategic fire management to maximise recruitment, reduce pest species densities and promote establishment of large canopy trees species and increase canopy cover.<br><br>Properly manage fire regimes to exclude wildfires, promote cooler planned fires and avoid hot and intense wildfires which are known to impact Brigalow and destroy fauna habitat, including shelter and food resources. Refraining from introducing fire to the regrowth brigalow until the canopy reaches a height that can safely carry cool fires and prevent undue harm to the ecosystem. |
| Confidence in the offset achieving the | 60% | Implementing the actions outlined in this OAMP provides a relatively high degree of confidence that the conservative increase in future habitat quality of three (3) units from the current condition can be achieved for Brigalow TEC. |

| Offset calculator input | Score | Comment |
|---|---|---|
| predicted quality score | | Biodiversity monitoring will also be conducted as part of the OAMP (refer to section 7.2) to measure the progress of the offset area and ensure the offset area achieves its required habitat quality. Annual reporting will be undertaken for compliance with the management action outlined in the OAMP. This will allow for timely identification of any corrective actions required.<br><br>An increase in future habitat quality of three (3) is conservative and is based on assessing the current habitat quality scores and those scores that could realistically be achieved through implementation of the management actions. An assessment has been undertaken and considered the current habitat score, the proposed management actions, and the resulting changes to the habitat quality scoring. The proposed management actions are predicted to increase the abundance of large trees in wooded areas, decrease non-native plant cover, increase, species richness, increase in canopy cover and height, increase abundance of large woody debris, and decrease threats to the Brigalow TEC.<br><br>Although an increase from 4/10 to 7/10 over a 20 year period with the management actions outlined in the OAMP is achievable with a relatively high degree of confidence, there is still be a level of uncertainty from DCCEEW regarding the level of confidence in achieving an increase in habitat quality of 3 units. Therefore, a 60% level of confidence has been proposed. This would equate to an offset area of 102 ha and an acquittal of 100.79 % of the Stage 2 impact area of 20.5 ha. Because Ornamental Snake and Brigalow offsets are to be co-located, the proposed offset area is 109.3 ha which equates to 107.7% of the impact being offset. |
| Risk of loss without the offset | 0% | Without the offset there is a zero (0) % risk that the vegetation communities will be lost and/or altered considering historical land management practices and due restrictions implemented by the Queensland Government on vegetation clearing for agricultural purposes. Although there are several threatening processes occurring within the offset area, these processes are likely to result in a loss of habitat quality rather than a loss of habitat *per se*.<br><br>Based on these factors, zero (0) % is considered a reasonable estimate of the risk of loss without the offset |
| Risk of loss with the offset | 0% | Risk of loss with offset is estimated to be zero (0) %. The offset area is proposed to be protected (legal security mechanism) through a Voluntary Declaration which will prevent clearing. By definition, the risk of loss under a protection mechanism must be less than or equal to the risk of loss in the absence of such a mechanism. Therefore, a risk of loss with protection is also zero (0) %. |

| Offset calculator input | Score | Comment |
|---|---|---|
| | | The offset area will be declared as an area of high nature conservation value under section 19F of the VM Act. |
| Confidence in the risk of loss predictions | 90% | The legally binding Voluntary Declaration will be registered on the land title and will be binding on all current and future landowners to ensure that the habitat is protected in perpetuity.<br>The legally binding mechanism precludes development unless the Queensland Government authorises an activity. However, for the activity to be authorised, offsets must be provided for the original offset obligation as well as any additional offsets that are required by the new activity. This process is very costly both economically and in time and provides a strong deterrent for development within a protected offset area. |
| Time over which the risk of loss is averted | 20 years | The offset area will be protected by a legally binding mechanism which will remain in effect in perpetuity as required by the applicable State and Commonwealth legislative requirements. Therefore, the time over which loss is averted is the maximum allowable time of 20 years as per the EPBC Offset Assessment Guide calculator. |
| Time until ecological benefit | 20 years | It is estimated that to achieve an improved habitat quality score of three (3) units could take up to 20 years, but improvements could occur in as little as 10 years. The improvement of habitat quality will be achieved by implementing a range of management actions (refer to section 6.0) aimed at managing the current threatening processes that are constraining habitat improvement. Such actions will involve managing fire, grazing, weed and pest management and are aimed at increasing recruitment and establishment of large canopy trees which will increase foraging and shelter habitat as well as decreasing potential threats from feral animals and weeds.<br>These management actions will result in an improvement in the habitat quality score within the 20-year timeframe. |

## 4.5 Property Details

Stanmore SMC Pty Ltd (SMC), a subsidiary of Stanmore Resources, is the landowner for the Denham Park properties.

## 4.6 Registered Interests

Several easements traverse Lot 23 SP262530, one of which is a rail line that runs to the east of the Proposed Offset Area in a north-south direction. The area of this rail line easement does not encompass the Proposed Offset Area. No mining interests (exploration or production) and no petroleum interests (exploration or production) occur over the Proposed Offset Area.

## 4.7 Offset Area Protection Mechanism

The offset will be secured by a Voluntary Declaration under section 19E and 19F of the VM Act as an area of high nature conservation value. It is Stanmore's intention that the Voluntary Declaration will be declared over the proposed 109.3 ha offset area for Ornamental Snake in accordance with the approval conditions (i.e. within 12 months of approval of this OAMP). The Voluntary Declaration will be registered on the property's title and will be binding on current and future landholders. Once the declaration has been registered on the property title, the offset area will be mapped as a Category A area on the Property Map of Assessable Vegetation (PMAV) which is shown as red and described as an "Area subject to compliance notices, offsets and voluntary declarations".

A Voluntary Declaration under the VM Act is an authorised legally binding mechanism and is considered an appropriate mechanism to legally secure MNES values and protect the area from vegetation clearing. The Voluntary Declaration will remain in place in perpetuity and may only be removed if the chief executive of the Queensland Department of Natural Resources considers it is necessary.

However, Queensland's Guide to Voluntary Declarations under the VM Act states that under section 19L of the VM Act, a declaration cannot end (i.e. be removed from the property title) until the management outcomes of the management plan have been achieved (the OAMP will be attached to the Voluntary Declaration). Hence, the legally binding mechanism, and by extension implementation of this OAMP, will remain in effect for the period of the EPBC Act approval. The EPBC Act Environmental Offset Policy states the offset must be provided for duration of the impact.

As per condition 4 of the EPBC approval, Stanmore will notify the DCCEEW within five (5) business days of the legal mechanism being executed and on commencement of stage 2. Additionally, the approval holder must not commence Stage 2 until the revised Offset Area Management Plan (OAMP) required under condition 8 has been approved by the Minister in writing.

## 4.8 Environmental Offsets Framework

An overview of how the Proposed Offset Area meets the requirements of the EPBC Act Environmental Offsets Policy is outlined in Table 16.

The offset area meets the requirements of the Environmental Offsets Policy (EOP). Consideration was also given to property plans and any potential conflicting future use of the property to minimise the potential for conflicting land use pressures within and around the Proposed Offset Area.

**Table 16: EPBC Act environmental offsets policy requirements**

| Policy requirements | Project offsets |
|---|---|
| Deliver an overall conservation outcome that improves or maintains the viability of the MNES in question | The Proposed Offset Area within Denham Park fully acquits the offset requirements for the approved impacts to the Ornamental Snake and the impacts to Brigalow TEC simultaneously.<br><br>The Proposed Offset Area currently poses several threatening processes that limit the habitat value of the area as outlined in Table 14. The Proposed Offset Area will undergo management aimed at enhancing habitat conditions and the viability of the Ornamental Snake, aligning with EPBC Act offset obligations and the strategies detailed in this OAMP. Simultaneously, efforts will be made to elevate the quality of the Brigalow TEC. The offset area will be managed and monitored for the duration of the approval and to ensure it meets the completion |

| Policy requirements | Project offsets |
|---|---|
| | criteria i.e. the future habitat condition improves to the predicted future habitat quality scores outlined in Table 13.<br><br>No Ornamental Snakes were identified in the impact area. Habitat within and surrounding the impact area was considerably lower in quality than at Denham Park. Within the Proposed Offset Area, three occurrences of the Ornamental Snake were recorded as outlined in Appendix A and (BASE, 2022), and an additional nine in the neighbouring paddock and over 30 occurrences within kilometres of the offset area (EMM, 2022).<br><br>Given the high numbers of Ornamental Snake records within the Proposed Offset Area and the wider Denham Park, the expanse of suitable habitat within and surrounding Denham Park and the proposed management actions to improve habitat quality, it is questionable whether a more suitable offset site could be located and secured.<br><br>The Proposed Offset Area consists entirely of vegetation synonymous with regional ecosystem 11.4.9, characterised by specific species composition and structural attributes. With the implementation of appropriate management strategies outlined in Section 6.0, this vegetation is expected to revert to a pristine, undegraded state, achieving a condition score of 7. |
| Be primarily built around direct offsets but may also include other compensatory measures | Denham Park is able to fully acquit the offset requirements for Brigalow TEC and Ornamental Snake through direct offsets and legally securing suitable habitat for the species and TEC. Therefore, no other compensatory requirements are necessary at this stage. |
| Be in proportion to the level of statutory protection that applies to the MNES | The threat status of the MNES is taken into account by the EPBC Offset Assessment Guide calculator in determining the area of the offset to be provided and was taken into account during the approval of the Project's impact (Appendix E. |
| Be of a size and scale proportionate to the residual impacts on the protected matter | The size of the Proposed Offset Area has been calculated in accordance with the EPBC Act Environmental Offsets Policy and the EPBC Offset Assessment Guide calculator. Inputs and justifications are based on the results of the detailed field assessments that were undertaken within the impact and offset areas with the corresponding habitat quality calculated in accordance with the Habitat Quality Guide.<br><br>Further, the Proposed Offset Area includes a range of habitat values that are known to support the full lifecycle of the Ornamental Snake, as well as the vegetation structure to support Brigalow TEC as outlined in section 4.4.1. |
| Account for and manage the risks of the offset not succeeding | The suitability of the offset area has been calculated in accordance with EPBC Act Environmental Offsets Policy and the EPBC Offset Assessment Guide calculator which takes into consideration a number of metrics including confidence in the offset succeeding. The inputs and justifications are shown in Table 14 for the Ornamental Snake and Table 15 for Brigalow TEC. Risks associated with the offset have been |

| Policy requirements | Project offsets |
|---|---|
| | assessed (refer to section 9.0) and appropriate mitigation and management measures are provided in section 6.0 |
| Be additional to what is already required | The proposed MRA2C offset area is zoned rural under the *Isaac Regional Planning Scheme 2021* and is located within the Isaac Regional Local Government Area. These areas have been historically used for cattle grazing with improvements including sheds, accommodation, water storages, fencing and dirt roads. The land manager is currently obliged to appropriately manage pest animals and invasive weed species to protect environmental values (amongst other values) under state government general biosecurity obligations. However, the proposed pest animal and weed management activities, decreased grazing periods and fire management are additional to those required under the *Biosecurity Act 2014* (Qld). See section 6.0 for further detail. |
| Be efficient, effective, timely, transparent, scientifically robust and reasonable | The Proposed Offset Area has been identified and its suitability assessed using standard practices approved by both Commonwealth and State Governments and were undertaken by suitably qualified ecologists (refer to Appendix B) using an evidence-based and scientifically robust approach. Stanmore commits to legally securing the offset area within 12 months. This OAMP outlines a transparent and scientifically robust ongoing monitoring program (refer to section 0) that can be readily audited to assess its effectiveness of assessing the success of the offset area in achieving the required offset obligations. Further, this OAMP supports an efficient, effective, timely, transparent, scientifically robust and reasonable approach to providing offsets. |
| Have transparent governance arrangements including management actions, monitoring and auditing | This OAMP outlines a clear governance framework and delivery pathway to legally secure the offset area and a transparent and scientifically robust monitoring and reporting program. The OAMP also provides an auditing framework that allows for continual improvement to ensure the offset area achieves the required offset obligations. |

## 4.9 Additional Management and Protection

Establishing the Proposed Offset Area would enhance protection for biodiversity values by mitigating the risk of clearing and strengthening biosecurity measures. The majority of the Proposed Offset Area is classified as non-remnant and thus subject to potential legal removal or alteration under Queensland's VM Act, securing an offset over this area would afford it additional safeguards not currently mandated by Queensland legislation. Even the remnant vegetation within the area is susceptible to limited clearing for essential management activities, such as the removal or thinning of undergrowth vegetation and fallen woody debris. Moreover, the VM Act does not mandate landholders to preserve the existing condition of regulated vegetation or fauna habitat areas. Therefore, establishing the offset would offer supplementary protection and management for both remnant and non-remnant vegetation.

Queensland's *Biosecurity Act 2014* imposes a 'general biosecurity obligation' on all people to manage biosecurity risks that are under their control and that they know about or could reasonably be expected to know about. In general terms, this means that for livestock owners, the owners are expected to stay informed about pests and diseases that could affect or be carried by the animals, as well as weeds and pest animals that could be present on their property. Landowners are also expected to manage them

appropriately. For landowners, there is an expectation that they will stay informed about the weeds and pest animals (such as wild dogs, feral pigs, etc.) that could be on their property. There is also an expectation that appropriate management will be undertaken.

The obligations outlined in this OAMP are additional to these general *Biosecurity Act 2014* obligations. For example, ongoing feral animal control will be undertaken to minimise the numbers of all feral animals with the end goal being eradication, where possible. This is above and beyond the requirements of the *Biosecurity Act 2014* as is the reduction of weed species to less than 10% weed cover within the Proposed Offset Area over the life of the OAMP.

# 5.0 Management Objectives

The environmental outcomes sought by this OAMP are to improve the condition and ecological values of the vegetation communities for the MNES within the Proposed Offset Area. The environmental outcomes will be realised by achieving the completion criteria defined in Table 18.

Implementation of this OAMP will also effectively manage risks to the MNES and implement adaptive management actions to continually refine, revise and update the management actions as additional data on the success of the offset area is collected.

As outlined in Table 20 the specific management objectives of this OAMP area:

- Strategically graze cattle to reduce and manage understorey fuel loads and native and non-native flora densities.
- Improve overall habitat quality within the Proposed Offset Area including the supplementation of woody debris.
- Reduce the risk of unplanned fire causing adverse impacts on the Ornamental Snake and Brigalow TEC through strategic fire management. Refraining from introducing fire to the regrowth brigalow until the canopy reaches a height that can safely sustain cool fires, preventing undue harm to the ecosystem.
- Minimise habitat degradation caused by feral pigs (Sus scrofa) and rabbits (Oryctolagus cuniculus) to reduce impacts on habitat variables for MNES including, tree species recruitment, understorey vegetation composition, and overall health of Ornamental Snake foraging habitat (gilgais).
- Restrict unauthorised access to prevent alternative land-use.
- Control invasive weed species to reduce impacts on the Ornamental Snake from over dominance of non-native floristic abundance in the understorey.
- Minimise predation risk to the Ornamental Snake by feral cats (Felis catus), wild dogs (Canis domesticus) and feral pigs (Sus scrofa).
- Restrict vegetation clearing within the offset area, except for selected ecological thinning of regrowth Brigalow, to enhance growth rates and to accelerate recovery of the Brigalow ecosystem Ecological thinning will be determined during the monitoring events in years 1-5.

These management objectives and the corresponding management actions outlined in section 6.0 and Table 20 are specific to the 109.3 ha Proposed Offset Area and based on the MNES requiring offsetting, with consideration of identified threats and recovery actions specific to the Ornamental Snake and Brigalow TEC as outlined in the Commonwealth listing and conservation advice, recovery plans and other relevant documents (Table 17).

**Table 17: Relevant conservation advice, recovery plans and threat abatement plans**

| MNES | Relevant conservation advice and plans | Main threats and recommended actions | Measures proposed in this OAMP |
|---|---|---|---|
| Ornamental Snake | Approved Conservation Advice for *Denisonia maculata* (Ornamental Snake) (TSSC, 2014) | Habitat clearing.<br>Habitat degradation including wetland and frog habitat, primarily from feral pigs but also | Ensure continued presence of Ornamental Snake and avoid loss of habitat.<br>Increase habitat quality and vegetation structure including the addition of wood debris. |

| MNES | Relevant conservation advice and plans | Main threats and recommended actions | Measures proposed in this OAMP |
|---|---|---|---|
| | | cattle during the wet season.<br><br>Poisoning from ingestion of Cane Toad. | Prevent habitat degradation and decline in habitat values within the Proposed Offset Area.<br><br>Reduce habitat degradation and potential predation on the Ornamental Snake by pest animals.<br><br>Minimise habitat alteration or degradation from changes to water quality and hydraulic activity.<br><br>Removal of Cane Toads and Cane Toad eggs. |
| Brigalow TEC | Approved Conservation Advice for Brigalow (*Acacia harpophylla* dominate or co-dominate) ecosystems (DOE, 2013) | Vegetation clearing<br><br>Fire<br><br>Invasive species<br><br>Inappropriate grazing regimes<br><br>Habitat degradation from feral pigs | Ensure that clearing is strictly prohibited within the designated offset area, including sections identified as non-remnant.<br><br>Implement a strategic fire management program to mitigate the risk of uncontrolled wildfires that may harm the ecosystem.<br><br>Implement a comprehensive pest management strategy to address both invasive plant species and pest animals.<br><br>Implement a strategic grazing management plan aimed at regulating ground-level biomass while preventing ecosystem damage caused by overgrazing.<br><br>Implement either ecological thinning or active revegetation of the regrowth Brigalow area depending on stem densities during monitoring. |

## 5.1 Completion Criteria and Interim Performance Targets

The EPBC Act EOP states that an offset area must deliver an overall conservation outcome that improves or maintains the viability of the MNES as if the action had not occurred. In accordance with the EOP the final habitat quality score (offset completion criteria) at the offset site must be equal to or greater than the habitat quality score of the impact area.

Completion criteria for the Ornamental Snake and Brigalow TEC are summarised in Table 18 and Table 19 and have been developed as a measure to assess and ensure that the final habitat quality scores as outlined in section 4.4.2, are achieved. Predicted interim performance targets are also included in Table 18 and Table 19.

For remnant Brigalow offset areas where an increase in habitat quality score of approximately 2 is expected over 20 years, baseline habitat quality will be re-assessed in 2025 (Year 1) and the interim performance targets assessed every five years during years 2030, 2035, 2040 and 2045 (Table 18). Completion is expected in 2045.

For the regrowth Brigalow offset area (Figure **2**) annual interim performance targets have been included for the first five years then at five-yearly increments through to year 20, or until the competition criteria is met. New baseline habitat quality scores will be re-assessed in 2025 (Year 1 following approval of the OAMP). Interim targets will be assessed in years 2026, 2027, 2028, 2029, 2030, 2035 and 2040. Completion is expected in 2045 (Table 19). A detailed breakdown of the predicted interim performance targets for the Brigalow offsets area are provided in Appendix E) The interim performance targets will help to assist the management and improvement of the offset area, enabling evaluation of the effectiveness of progress towards completion criteria.

The completion criteria and corresponding increase in habitat quality scores will be reached by the implementation of the management actions outlined in Table 20 and ongoing monitoring of the effectiveness of those actions section 0. Annual reports will provide transparency regarding the implementation of the management measures and where relevant, identify any non-compliance with the OAMP and *force majeure* events that impact the offset area.

Failing to meet the interim performance targets will prompt adaptive management and the land manager will apply corrective actions outlined in Table 20 to ensure the completion criteria will be met. The need for additional mitigation measures will be assessed and addressed during the annual compliance reporting of the OAMP.

The intent of the interim performance targets is to assess, revise and if required, amend the OAMP such that the completion criteria can be attained within the proposed 20-year time frame. It is important to note that interim performance targets are a guide and have been predicted based on the expected increases in habitat quality following implementation of the proposed management measures. Corrective actions are outlined in Table 20 that must be undertaken if the predicted interim performance targets are not met. Once attained, the completion criteria will be maintained for at least the duration of the approval.

**Table 18: Completion criteria and interim performance targets Ornamental Snake**

| AU and percentage of Offset Area | Starting Habitat Quality Score | Interim Performance Targets | | | | | | | | Final Habitat Quality – Completion Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 10 | Year 15 | Year 20 | |
| AU1 – Young regrowth Brigalow (73%) | 5.5 | 5.6 | 5.6 | 5.7 | 6.1 | 6.3 | 6.5 | 6.7 | 7.2 | 7.2 |
| AU2 – Mature regrowth Brigalow (27%) | 6.7 | 6.7 | 6.8 | 6.8 | 6.8 | 6.9 | 7.2 | 7.3 | 7.3 | 7.3 |
| **Total Offset Area Habitat Quality Score (Area-Weighted)** | **5.79** | **5.88** | **5.92** | **5.95** | **6.27** | **6.43** | **6.73** | **6.82** | **7.21** | **7.21** |

**Table 19: Completion criteria and interim performance targets Brigalow TEC**

| AU and percentage of Offset Area | Starting Habitat Quality Score | Interim Performance Targets | | | | | | | | Final Habitat Quality – Completion Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 10 | Year 15 | Year 20 | |
| AU1 – Young regrowth Brigalow (73%) | 3.0 | 3.5 | 3.8 | 3.9 | 4.7 | 4.9 | 5.6 | 6.4 | 6.7 | 6.7 |
| AU2 – Mature regrowth Brigalow (27%) | 5.6 | 5.9 | 6.0 | 6.0 | 6.1 | 6.6 | 7.4 | 7.5 | 7.6 | 7.6 |
| **Total Offset Area Habitat Quality Score (Area-Weighted)** | **3.71** | **4.13** | **4.35** | **4.46** | **5.05** | **5.38** | **6.08** | **6.68** | **7.0** | **7.0** |

The specific attributes of site condition, site context and species stocking rate (species stocking rate only applies to the Ornamental Snake) that are expected to change over the life of the approval and lead to the final habitat score/competition criteria may change from those outlined below. However, the calculation method will remain unchanged and the final habitat quality/completion criteria scores remain as outlined in Table 18 and Table 17.

It is anticipated that the management measures described in section 6.0 will result in habitat quality improvements as follows:

Site condition:

- Species richness will increase by approximately one new forb species per year for the first five years, then every two years thereafter. Native tree species will increase by one in the first year, with further additions to reach the benchmark by year 20. Native grass species richness will gradually improve over the 20-year period in both AUs, through cattle removal and the implementation of the pest management program. This projected progress aims to meet the BioCondition benchmark by the end of the plan's duration.
- Canopy height will increase by approximately 0.5 meters per year for the first 10 years in both AU1 and AU2, then slow as the trees mature, ultimately reaching a climax mean community height of 8-10 meters. Additionally, a lower tree layer is expected to develop once the dominant canopy reaches approximately 6.5 meters. The mean height of the lower tree layer will increase gradually as the main canopy matures.
- Native shrub cover in AU1 will decrease as the regrowth brigalow develops into a canopy.
- Organic litter and course woody debris is expected to increase with the growth of above ground biomass or tree species over time and the application of an appropriate fire regime. In addition, woody debris will be added (where required) to the Proposed Offset Area and will come from other locations within Denham Park following natural tree falls.
- The number of large trees is expected to increase through natural growth of canopy and subcanopy trees by excluding clearing in areas of non-remnant and remnant vegetation and implementing controlled burns to mitigate the potential for wildfires, and the strategic removal of cattle over time.
- Non-native flora cover is expected to be reduced 5% annually and achieve 25% reduction within the first 5 years by mechanical removal, fauna friendly chemical spraying and the implementation of an appropriate fire regime. The control of non-native species will be applied throughout the life (20 years) of the offset to maintain a weed cover at <10%, this will be maintained for the duration of the approval of this OAMP.
- Reduction of pest species annually and maintained at a low density (<10%) within foraging habitat for the Ornamental Snake, Brigalow woodlands and associated wetland habitats. Reduction of threats to the Ornamental Snake through reduced pest and predator densities, and improved habitat structure (increased woody debris, reduced disturbance of gilgais),
- Reduction of threats to the Ornamental Snake through reduced pest and predator densities, and improved habitat structure (increased woody debris, reduced disturbance of gilgais),

Site Context:

- Increasing the patch size of Brigalow TEC and Ornamental Snake habitat will directly increase the habitat quality score. Larger patches of vegetation are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna.
- Increasing the amount of remnant native vegetation retained in the wider landscape (1 km buffer from each HQAP) will increase the habitat quality scores.
- Increasing the connectivity to adjacent remnant vegetation by improving the adjacent regrowth communities; therefore, increasing the remnant vegetation alongside the long, isolated patch (AU2). High connectivity in a landscape allows fauna species to move easily between suitable habitat areas, while low connectivity results in isolated populations.

Overall, the increase in habitat quality scores will increase the quality of habitat by improving habitat quality of the each of the Assessment Units through encouraging tree growth, decreasing weed cover, increasing shelter and foraging habitat and minimising threats to the Ornamental Snake.

# 6.0 Management Actions

The OAMP is based on adaptive management principles, which are scientifically validated approaches to ecosystem management. The management objectives and actions are based on rigorous field surveys conducted using established scientific methodologies, assessing ecological conditions, species diversity, and potential threats such as invasive species. These surveys provide empirical data that informs the development of management strategies. Recognising the dynamic nature of ecosystems and the uncertainty in environmental management, the OAMP incorporates adaptive management to allow for flexibility and responsiveness to changing conditions. Monitoring protocols outlined in section 0 track key indicators, enabling evaluation of the management actions effectiveness over time. This evidence-based approach ensures that management efforts remain scientifically sound, maximizing the likelihood of achieving the desired conservation outcomes while minimizing unintended consequences. This OAMP will be adapted and updated annually, if required as determined by any corrective actions as outlined in Table 20.

This section of the OAMP outlines the management actions that will be implemented within the offset area to abate the identified threats to the MNES and to protect and enhance the habitat values of the offset area. The management actions focus on the key threatening processes for the species as outlined in section 6.0 and described in the DCCEEW SPRAT species profiles and relevant EPBC Act statutory documents for the species Table 17.

Detailed management actions for the Proposed Offset Area are outlined in Table 20 and should be read in conjunction with sections 6.1 to sections 6.7. These sections provide the detail on how the management actions will be implemented. The majority of the ongoing and routine management actions are expected to be undertaken by the land manager (e.g. grazing management, fire management, feral animal, addition of woody debris and weed management) under agreement with Stanmore Resources (note that Stanmore SMC Pty Ltd, as landholder, may lease Denham Park to a land manager or manage the land itself).

Ongoing ecological monitoring will be undertaken by suitably qualified ecologists also under agreement with Stanmore Resources as outlined in section 0 and Table 21. Should the results of ongoing monitoring identify that the relevant management action(s) have been unsuccessful, corrective action(s) will be undertaken and the management actions reviewed and updated accordingly as shown in Table 20.

**Table 20: Management actions, triggers for further action and corrective actions**

| Habitat management objective and relevant MNES | Management and mitigation measures | Trigger for further actions | Monitoring | Corrective actions |
|---|---|---|---|---|
| Avoid habitat or vegetation loss through unplanned land clearing.<br><br>This management objective is applicable to Brigalow TEC and Ornamental Snake. | • No unapproved and/or intentional clearing of vegetation within the offset area for the duration of the approval, except for clearing that is required for fencing, access, firebreaks or public safety.<br>• Signs and fences will be erected within three months of the offset being legally secured. They will be erected at all entrances and potential access points to the site identifying the area as an environmental offset and stating that access to the site is forbidden.<br>• Fences will be maintained to prevent unauthorised access, to minimise incursions by feral herbivores and to control stock presence. | • Any activities that are in contravention of the Voluntary Declaration and this OAMP.<br>• Detection of damaged fences associated with vehicle access roads/tracks.<br>• Detection of prohibited forestry operations, native timber harvesting or clearing outside of established access tracks, fire control lines and fence lines (existing infrastructure). | • Monitoring and inspections (section 0 and Table 21) will document if there is evidence of recent forestry or timber harvesting activities or illegal clearing.<br>• Monitoring will also document vegetation clearing that has occurred for fire break, access road or fence line maintenance.<br>• Monitoring will occur at least quarterly during routine land management practices by the land manager.<br>• The annual compliance report will document any illegal/ unauthorised land clearing. | • Upon being notified or becoming aware of prohibited forestry operations, native timber harvesting or unapproved clearing outside of existing infrastructure, the landholder is to assess how unauthorised persons accessed the site.<br>• Review existing access restrictions and inspect signage and offset area fencing within one fortnight of detection of the clearing.<br>• Corrective actions will be implemented immediately (e.g. the regeneration of those areas will be undertaken, and these areas added to the ongoing monitoring sites for the duration of the approval) and if appropriate the OAMP will be revised and updated if required.<br>• Any changes to the OAMP will be reported to the Minister for approval prior to changes in management.<br>• Any impact on the offset resulting from unauthorised activities must be reported to DCCEEW as a non-compliance as per condition 21 and 22. |
| Control invasive weed species to reduce impacts on MNES from an overdominance of non-native floristic abundance in the understorey.<br><br>This management objective is applicable to Brigalow TEC and Ornamental Snake. | • Access to the offset site will be restricted to authorised persons only.<br>• Weed management and weed hygiene restrictions will be implemented across the offset site to reduce the extent of existing weeds and to control the potential introduction of other exotic weed species.<br>• Weed hygiene and management will be undertaken in consultation with the land manager.<br>• Mechanical control of declared weed species will be undertaken in accordance with the control measures outlined in the | • An increase in the average percent (%) cover score of weed species from baseline or previous monitoring events.<br>• Outbreak of infestations of weed species not previously recorded in the offset area during baseline or previous monitoring events.<br>• An increase in the presence of weeds (relative abundance and/or area of occurrence) as determined from photo monitoring results.<br>• An interim performance target is not likely to be attained, or a completion criterion is not likely to be attained and/or maintained. | • Monitoring of weeds and non-native plants (section 0 and Table 21) will be undertaken during the habitat quality assessment surveys using the same methodology used to assess baseline habitat quality.<br>• Monitoring of weeds and non-native plants will occur annually for the first five years following the wet season then every (5) years subsequently.<br>• The annual compliance report will document the presence of weeds, weed control measures and extent of weed cover during the reporting period, and the relevant responsive actions. | • Any increase in the relative abundance of invasive or other weed populations from those recorded during the baseline survey, or subsequent monitoring events will trigger the following corrective actions that must be undertaken:<br>  • Review adherence to current weed hygiene procedures to ensure compliance and to update restrictions.<br>  • Review timing and frequency of weed management measures as outlined in section 6.6, and implement alternative weed management timeframes.<br>  • Investigate alternative weed management control actions (e.g. injection of herbicides) and implement. |

| Habitat management objective and relevant MNES | Management and mitigation measures | Trigger for further actions | Monitoring | Corrective actions |
|---|---|---|---|---|
| | Biosecurity Queensland Fact Sheets[5] or other sources of information.<br>• Broad-scale herbicide usage is prohibited within the offset area due to the potential negative effects it may have on the Brigalow TEC, as well as the Ornamental Snake population and their habitat. | | | • Undertake additional weed management measures until weed populations are reduced.<br>• Suitably qualified ecologist to review the OAMP within one month and update if required. |
| Strategic cattle grazing to minimise degradation of gilgai habitats during the wet season and to reduce and manage understorey fuel loads and, native and non-native flora densities and improve water quality within wetland habitats.<br>This management objective is applicable to Brigalow TEC and Ornamental Snake. | • Stock management will be undertaken in consultation with the land manager and as required to achieve the performance objectives and completion criteria.<br>• If and where new fencing is required to demarcate the offset area, ensure fencing is permanent and prohibit unintended grazing by cattle.<br>• Grazing will be excluded during the peak Ornamental Snake activity periods which, in a typical/neutral year is nominally between November-March).<br>• The onset, length and end of the wet season changes with the El Nino-Southern Oscillation (ENSO). The length of the wet season is typically three to five months with the duration typically defined by the Bureau of Meteorology (2022) as:<br>  • Neutral year starting in November end ending in March<br>  • El Nino year starting in December and ending April<br>  • La Nina year starting in October and ending in March<br>• Stock to be removed from the offset area following heavy rainfall at any time of the year, that results in light vehicles unable to drive along unsealed tracks with cattle only returned once conditions permit vehicle access. This is an indicator that cattle could damage gilgai or wetland habitats. | • Livestock located in the offset areas during strategic grazing events such as the typical/neutral year wet season (November-March).<br>• Damaged fencing is observed.<br>• If local weather produces an extended or varied peak activity period for Ornamental Snake outside the typical/neutral year wet season (November- March).<br>• If fuel loads are assessed and indicate the groundcover exceeds thresholds (40% cover).<br>• Interim performance targets for regrowth Brigalow are not being achieved. | • Regular inspections (refer to section 0) at least quarterly) of the offset area will be undertaken during normal land management and farming practices to examine fence lines when stock are grazing in the offset area and/or adjacent to the offset area.<br>• Annual records will be kept of when and how many cattle graze in offset area. These records will be kept whenever stock enter the offset area.<br>• Regular inspections (refer to section 0) will be undertaken to assess signs of overgrazing and pugging.<br>• Habitat quality assessments (refer to section 0) will be undertaken in accordance with this OAMP and will include assessment of percentage cover of native perennial grasses. These Habitat quality assessments will take place in year one (1) of the approval following the wet season then every (5) years subsequently. | • Repair offset area boundary fencing if damaged within one week of detection.<br>• Remove stock immediately when found to be grazing in the typical/neutral year wet season.<br>• Remove stock following heavy rainfall when light vehicles are unable to drive along unsealed access tracks with cattle only returned once conditions permit vehicle access. This is an indicator that cattle could damage gilgai or wetland areas.<br>• Construct additional fencing if stock have been located within the offset area as required.<br>• Should monitoring activities identify triggers for further action, the OAMP will be reviewed by a suitably qualified ecologist within one month and updated if required.<br>• Any corrective action identified will be implemented within 1 month of the OAMP being updated.<br>• If the interim performance targets for regrowth Brigalow are not being achieved, exclude cattle from the regrowth offset area until interim performance targets have been met. |

[5] https://www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/fact-sheets

| Habitat management objective and relevant MNES | Management and mitigation measures | Trigger for further actions | Monitoring | Corrective actions |
|---|---|---|---|---|
| | • Stock to be restricted beyond the peak Ornamental Snake activity periods if the annual interim performance targets for regrowth Brigalow in the first five years are not being achieved. | | | |
| Minimise habitat degradation caused by feral animals including feral pigs and rabbits.<br><br>This management objective is applicable to Brigalow TEC and Ornamental Snake. | • Pest animal management will be undertaken in consultation with the land manager and in accordance with general pest management processes.<br>• Pest management will include a range of best management practice actions including shooting, trapping, fencing and baiting, and will be undertaken in accordance with Queensland's Department of Agriculture and Fisheries (DAF) guidelines[6] and the requirements of the *Biosecurity Act 2014*.<br>• If an increase in feral pest species is noted above trigger levels, additional pest management/control measures will be instigated until the increased activity has ceased. | • Any increase in sightings/signs (tracks) and/or the relative abundance of pest animals above baseline levels and/or previous monitoring event.<br>• Observation of, or signs of, a feral animal not identified as occurring within the offset area during the baseline surveys.<br>• Habitat quality scores for interim performance targets are not likely to be achieved by:<br>  • Year 5<br>  • Year 10<br>  • Year 15<br>  • Year 20 | • Feral animal presence will be monitored as outlined in section 0. As a minimum through visual signs recorded during monitoring, routine land management and direct observations.<br>• Remote camera monitoring will also be used to assess the presence of feral animals. Remote cameras will be placed during ecological surveys to assess habitat quality in year one (1) of the approval following the wet season then every (5) years subsequently. Remote cameras will be placed for a period of 20 camera trap nights targeting gilgais and other Ornamental Snake habitats.<br>• Feral animal monitoring results, and associated actions, will be included in annual reporting to the Department.<br>• Monitoring of habitat quality scores (refer to section 0), will be undertaken. The results of monitoring events will be compared against baseline habitat quality scores, interim performance targets and completion criteria to determine the progress of the offset area and recorded as part of reporting. | • If one of the triggers for further action is triggered, a review of the adherence to pest animal management actions will be undertaken immediately.<br>• Investigate potential sources or reasons for an increase in pest animal numbers and rectify.<br>• Increase the frequency or revise the type of invasive pest animal control efforts in accordance with DAF guidelines, and in conjunction with neighbouring landowners.<br>• Suitably qualified ecologist to review the OAMP within one month and update if required. |
| Reduce the risk of unplanned fire causing adverse impacts to the MNES by strategic fire management.<br><br>This management objective is applicable to Brigalow TEC and Ornamental Snake. | • Controlled burns will be undertaken in consultation with the land manager and in accordance with the recommended fire management guidelines for Regional Ecosystems and will involve a range of burn strategies including patchwork burns.<br>• Fire is to be excluded from the offset area except for planned and strategic burns as required to reduce understorey fuel loads | • Unplanned fire within the offset area.<br>• Planned fires become out of control or the required burning regime is not achieved.<br>• If fuel loads are assessed and indicate the native perennial groundcover exceeds thresholds (i.e 40% cover). | • Fire breaks are to be inspected annually in September.<br>• Visual inspection of signs of fire during routine land management (at least quarterly) and during the habitat quality assessments in year one (1) of the approval following the wet season then every (5) years subsequently. | • Occurrences of fire are to be recorded during the visual inspections undertaken during routine land management. (section 0).<br>• If an uncontrolled bushfire has impacted the offset area (including if controlled burning becomes out of control), review the grazing management and fire management strategies and adherence to these strategies will take place within one |

[6] https://www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/fact-sheets

| Habitat management objective and relevant MNES | Management and mitigation measures | Trigger for further actions | Monitoring | Corrective actions |
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| | having a detrimental impact on canopy tree recruitment and establishment and to maintain existing fire breaks.<br>• Create firebreaks around the offset area boundary, if required or where a natural firebreak (e.g. creek line, paddock roads or fence lines) does not occur, to minimise unplanned fire from adjacent lands.<br>• Firebreaks, if required, are to be co-located, where possible, with roads, fence lines and vehicle access tracks. No areas of Ornamental Snake habitat will be cleared unless necessary for safety management and without consideration to the impacts and Department requirements (i.e. habitat areas are not reduced).<br>• Fire is to be excluded from the cleared paddocks until regrowth reaches a height which will allow for cool ground layer fires are possible without the risk of fire reaching the canopy. | | • Fuel loads will be monitored during habitat quality assessments (refer to section 0), through monitoring of ground cover which will inform fire management strategies. | (1) month. Cattle will immediately be excluded from the offset area for at least three months (depending on conditions for re-growth). All fire breaks will be inspected, maintained, and repaired if required within one (1) month of the damage occurring.<br>• To ensure compliance with performance criteria, undertake remedial action within one month including:<br>o Alteration to stocking rates, and/or duration and frequency of strategic grazing events. Amendments to fire management practices as required including fire safety and containment management.<br>• Suitably qualified ecologist to review the OAMP within one (1) month and update if required. |
| Habitat degradation and indirect impacts to MNES due to unauthorised access to the Proposed Offset Area<br>This management objective is applicable to Brigalow TEC and Ornamental Snake. | • All signs and fences will be erected within three (3) months of the offset being legally secured.<br>• Signs will be erected at all entrances and potential access points to the site stating that access to the site is forbidden.<br>• Fences will be maintained to prevent unauthorised access, to minimise incursions by feral herbivores and to control stock presence. | • Evidence of unauthorised or unplanned access by persons, vehicles, and/or stock is detected during exclusion periods.<br>• Evidence of stock is detected at any point during exclusion times.<br>• Damage is detected to any fence or sign, or MNES. | • Monitoring of fence lines will be undertaken by the Landholder or suitable qualified person appointed by the approval holder within three (3) months of the offset area being legally secured and during quarterly inspections.<br>• Inspections will monitor and document damage or loss of signs, damage to Ornamental Snake habitat and evidence of unauthorised access to the offset area. | • Upon being notified or becoming aware of prohibited access to the offset area, the approval holder is to immediately reassess access protocols for any lessees, easement holders etc., signage and general access.<br>• Damage to signage and fences will be repaired within one month of noting the damage.<br>• If there are areas that have been negatively impacted by unauthorised access, the regeneration of those areas will be undertaken, and these areas added to the ongoing monitoring sites.<br>• Signage will be repaired and maintained as required within one (1) fortnight by the Landholder or suitable qualified person appointed by the approval holder. |
| Offset fails to achieve the interim performance targets and completion criteria within the anticipated 5, 10, 15 and/or 20-year time intervals including the required | • All management actions outlined in this OAMP will be implemented to ensure that the interim performance targets and competition criteria are achieved. | • Interim performance targets are not likely to be achieved by year 5, 10 or 15. | • Habitat quality score assessments will be undertaken in year one (1) of the approval following the wet season then every (5) years subsequently. | • Within one (1) month of detection of the trigger, complete an investigation into the reasons why the interim performance targets or the completion criteria were not |

| Habitat management objective and relevant MNES | Management and mitigation measures | Trigger for further actions | Monitoring | Corrective actions |
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| benchmark levels of wood debris which provides shelter habitat for Ornamental Snakes.<br><br>This management objective is applicable to the Ornamental Snake. | • The Voluntary Declaration under the VM Act will ensure that the landholder remains obliged to undertake active management of the offset until all completion criteria are achieved.<br>• Monitoring and management, as needed, will continue for the life of the approval to ensure that completion criteria have been met and maintained.<br>• Add course woody debris to the offset area to achieve at least 75% of course woody debris benchmark levels by year 5 and 100% of benchmark levels by year 10. | • Completion criteria are not achieved by year 20.<br>• At least 75% of course woody debris benchmarks levels not attained by year 5.<br>• At least 100% of course woody debris benchmarks levels not attained by year 10. | • Targeted monitoring for the Ornamental Snake will be undertaken annually in the first five (5) years, as a minimum.<br>• Monitoring of the offset area will be undertaken in accordance with the methods outlined in this OAMP.<br>• Monitoring results will be compared against the interim performance targets and completion criteria to assess progress of offset area in achieving the requirements of this OAMP. | or are not likely to be achieved within the specified timeframes. This investigation must re-evaluate the suitability of the relevant management actions and identify appropriate corrective actions.<br>• As soon as practicable, and within six months of detection of the trigger, implement revised corrective actions. These may include (but not limited to):<br>  • Increasing the frequency and intensity of pest animal and weed control measures or revising the type of measures to be implemented.<br>  • Modify fire management measures, to better support enhancement of offset values.<br>  • If the investigation outlined above requires changes to the management actions, then as soon as possible, and within six (6) months of detection of the trigger, implement a revised OAMP, as approved by the Minister, incorporating those recommended changes.<br>  • Add additional course woody debris if natural processes and anthropogenic supplementation haven't seen benchmark levels realised. |
| Improve habitat quality of the regrowth Brigalow offset area. | The primary methods of improving habitat quality in the regrowth area will be:<br>• Natural regeneration is the primary method for improving habitat quality within the offset areas once weeds and pests have been controlled.<br>• Active revegetation (seeding/planting) is a contingency measure if natural regeneration is not readily occurring, or if interim performance targets aren't being met after at least three successive annual monitoring events. Three years is considered sufficient to allow natural regeneration to occur based on existing seed stock, seed dispersal from the adjacent remnant Brigalow area, weed control and grazing management to | • Annual interim performance targets are not likely to be achieved by year 5 and/or interim performance targets from year 5 onwards are not achieved.<br>• Stem densities of brigalow regrowth exceeds 10,000 stems/ha and shrub and tree cover exceed benchmark levels.<br>• Where active revegetation has been undertaken, mortality exceeds 10% as determined by the annual monitoring events. | • Following the wet season, annual habitat quality score assessments will be undertaken for the first five years of the OAMP approval then every (5) years subsequently.<br>• Targeted stem density monitoring in regrowth and remnant Brigalow will be undertaken annually in the first five (5) years, as a minimum and will continue until the interim performance targets are met.<br>• If active revegetation is required, monitoring of the revegetation works will be undertaken annually for a minimum of five years. | • Within one (1) month of detection of the trigger, complete an investigation into the reasons why the interim performance targets or the completion criteria were not or are not likely to be achieved within the specified timeframes. This investigation must re-evaluate the suitability of the relevant management actions and identify appropriate corrective actions.<br>• As soon as practicable, and within three months of detection of the trigger, implement revised corrective actions. These may include (but not limited to):<br>  • Increasing the frequency and intensity of pest animal and weed control measures or revising the |

| Habitat management objective and relevant MNES | Management and mitigation measures | Trigger for further actions | Monitoring | Corrective actions |
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| | encourage further growth and for soil conditions to improve. Active revegetation may be required where extensive weed management has occurred to ensure other weed species do not establish. This will be determined during the interim monitoring events.<br>• Active revegetation will involve direct seeding and/or tube stock plantings of locally endemic tree species reflective of the species composition mix in RE 11.4.9, or seeding from local seed sources, as outlined below:<br>• Density of plants will be consistent with the applicable RE 11.4.9 benchmark and in consultation with either the Queensland Herbarium and/or a suitably qualified ecologist with revegetation experience, and plantings will be protected with tree guards. Supplementary watering will be undertaken during and after planting.<br>• During annual weed monitoring, mapping of weed treated areas will be undertaken to identify areas that are not naturally regenerating. Surveys will include identification of the underlying causes so these can be remediated.<br>• Undertake ecological thinning/removal of the regrowth Brigalow for those plant species that are not listed in the 11.4.9 RE description. Thinning will also be undertaken where the shrub and tree layers exceed benchmark cover values and/or when stem densities exceed 10,000 stems/ha (Peeters & Butler, 2014). | | | type of measures to be implemented.<br>• Undertake additional active revegetation and replanting when mortality exceeds 10% as determined from the annual monitoring events.<br>• Update the OAMP as soon as practicable to include any revised management actions or interim performance targets.<br>• Depending on the investigation outcomes, either increase stem density thinning or cease thinning for a 12-month period and until the following year's annual monitoring has been undertaken. |

## 6.1 Access and Fencing

Access to the offset area is restricted to authorised personnel only including the land manager and persons authorised by the land manager and Stanmore Resources to undertake monitoring programs and maintenance. Existing and new fences, if required, will be used to restrict access into offset areas. Signs will be erected in prominent locations (i.e. at access points into the offset site) which recognise that the area is protected for conservation purposes and that access into these areas is restricted to authorised personnel only. Signs will be installed prior to commencement of the action. Environmental awareness training will be provided to all workers as part of site induction and will include specific topics on risks and protective measures, and identification of the Ornamental Snake and Brigalow TEC.

Existing access tracks where possible, will be used to enable management, monitoring and maintenance to be undertaken. In the event that existing access tracks become impassable (e.g. from erosion, flooding or vegetation regrowth), maintenance and remediation of the existing access tracks will be undertaken. Any new access tracks will be noted in revisions of this OAMP, and the offset area increased accordingly where tracks impact Ornamental Snake habitat. Should new tracks be required, consultation will be undertaken with DCCEEW prior to construction to ensure appropriate approvals, if required, are obtained including Minister approval of any revised OAMP.

## 6.2 Vehicles

Vehicle access within the ecological management area will be restricted to those vehicles (e.g., quad bikes) authorized by the land manager/offset area manager and Stanmore. Movement of vehicles will be confined to designated access tracks wherever feasible, with exceptions made for general cattle management activities (e.g., mustering, health checks for sick or injured animals) within the offset area. Vehicle operators must adhere to track conditions and guidance provided by the land manager/offset area manager to minimize the risk of harm to Ornamental Snakes and prevent habitat degradation of Brigalow TEC caused by vehicles and/or recovery equipment in the event of accidents or bogging. The land manager will enforce a maximum speed limit of 30 km/h on all access tracks throughout the offset area.

Individuals entering the offset area must guarantee that all vehicles and equipment brought in are certified as weed free. Any authorized personnel (e.g., contractors) entering the offset area must possess a valid weed hygiene certificate and obtain approval from the land manager/offset area manager to access the area. Proof must be provided upon request to the land manager demonstrating that vehicles and machinery are free from weeds and seeds before entry to mitigate the risk of weed spread. Documentation of individuals entering the offset area and verification of weed-free certification must be maintained and provided to the Department as requested.

All vehicles entering the offset area will be required to stay on the formed tracks and be issued with weed inspection certificates and all staff or contractors entering offset areas are to be made aware of, and provided access to, this OAMP.

## 6.3 Vegetation Clearing

Vegetation clearing is not permitted within the offset area. With the exception of clearing that is exempt under Queensland's VM Act and is required for:

- Maintenance of currently established access tracks and/or fire breaks.
- As directed by emergency management response personnel in the event of uncontrolled bushfire or other emergency procedures. Any native vegetation cleared from the offset area in this circumstance will be revegetated using the same species that were cleared. The OAMP

will be revised to include revegetation works and submitted to DCCEEW within 3 months of this clearing occurring.

## 6.4 Grazing Management

The offset area has historically been used for cattle grazing and there was evidence of grazing throughout the offset area and coexistence with Ornamental Snakes. To optimise canopy tree and shrub recruitment and establishment, and to achieve the interim performance targets and final completion criteria of ground layer species richness and cover, grazing will be strategically controlled. Excluding cattle grazing during the wet season as shown below will also minimise degradation of the gilgai habitat and minimise encounters with the Ornamental Snake or the trampling of the species shelter or foraging habitat. These measures will allow the ecological condition to continue to improve, to minimise the potential for unplanned fires adversely impacting the offset area by managing fuel loads, and to minimise soil compaction and erosion.

Existing fences and if required, new fences, will be used to manage access to and demarcate the offset area, including management of strategic grazing activities. New fencing is not required where paddocks containing the offset area are fenced and managed in the same manner as the offset area. If and where additional fencing is required to be installed, it should preferably be constructed off 1.4 m high, 4-strand barbed-wire, with plain wire as the top strand and the bottom wire set 350 mm from the ground to allow native wildlife access, or an alternative and equally suitable fence design as determined by the land manager (e.g. where the fence line crosses periodically inundated areas, a 3-strand barbed wire fence is applicable). Restricted access signage will also be established prior to commencement of the action to prevent unauthorised access.

Grazing will be permitted throughout the offset area, with the exception of the wet season and other constraints outlined in Table 20 (such as rainfall events that restrict vehicle access), under strict controls in order to reduce fuel loads, to control exotic flora and to increase native species richness of the ground layer and to avoid trampling of the species habitat. Following grazing, the offset area will be spelled to allow for native grasses to seed and to facilitate recovery of perennial grasses and the herbaceous layer while mitigating wildfire risk by restricting fuel loads. The suitability of conditions for undertaking a grazing event outside the wet season exclusion period, will be directed by climate, the length of the wet season, rainfall and the suitability for cattle to graze without land degradation.

To minimise erosion and subsequent impacts on water quality within wetland habitats that may in turn impact on Ornamental Snake habitat and/or affect attainment of the interim performance targets and/or completion criteria, strategic grazing will be excluded within the offset area during the peak activity season for the Ornamental Snake, as a minimum, which is nominally during the wet season (i.e. nominally November-March during a neutral wet season but does depend on seasonal rainfall). The location and extent of grazing exclusion areas will be reviewed annually based on the results of management and monitoring events and reported on in annual compliance reports for implementation of this OAMP.

The onset of the wet season changes with the ENSO and is broadly defined by the Bureau of Meteorology (2022) as outlined below. While the duration is less clear, the wet season typically lasts for three to five months as indicated below:

- Neutral year starting in November and ending in March.
- El Nino year starting in December and ending in April.
- La Nina year starting in October and ending in March.

The location and extent of grazing exclusion areas will be reviewed annually based on the results of management and monitoring events and reported on in annual compliance reports for implementation of this OAMP. In the Brigalow regrowth areas, greater restrictions on cattle grazing may need to be

implemented based on compliance with the interim performance targets. If the annual targets are not being met, cattle may need to be completely excluded until the interim performance targets are met.

Strategic grazing, when permitted, will be determined by biomass monitoring described in section 7.7.

## 6.5 Fire Management

Fuel loads in the offset area and in the surrounding paddocks will be controlled through a combination of strategic grazing, weed control measures and fuel reduction burns to minimise the risk and impacts of unplanned and hot and intense fires and to improve habitat quality through controlling weeds and increased recruitment and establishment of native plants.

Regular maintenance (e.g. grading and vegetation spraying) of firebreaks, roads and tracks will be an integral part of fire management to mitigate the risks associated with unplanned fire. Ground cover monitoring will be undertaken annually as part of fire management activities to assess fuel loads, determine the risk of unplanned fires to the offset area and inform fire management strategies (section 7.7).

New fire breaks may not be required where natural firebreaks occur (e.g. creek lines or existing paddock roads or fence line tracks).

Fire management will be consistent with the recommended fire management regime for REs within the offset area as per the Fire Management Guidelines produced by the Queensland Herbarium (refer to Appendix G for the relevant fire management regime).

The vegetation communities within the offset area benefit from controlled burns of low intensity fires that occur in the early dry season where there is good soil moisture. Controlled burns will be low intensity with the aim of reducing fuel loads and promoting understorey growth. Moderate to high intensity fires will be avoided as they can degrade vegetation structure and destroy fauna habitats and kill native fauna.

Effective fire management within offset areas should be based on maintaining vegetation composition, structural diversity, animal habitats (in particular shelter habitat such as leaf litter, fallen timber and logs) and preventing extensive wildfires. Regional ecosystem Fire Management Guidelines outline the following for regional ecosystem 11.4.9:

- STRATEGY: Maintain fire management of surrounding country so that wildfires will be very limited in extent. Frequent fire at the edge of this RE keeps fuel loads low. Protection from fire is necessary.
- ISSUES: *Casuarina cristata* is fire sensitive, although germination can be good in bare areas. Brigalow is soft-seeded, therefore germination is not promoted by fire. Buffel grass invasion will increase risk from fire. High intensity fires will cause damage to overstorey. Grazing may be an option for reducing fuel loads where exotic grass such as buffel have invaded.

The exclusion of fire from the cleared paddocks (AU1) is critical until regrowth reaches a sufficient height. This precaution ensures that fire management can occur without risking the fire reaching the canopy. By allowing regrowth to attain a suitable height, the risk of uncontrollable fires spreading to the upper layers of the vegetation will be significantly reduced. This approach not only safeguards against the loss of valuable flora and fauna but also promotes the establishment of a resilient ecosystem capable of withstanding and recovering from periodic disturbances such as bushfires. Consequently, proper timing for reintroducing controlled burns becomes crucial, ensuring that fire management practices align with ecological processes while minimising potential risks to the environment and surrounding communities.

Burn intervals for conservation purposes will differ from that for grazing purposes with the latter generally being much shorter.

## 6.6 Pest and Animal Management

Several pest animals have been recorded in the offset area and include wild dogs, feral pigs, feral cats, European rabbits and cane toads (Appendix A. These pest animals pose threats to the Ornamental Snake including predation (wild dogs, feral cats and feral pigs), poisoning (cane toads), and habitat degradation of the Brigalow TEC (feral pigs and European hare).

Additional assessments of pest animals will be undertaken as part of a comprehensive baseline habitat quality assessment that will be undertaken in year one (1) (refer to sections 7.2 and 7.6). These assessments will form part of the ongoing monitoring program and will consist of surveys to assess the presence, and extent of, pest animals within the offset area and to also assess impacts to Ornamental Snake habitat values and vegetation condition (refer to section 0 for monitoring schedules). Results from these assessments will inform the most appropriate species-specific control measures and management activities. These results and any additional management actions will be included in an updated OAMP and as part of the annual compliance report.

Pest animal controls will be undertaken in accordance with the *Biosecurity Act 2014*, DAF guidelines and in conjunction with neighbouring landowners and include the following control methods as approved by DAF:

- Wild dogs (DAF, 2020a) applies to the Ornamental Snake: Shooting, trapping, baiting and fencing. Baiting and trapping will be undertaken at peak activity times including breeding (March/May) and rearing of young (September/November) and will target watering locations. Dingoes will not be shot or trapped. One or a combination of the control methods outlined below will be implemented to reduce the abundance of Wild Dogs accessing/utilising the offset area:
    - Shooting is an opportunistic method, mostly used for control of small populations or individual problem animals.
    - Trapping is predominantly used in areas with low populations and to control ‘problem’ Wild Dogs. Foot-hold traps will be used at times of the year corresponding with peak activity, with traps placed in high activity areas and poisoned with strychnine for humane reasons and to prevent escape. Lures such as scents can be used to attract dogs to the traps.
    - Baiting can be used in conjunction with other control tools, provided they aren’t detrimental to the native fauna including the Ornamental Snake. Poison baits using 1080 and strychnine and fresh meat baits are delivered by hand, from vehicles or aircraft.
- Feral pigs (DAF, 2020b) applies to both Brigalow TEC and Ornamental Snake: Control of feral pigs will be by implementing a collaborative approach with surrounding landowners and will include:
    - Poisoning with 1080 baits. Generalised feeding with non-poisoned bait will be performed for several days prior to laying poisoned baits to attract animals.
    - Shooting is an opportunistic method, mostly used for control of small populations or individual problem animals.
    - Trapping in smaller areas to control remaining individuals from poisoning programs.
- European hare/rabbits (DAF, 2021) applies to Brigalow TEC and Ornamental Snake: An integrated control approach, combining different control methods in concert with land management practices, will be implemented to control rabbits and includes:
    - Destroying (ripping) rabbit warrens. All warrens within 1 km of permanent water sources will be ripped.

  - Baiting using 1080-sodium fluoroacetate or Pindone in the non-breeding season and when food sources are low. Pre-feeding should be undertaken to accustom rabbits to the new food sources.
  - Trapping using a mix of cage traps and barrel traps, followed by humanly euthanising. Traps will be put in place and left open for 2-3 days to allow rabbits to be accustomed to the trap before trapping begins.
  - Shooting as a means to target remaining individuals following other control measures. Shooting is most effective when rabbits are active (early afternoon, late afternoon or night).
- Feral cats (DAF, 2020c) applies to the Ornamental Snake. Control programs will be comprised of multiple methods, including night shooting, poisoning, trapping and fencing, combined with land management practices:
  - Shooting at night when cats are hunting.
  - Poisoning using fresh meat baits containing 1080 (sodium fluoroacetate).
  - Rubber-jawed and leg-hold traps will be set at territorial markers such as faecal deposits and pole-clawing are present.
  - Trapping using cage traps baited with meat or fish.
- Cane toads (DAF, 2022) applies to the Ornamental Snake: There is currently no available effective broad scale control methods. However, different small scale control methods combined with land management practices have proven successful to control Cane Toads and include.
  - Individuals may be killed humanely using commercial spray, may be stunned and decapitated (only by experienced operators).
  - Selective removal of eggs from small water bodies.

## 6.7 Weed Management

A total of 11 non-native species were recorded during the HQAPs within the Investigation Area of which, three (3), *Harrisia martini, Opuntia tomentosa,* and *Parthenium hysterophorus* are considered 'restricted matter' under the Queensland *Biosecurity Act 2014* of which all three are also identified as a Weed of National Significance (WONS). Several other species of invasive plants were also identified (refer to the Ecological Assessment Report in Appendix A).

These weeds and invasive plants pose a considerable threat to the ecological condition of the offset area due to the increase in groundcover biomass and the risk of uncontrolled fires. The highest distribution of weeds and invasive plants were generally confined to areas of prior disturbance, wetland features and drainage lines and along existing access tracks.

Additional comprehensive surveys of the offset site will be undertaken in year one (1) to determine distribution and abundance of weeds species. Results of these comprehensive surveys will inform the most appropriate species-specific weed control measures, location and timing for management activities. In general, however, weed management will be undertaken in accordance with the current management practices implemented at Denham Park.

General visual inspections will also be undertaken to monitor the distribution and abundance of weed species and invasive plants within the offset area. Weed infestations will be controlled and managed by preventing seed set and dispersal in accordance with Queensland's DAF recommended control

measures[7]. Species-specific control measures including timing of management activities will be reviewed by a suitably qualified ecologist on an annual basis based on the results of ongoing weed monitoring in the offset area.

Weed management will include spot spraying weeds within gilgais and drainage lines, and along existing access tracks and fence lines as well as mechanical removal and the strategic use of fire. Spraying will occur in the early dry season following periods of active growth. Strategic spraying of small, isolated patches of invasive species will be undertaken and follow-up inspection and treatment will be implemented two to four weeks later if regrowth is evident, including mechanical removal of woody weeds. Woody weeds will be managed through a combination of herbicide and mechanical techniques.

Weed hygiene measures will also be implemented to prevent the movement of weed material into the offset area (section 6.2). Prior to entering the offset area, all vehicles and equipment will be inspected for weeds and will only be permitted access if approved by the land manager and accompanied by a weed inspection certificate. To further restrict the spread of weeds, vehicles will be restricted to designated access tracks.

Ongoing regular maintenance of firebreaks, roads and tracks will also help reduce the risk of weed incursion by preventing traffic into the MNES offset area.

## 6.8 Woody Debris

Woody debris, along with other microhabitat factors such as rocks and leaf litter provide shelter habitat for the Ornamental Snake (DSEWPC, 2011b). The management actions outlined in Table 20 and the above sections are proposed to allow an increase in habitat quality within the Proposed Offset Area, including increasing a range of vegetation attributes towards benchmark values.

Increasing woody debris to the Proposed Offset Area is dependent to a large degree on the presence and regeneration of shrubs and trees and from fallen branches from this vegetation. Depending on the type of vegetation, woody debris can take many years to accumulate. Therefore, course woody debris is proposed to be added to the Proposed Offset Area to supplement the accumulation of woody debris from natural processes.

The quantity of woody debris to be supplemented will be determined by benchmark levels and the amount provided through natural processes. As a minimum, course woody debris will be added to vegetation communities such that at least 75% of course woody debris benchmarks levels are attained by year 5 and at least 100% of benchmark levels attained by year 10. Given the benchmark levels for RE 11.4.9 are 980 m/ha, locating sufficient naturally occurring fallen woody debris to achieve 100% benchmark levels in the first 5 years is likely to be difficult to achieve.

## 6.9 Selective Thinning

Historical clearing and disturbance of Brigalow within Denham Park have left a legacy of regrowth Brigalow. Many of the areas of regrowth Brigalow have the potential to result in clonal stands of regrowth or ‘whipstick Brigalow’ that can lead to high stem densities. This can lead to lower plant species diversity, poor structure and limited fauna habitat features (e.g. woody debris, organic litter, shrub cover and increased weeds).

Selective thinning of regrowth Brigalow has been shown to accelerate the growth rate of stems, increase woody species diversity and increase ground cover (Dwyer et al. 2010; Peeters & Butler, 2014; Towers

[7] https://www.daf.qld.gov.au/business-priorities/biosecurity/invasive-plants-animals/plants-weeds

& Dwyer, 2021). Thinning is also likely to create additional fauna habitat, with thinned stems adding to the coarse woody debris present when left *in situ*. The process of restoration thinning works by selectively thinning vegetation to an optimal stem density that reduces competition between individual plants which in turn, can promote accelerated growth and development towards remnant/mature status.

The requirement for thinning will be determined during annual monitoring by assessing stem density of all plants within three 20 m x 20 m quadrats that will be located either side of the BioCondition and habitat quality plots. Thinning will be undertaken when stem density exceeds 10,000 stems/ha as outlined in Peeters & Butler (2014).

## 6.10 Active Revegetation

Active revegetation involves the introduction and re-establishment of vegetation at a site using a range of methods. These methods can include planting advanced tube stock grown in nurseries, transplanting mature individual plants from another location or rehabilitation site, direct seeding, or hydro-mulching. While native vegetation communities have an inherent capacity to recover following disturbance, there are situations where more significant intervention is necessary. This is especially true for highly disturbed sites or ecological communities at risk of arrested succession, where natural regeneration may not occur without assistance.

The primary goal of active revegetation is to strengthen and expand existing areas of native vegetation. In situations where natural recruitment is low and connectivity to existing climax communities is poor, revegetation can play a crucial role. It can help establish on-site source populations, facilitating vegetation communities in reaching benchmark values more quickly. Proven benefits of revegetation include accelerating the establishment of vegetation cover at highly disturbed sites, assisting disturbed communities in achieving climax status in shorter timeframes, covering exposed soil (e.g., through hydro-mulching), re-establishing native plant species lost due to historical disturbances, and creating habitat conditions and seed sources that encourage the re-establishment of natural regeneration processes.

Active revegetation is most suitable for sites where native vegetation has been removed or significantly disturbed, where natural recruitment is not occurring, or where there is an urgent need to establish vegetation cover to prevent environmental damage, such as soil erosion. The need for active revegetation will be determined through ongoing annual monitoring and evaluation of key performance indicators, such as low natural recruitment (e.g., stem densities of Brigalow plants of fewer than 8,000 stems/ha or a decrease in 20% from 10,000 stems/ha) in areas where natural regeneration is clearly lacking from visual assessments or from habitat quality data.

# 7.0 Monitoring

Stanmore commits to implementing a monitoring program to assess the effectiveness of management measures outlined in section 6.0 and to make timely decisions on corrective actions to ensure the performance criteria outlined in sections 0 and 6.0 are achieved.

The monitoring methods are as follows:

- Specific to the interim performance targets and completion criteria being assessed and to enable detection of whether the performance criteria have been or are likely to be achieved or whether corrective actions are needed.
- In accordance with the recommended survey guidelines for the Ornamental Snake and Brigalow TEC.
- Quantitative and repeatable such that the monitoring assessments can be compared to each other which provides for changes between sampling events can be detected.

Further to this, the monitoring undertaken will be:

- Sufficient to evaluate performance of the OAMP against interim performance targets and competition criteria as outlined in Table 18.
- Able to ensure management triggers are sufficiently defined and enable detection of problems in good times as outlined in Table 20.
- Sufficient to develop and implement corrective actions when management triggers are detected as outlined in Table 20.
- Sufficient to inform subsequent reviews and amendments to the OAMP.
- Be undertaken in accordance with the requirements of DCCEEW's Guidelines for biological survey and mapped data (DoEE, 2018).

Table 21 below displays a monitoring schedule, summarising monitoring timing, frequency and methods. sections 7.1 through to 7.7 further details each monitoring parameter.

**Table 21: Monitoring schedule for the offset area**

| Monitoring type | Monitoring attribute | Monitoring frequency | Monitoring method | Monitoring location |
|---|---|---|---|---|
| Habitat quality surveys undertaken by suitably qualified ecologists | | | | |
| Initial habitat quality assessment | Site condition, site context and species stocking rates as outlined in this OAMP. | Initial assessments were completed in and August 2023 and February 2024 to inform this OAMP.<br><br>Revised baseline monitoring will commence in Year 1 following approval of the OAMP. Results from the revised baseline monitoring will be used as to assess the success of subsequent monitoring events. | Visual inspections and detailed habitat quality assessment as per the Guide (DES, 2020) and as outlined in this OAMP. | Assessment sites outline in section 7.2 and Figure 7. |
| Ecological condition (site condition) | Recruitment of woody perennial species in the ecologically dominant layer (EDL) | Year one (1) following approval of the initial OAMP and securing the offset area, then annually for the first five (5) years, then every five (5) years until the end of the approval. | As per the methods outlined in the Guide (DES, 2020) and the BioCondition Assessment Manual (Eyre, et al., 2015).<br><br>Visual observations and, where relevant, methods outlined in the Guide to determining terrestrial habitat quality and with reference to interim criteria as per Table 18 for the relevant RE and AU being monitored. | |
| | Native plant species richness – trees | | | |
| | Native plant species richness – shrubs | | | |
| | Native plant species richness – grasses | | | |
| | Native plant species richness – forbs | | | |
| | Tree canopy height | | | |
| | Tree canopy cover | | | |
| | Shrub canopy cover | | | |
| | Native perennial grass cover | | | |
| | Organic litter | | | |
| | Large trees | | | |
| | Course woody debris | | | |
| | Non-native plant cover (weeds) | | | |
| | Quality and availability of food and foraging habitat (e.g. tree canopy height and cover, organic litter, tree and shrub species richness) (applies to Ornamental Snake). | | | |

| Monitoring type | Monitoring attribute | Monitoring frequency | Monitoring method | Monitoring location |
|---|---|---|---|---|
| | Quality and availability of shelter (e.g. presence of organic litter, course woody debris and cracking clay soils) (applies to Ornamental Snake). | | | |
| Site context[8] | Threats to species (e.g. presence of feral animals and weeds etc.) (applies to Ornamental Snake). | | | |
| | Threats to mobility capacity (applies to Ornamental Snake). | | | |
| Species stocking rates/targeted Ornamental Snake surveys | Presence/absence of the Ornamental Snake.<br>Ornamental Snake densities if observed. | Year one (1) following approval of the initial OAMP and securing the offset area, then every five (5) years until the end of the approval. | Refer to Appendix A. | Refer to section 7.2. |
| Targeted stem density counts of Brigalow within the remnant and regrowth offset areas. | Counts of all Brigalow stems as well as recording of all plant species encountered. | Year one (1) following approval of the initial OAMP and securing the offset area, then annually for the first five (5) years, then every five (5) years until the end of the approval. | Three 20 m x 20 m quadrats positioned either side of the centreline of the bio-condition and/or habitat quality plot. | Assessment sites outline in section 7.3 and Figure 7. |
| Pest monitoring | Identify, record and map all non-native species within the offset area. | Year one (1) following approval of the initial OAMP and securing the offset area, then annually for the first five (5) years, then every five (5) years until the end of the approval. | Driving/walking grid transect survey across the offset area identifying all pest species and recoding their densities.<br>Quantitative survey and evaluation of pest densities via two 50 m x 10 m transects positioned adjacent to established monitoring sites. Capturing data in 5 m x 5 m quadrat sampling at 10 m intervals along both 50 m transects placed parallel to established monitoring sites.<br>Establish permanent photo point monitoring site within pest impact and control area. | Assessment sites outline in section 7.5 and Figure 7. |
| **Visual inspection surveys undertaken by the land manager or authorised land manager representative and targeted weed and feral animal surveys undertaken by suitably qualified ecologists.** | | | | |
| Photos points | General vegetation condition and cover. | Year one (1) following approval of the initial OAMP and securing the offset area, then every five (5) years until the end of the approval. | Photographs of offset area to be taken from the same location and direction for each monitoring event. | Assessment sites outline in section 7.2 and Figure 7. |

[8] Non-GIS attributes that can be measured in the field

| Monitoring type | Monitoring attribute | Monitoring frequency | Monitoring method | Monitoring location |
|---|---|---|---|---|
| Grazing | Stocking rates, ground cover, evidence of pugging and fencing. | Stocking rates will be monitored quarterly until the end of the approval. Biomass will be monitored annually in the early dry season. Fencing will be monitored during routine land management of the offset area and at least quarterly. Livestock access will be monitored following heavy rainfall events and include evidence of light vehicle access. | Assessments of the offset area will be undertaken by the land manager or authorised representative to observe and record grass cover, presence of weeds and pest animals, evidence of fire and evidence of unauthorised access.<br><br>Fire break and fence maintenance activities will be recorded for inclusion in the annual report. Any unplanned fires will also be recorded as well as monitoring results for any planned cool or mosaic burns on habitat.<br><br>Weed cover will be recorded as per the Level 2B methodology described in the Land Manager's Monitoring Guide (DERM, 2010) (or any subsequent published version of this document or similar recognised methods). This methodology is suitable for landowners to rapidly assess whether weed management measures need to be conducted within the offset area.<br><br>Detailed assessments as outlined in section 0 will also be undertaken in conjunction with the habitat quality assessments.<br><br>For grazing following heavy rainfall, visual evidence of light vehicle access. | Throughout the offset area. |
| Fire | Presence of fire and extent of burning.<br><br>Condition of fire breaks. | Presence of fire will be monitored during routine land management and at least quarterly and following known fire events.<br><br>Biomass will be monitored annually in the early dry season. | | |
| Feral animals | Presence of pest animal, control measures undertaken and success of control measures. | Incidental observations during routine land management at least monthly.<br><br>Year one (1) following approval of the initial OAMP and securing the offset area, then every five (5) years until the end of the approval. | | |
| Non-native plants | Presences of weeds, control measures undertaken and success of the control measures. | Incidental observations during routine land management at least monthly.<br><br>Year one (1) following approval of the initial OAMP and securing the offset area, then annually for the first five (5) years, then every five (5) years until the end of the approval. | | |
| Fencing and site access | Unauthorised clearing, degradation of habitat or disturbances. | Monitoring of fences and unauthorised site access will take place during routine land management at least quarterly. | | |
| Unauthorised impacts to vegetation from activities such as illegal harvesting and illegal access. | Unauthorised clearing or disturbances. | Visual inspections undertaken during routine land management and undertaken at least quarterly. | Observe and record accessibility to the offset site (i.e. condition of fencing), evidence and location of illegal clearing, fire and/or pest animal incursion. | |
| Cyclone event. | Condition and damage to vegetation. | Following cyclones or large tropical rainfall events. | Visual throughout the offset area. | |

## 7.1 General Site and Visual Inspections

Offset area inspection visits will be conducted biannually (prior to and following the wet season) by the land manager/offset area manager to inspect the offset area and assess the following:

- Fencing and signage condition (Note: fencing will be inspected every four weeks when stock are adjacent to the offset area).
- Evidence of excessive pugging or areas of overgrazing while stock are in the offset area.
- Condition of firebreaks.
- Fuel loads.
- Damage and/or degradation resulting from pest animal activity within the offset area.
- New weed outbreaks.
- Signs of unplanned fires.
- Incidental fauna observations and any additional risks to offset values (i.e. evidence of predation on the Ornamental Snake).

## 7.2 Habitat Quality Monitoring Sites

Ongoing habitat quality monitoring will be undertaken at the eight permanent monitoring sites within the offset area as per Figure 7. The location of the sites will be in accordance with QLD guidelines (DES, 2020) and methodologies used in this OAMP (section 4.1). The location of the sites will ensure there is sufficient spatial coverage to assess any variation in condition across the offset area and effectively assess key habitat features for the Ornamental Snake.

All habitat monitoring sites will be used to assess habitat quality for the Ornamental Snake and Brigalow TEC. Each monitoring site will include a 100 m transect, with the start and central points to be marked with permanent markers (i.e. star picket) and the GPS location recorded. The final monitoring locations will be included in the first annual compliance report for the offset area. Photo monitoring will also be undertaken with photographs taken from north, south, east and west directions. All subsequent monitoring events will be undertaken at the same locations.

The permanent habitat quality monitoring sites will be utilised as part of the following monitoring activities:

- Habitat quality assessments undertaken in accordance with the Guide (DES, 2020) and the methods outlined in section 4.1 .
- Fauna assessments including targeted surveys and spotlighting surveys.
- Photo monitoring, undertaken at the ends of each of the habitat monitoring site transects.
- The presence of feral animals.
- The presence of weeds and invasive plants.
- Signs of fire.

## 7.3 Habitat Quality and Fauna Monitoring

Initial baseline habitat quality and fauna assessments were undertaken in October 2023 and February 2024 (refer to Appendix A). A comprehensive habitat quality and fauna assessment will be undertaken in year one (1) following approval of this OAMP and during or immediately following the wet season. Targeted surveys for the Ornamental Snake will be undertaken in year one (1) to confirm the presence and abundance of the species within the offsets area. Subsequent assessments, for both habitat quality for the Ornamental Snake and Brigalow TEC and abundance of Ornamental Snake, will be undertaken

every five (5) years and then at the end of approval. The results will be used to determine how the offset is tracking against the interim performance targets and the completion criteria.

If habitat quality and fauna monitoring indicate a decline in habitat quality and / or a reduction in the abundance or distribution of the Ornamental Snake in the offset area, monitoring may increase in frequency (e.g. every two years for the presence of the Ornamental Snake and Brigalow TEC vegetation quality) until trends indicate an increase in habitat quality and/or abundance of the Ornamental Snake.

The Guide (DES, 2020) as well as the methods outlined in section 4.1, will be used to assess habitat quality for the Ornamental Snake and Brigalow TEC and is based on the methodology set out in the BioCondition Assessment Manual and BioCondition benchmarks (Eyre, et al., 2015). A range of habitat variables are assessed using standard methods and compared to regional ecosystem benchmarks (undisturbed) sites as a measure of how well a terrestrial ecosystem is functioning for biodiversity.

The Guide allows for a habitat quality score to be calculated for the Ornamental Snake based on three key indicators and include:

- Site condition: assessment of vegetation compared to benchmark (undisturbed) areas.
- Site context: a geospatial analysis of the assessment area in relation to the surrounding environment.
- Species habitat index: the ability of assessment area site to support a species applies to the Ornamental Snake only.

Habitat quality scoring for the Brigalow TEC utilises site condition and site context and does not take into consideration species stocking rate.

To assess habitat quality in line with the EPBC Offsets Policy for the Ornamental Snake, the attributes from the three indicators are used but partitioned as outlined in section 4.1 which uses 15 attributes for site condition and 7 attributes for site context.

The habitat quality assessment will include targeted fauna surveys for the Ornamental Snake and will be undertaken in accordance with the relevant Survey Guidelines, described in **Table 22**. Fauna surveys as well as the habitat quality assessment will be undertaken by suitably qualified ecologists generally during the mid to late wet season (nominally February/March/April/May) which corresponds to peak species activity and detectability. The habitat quality assessments will also include assessments of weed abundance and distribution and an assessment on the presence of pest animals.

In addition to targeted Ornamental Snake surveys, targeted Brigalow stem density surveys will be undertaken in the regrowth area. This will be over and above the BioCondition and habitat quality plots and will involve counting all plants in three 20 m x 20 m quadrats at each BioCondition survey plot. The three quadrats will be either side of the centreline. Average stem densities within the three 20 m x 20 m plots will be extrapolated to stem density/ha. For comparative purposes, stem density will also be assessed using the same method within the remnant Brigalow area. Stem density counts will be undertaken annually for the first five years, then at five yearly intervals through to Year 20.

**Table 22: Survey techniques for the Ornamental Snake**

| MNES | Survey | Survey guidelines |
|---|---|---|
| Ornamental Snake | • Nocturnal spotlight searches will be conducted over a minimum of four (4) survey nights during periods of known peak activity (wet season) while frogs are active around suitable gilgai habitat.<br>• Opportunistic nocturnal driving searches on roads near suitable gilgai habitat will be conducted over a minimum of three (3) survey days and nights during periods of known peak activity (wet season) while frogs are active.<br>• Diurnal active searches will be undertaken in areas of suitable gilgai habitat under potential sheltering sites (rocks, logs or other large objects on the ground) for a minimum of three (3) survey days and nights.<br>• Pitfall and/or funnel traps will be utilised in suitable gilgai habitat (microhabitat) over a minimum of four (4) survey days and nights during periods of known peak activity (wet season) while frogs are active. | • Survey guidelines for Australia's threatened reptiles (DSEWPC, 2011b)<br>• Terrestrial Vertebrate Fauna Survey Guidelines for Queensland Version 4.0 (Eyre, et al., 2022) |

Where the habitat quality assessments do not demonstrate improvements in each of the individual site condition and site context attributes, and the overall habitat quality/interim performance targets and/or the completion criteria for the offset area in the required timeframes, adaptive management will be undertaken. The adaptive management framework allows for a review of management actions and corrective actions to be undertaken to assess if additional management measures or corrective actions are required. If the review deems additional actions are required, the OAMP will be revised and approval of the revised OAMP sought from the Minister.

As outlined in Table 18 and Table 19, a period of 20 years has been chosen as the time period of which the final habitat quality, and hence, increased habitat values will be reached (i.e. 2044). This time period was chosen as 20 years is the nominated time until ecological benefit used in offsets calculations and is the time required for the restoration in gilgai and for large canopy trees to become established. Targeted Ornamental Snake monitoring is scheduled in year one and every five years thereafter and habitat quality assessments are scheduled every five years through to the end of the approval. The final assessment will be undertaken in approximately 2044 (depending on whether the completion criteria are on target to be met) to demonstrate that the final habitat quality of the offset area conforms to that outlined in this OAMP and that the competition criteria has been achieved.

Where the completion criteria outlined in Table 18 and Table 19 are not achieved by the end of the approval, management actions will continue until the offset requirements are realised. In contrast, if the completion criteria are met prior to the end of the approval, all management actions and monitoring will continue until the end of the approval to ensure the completion criteria and habitat quality is maintained throughout the life of the approval.

## 7.4 Photo Point Monitoring

Photo monitoring will be undertaken at each monitoring location during the habitat quality assessments to allow habitat changes to be visually assessed over time. Photos at each photo monitoring point will be taken in a north, east, south and westerly direction. A permanent feature will be included within the photo frame to provide a fixed reference point. A record of the photographs will be maintained, including GPS location, date, time, direction and the height above the ground at which the photograph was taken. Data from habitat quality assessments and photo monitoring will be recorded on survey sheets and these will be attached to annual monitoring reports.

## 7.5 Weed Monitoring

The offset area will be monitored for invasive introduced plants and will include a comprehensive weed survey in year one (1) which will map the distribution and density of weed infestations in the early dry season. The final weed mapping methodology will be determined by the suitably qualified ecologist prior to and during the comprehensive year one (1) surveys. Ongoing seasonal weed monitoring surveys will be undertaken in conjunction with BioCondition and habitat quality monitoring surveys outlined in section 7.2. Comprehensive weeds surveys aimed at re-mapping the distribution and density of weeds will be undertaken annually for the first five years, then at five yearly increments to Year 20. .

Assessing the presence and abundance of weed cover will be done in accordance with the methodology outlined in the Guide for assessing non-native plant cover (DES, 2020). Briefly, this method involves establishing a 50 m x 10 m plot and dividing this plot into 20 smaller 5 m x 5 m sub-plots. Percent (%) weed cover will be assessed in each of the 20 sub-plots and the total percent weed cover determined by taking the average from the 20 plots. Photo monitoring will also be undertaken within each plot in the same manner described in section 7.4.

In addition to the permanent weed monitoring sites, incidental observations will be recorded from the offset area from general observations undertaken during routine land management. This will inform any instances of weed infestations that occur away from the permanent weed monitoring sites. If trigger levels outlined in Table 20 for weeds are met or exceeded, additional monitoring will be undertaken and will occur in conjunction with appropriate weed management measures outlined in section 6.7, until the presence and distribution of weeds reduces to baseline levels or below.

## 7.6 Feral Animals Monitoring

The offset area will be monitored for pest animals and will include a comprehensive survey in year one (1) which will map the presence of feral animals. Ongoing feral animal monitoring surveys will be undertaken in conjunction with the habitat quality monitoring surveys outlined in section 7.2 and at the same surveys locations as the habitat quality assessment surveys in Figure 7. Monitoring will primarily entail standardised timed visual observations as well as baited camera trap monitoring and nocturnal spotlighting surveys. Evidence of faecal samples and damage caused by pest animals will also be recorded. The final methodology will be determined by the suitably qualified ecologist during the initial comprehensive survey in year one (1). Exact monitoring methods will be determined by the suitably qualified ecologist engaged to undertake the monitoring.

Feral animals will also be opportunistically surveyed throughout the year outside of monitoring times, including observations for potential new pest animal species that have not been previously recorded, and which are known to prey on Ornamental Snakes and/or degrade to ecological health of Brigalow TEC and associated habit features such as gilgais. Any evidence of mortality or injury to the Ornamental Snake because of pest animals will also be recorded during the surveys. If trigger levels as defined in Table 20 for any pest animal species are met or exceeded, additional monitoring will be undertaken and will occur in conjunction with appropriate feral animal management measures until pest animal presence reduces to baseline levels or below.

## 7.7 Fuel load Monitoring

Fuel load monitoring for fire management will be undertaken annually in the early dry season when biomass (i.e. ground cover) is at its greatest, to determine the risk of fire to the offset site and to inform fire management strategies. Groundcover will be monitored at the same permanent habitat quality monitoring sites established as part of the comprehensive baseline surveys in year 1.

Fuel loads will be managed through strategic grazing events if the percent cover of native grasses exceeds 40%. For strategic grazing, the cattle stocking rate will be determined by the percent ground cover vegetation and native grass cover as outlined in Table 15.

# 8.0 Data Management, Reporting, Implementation and Auditing

## 8.1 Data Management

Stanmore or their authorised representative, will be responsible for overseeing and managing the monitoring activities required as part of this OAMP. This will include maintaining data records to confirm all activities associated with the management actions in this OAMP have been undertaken as outlined in this OAMP and/or any subsequent approval conditions. These records will be made available to DCCEEW.

## 8.2 Reporting

A reporting schedule is shown in Table 23 and this process will enable assessment of changes in vegetation condition/habitat quality relative to baseline data and determine progress towards the offset completion criteria (see section 0). Reporting will also determine the success of the management actions and note any changes due to climatic conditions and will inform the type and frequency of management measures required in the upcoming monitoring period.

The results of the monitoring activities will be documented by suitably qualified ecologists in stand-alone progress reports and combined into an annual compliance report.

The reports will include the following information:

- EPBC approval number.
- General description of the climatic conditions for the monitoring period (e.g. rainfall, duration of the wet season etc.).
- All activities undertaken during the monitoring period including, monitoring undertaken, the entity who undertook the monitoring and, results of the monitoring undertaken.
- Location (GPS coordinates) and details of all confirmed sightings of Ornamental Snake identified during surveys and monitoring.
- An indication of whether any additional risks/threats over and above those outlined in the final approved OAMP are apparent and management actions to be employed to manage those risks.
- If any triggers were detected, and if so, the corrective actions that were implemented.
- Discussion on progress towards achieving the management objective and offset obligations outlined in the OAMP.
- Recommendations for improving/updating the OAMP in accordance with adaptive management.

Additional notifications and/or reporting will be undertaken in accordance with all relevant EPBC approval conditions including:

- Condition 4 – Provide evidence to DCCEEW within five business days of the legally securing mechanism being executed.
- Condition 12 – Five yearly progress report provided to the DCCEEW within 3 months of each five-year period from the OAMP implementation date showing how the offset is achieving and maintaining the completion criteria.
- Condition 26 – Final compliance report provided to the DCCEEW within 30 business days of the 20$^{th}$ anniversary of the OAMP implementation date showing the offset obligation has been met.

## 8.3 Implementation

Following approval, the OAMP will be implemented and will be remain effective for the life of the approval. Stanmore commits to implementing management actions under this OAMP and legally securing the environmental offsets within 12 months from approval of the OAMP. Stanmore commits to commencing components of this OAMP (e.g. year one (1) baseline monitoring) of the offset area following approval of the OAMP and prior to formal legal security. The schedule of monitoring activities is shown at Table 21 and the schedule of reporting is shown in Table 23.

**Table 23: Reporting schedule**

| Report | Reporting period | Responsibility | Submission period |
|---|---|---|---|
| EPBC Act Annual Compliance Report which will report on compliance with the EPBC Act approval and the management measures outlined in the OAMP. | Every 12 months for the duration of the approval or until otherwise advised by the Minister. | Stanmore. | Publication of the report within 20 business days of every 12-month anniversary of the commencement of the action and notify DCCEEW within 5 business days of the publication, including a weblink to the report. |
| Offset Area Report that will outline the results and the effectiveness of the management actions outlined in this OAMP, including against habitat quality score criteria and presence of Ornamental Snake. This report will include all monitoring results, management actions, investigations and any corrective actions taken.<br><br>This report will include the annual survey results to assess compliance with the interim performance targets. | Every 12 months from the approval. | Generally, Stanmore but with inputs from a relevant suitably qualified persons, and/or the land manager. | The report will be an appendix to the Annual Compliance report. |
| Ecological Condition Assessment Report that provides results of habitat quality surveys and the targeted stem density and weed monitoring surveys. | Year one (1) following approval of the initial OAMP and securing the offset area, then annually for the first five (5) years, then every five (5) years | Suitably qualified person, directed by Stanmore. | The report will be appended to the Annual Compliance Report. |

| Report | Reporting period | Responsibility | Submission period |
|---|---|---|---|
| | until the end of the approval. | | |
| Internal Audit Report that confirms compliance and effectiveness of the OAMP. This report will also provide any necessary corrective actions of management action improvements. | In year one (1) and then every five (5) years subsequently from the grant of the Voluntary Declaration (VDec) for the life of the approval. | Stanmore. | Within three (3) months of the submission of the Ecological Condition Assessment Report. |
| External Audit Report confirming compliance with the approval conditions. | As and if required by DCCEEW. | Generally, Stanmore but with inputs from relevant suitably qualified persons. | As and if required by DCCEEW |
| Revised OAMP as approved by the Minister to document any required changes to the management actions of the offset area due to the interim habitat quality values or completion criteria not being met. | Only required if the management actions in the OAMP needs to be amended to ensure the interim and/or completion criteria are met, or should additional offsets be required in the event that completion criteria cannot be achieved. | Stanmore. | Within 6 months of failing to meet the interim habitat quality values or completion criteria where the management actions require amending. |
| Notification and details of any non-compliance with the EPBC Act approval conditions or with the requirements of this OAMP | Only required if any non-compliance occurs | Stanmore | Notify DCCEEW as soon as possible in writing and no later than two (2) business days after becoming aware of the non-compliance. Further, details of any non-compliance must be provided to DCCEEW no later than 10 business days after becoming aware of any non-compliance. |
| Notification of illegal timber harvesting or clearing to the relevant Queensland Governments Departments and Queensland Police (where relevant). | Only required if illegal clearing or timber harvesting occurs within the offset area. | Stanmore | Within 10 business days of the detection of illegal clearing or timber harvesting. |

| Report | Reporting period | Responsibility | Submission period |
|---|---|---|---|
| Final EPBC Act Compliance Report which will report on compliance with the EPBC Act approval. | Once following the 20th anniversary of the OAMP being implemented. | Stanmore. | Publication of the report within 30 business days following the 20th anniversary of the OAMP being implemented. |

## 8.4 Auditing and Review

Internal audits/reviews of management and monitoring activities will be undertaken in response to a trigger for further action (outlined in Table 20) being triggered and non-compliances with the OAMP requirements. External auditing will be undertaken as required by the approval conditions and will be published in annual compliance reports that will include details on the progress towards achieving the interim performance targets and/or completion criteria specified in this OAMP.

The effectiveness of actions within this OAMP will be reviewed annually and amended (if required) to incorporate changes identified through management activities and monitoring activities. Any changes to this OAMP, including but not limited to monitoring and management measures must be approved in the form of a revised OAMP by the Minister, prior to implementing changes to practices. Changes may include amendments to management actions, identification of additional monitoring activities and responses to adaptive management triggers. If the completion criteria have been attained prior to the end of the approval, the OAMP will continue to be implemented and reviewed to ensure the completion criteria are maintained until the approval expires.

# 9.0 Risk Assessment

A risk assessment was undertaken using the risk assessment process provided by the DCCEEW to assess the risks associated with failing to achieve the objectives outlined in this OAMP for mitigating impacts to the Ornamental Snake. For each identified risk, the potential consequence of the risk (Table 24) was assessed against the likelihood of that risk occurring (Table 25) to determine an overall risk rating using the matrix in Table 26. The consequence and likelihood of each risk occurring was reassessed following the implementation of the management and mitigation measures (i.e. control measures) to provide a residual risk rating (Table 27).

**Table 24: Consequence classification**

| Qualitative measure of consequences (what will be the consequence/result if the issue does occur) | |
|---|---|
| Minor (Mi) | Minor risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing low cost, well characterised corrective actions. |
| Moderate (Mo) | Moderate risk of failure to achieve the plan's objectives. Results in short term delays to achieving plan objectives, implementing well characterised, high cost/effort corrective actions. |
| High (H) | High risk of failure to achieve the plan's objectives. Results in medium-long term delays to achieving plan objectives, implementing uncertain, high cost/effort corrective actions. |
| Major (Ma) | The plan's objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies. |
| Critical (C) | The plan's objectives are unable to be achieved, with no evidenced mitigation strategies. |

**Table 25: Likelihood classification**

| Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management actions have been put in place/are being implemented) | |
|---|---|
| **Highly likely (Hi)** | Is expected to occur in most circumstances. |
| **Likely (L)** | Will probably occur during the life of the project. |
| **Possible (P)** | Might occur during the life of the project. |
| **Unlikely (U)** | Could occur but considered unlikely or doubtful. |
| **Rare (R)** | May occur in exceptional circumstances. |

**Table 26: Risk rating matrix**

| | | Consequence | | | | |
|---|---|---|---|---|---|---|
| Likelihood | | Minor | Moderate | High | Major | Critical |
| | 5. Highly Likely | Medium | High | High | Severe | Severe |
| | 4. Likely | Low | Medium | High | High | Severe |
| | 3. Possible | Low | Medium | Medium | High | Severe |
| | 2. Unlikely | Low | Low | Medium | High | High |
| | 1. Rare | Low | Low | Low | Medium | High |

For the purposes of this risk assessment, the risk levels are defined as follows:

- Severe: Unacceptable risk that must not proceed until suitable and comprehensive control measures have been adopted to reduce the level of risk.
- High: Moderate to critical consequences. Works should not proceed without considerations of additional actions to minimise the risk.
- Medium: Acceptable with formal review. Medium level risks require active monitoring due to the level of risk being acceptable.
- Low: Acceptable with active management not considered required.

**Table 27: Risk assessment and management**

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | | |
| **Standard Risks** | | | | | | | | | | | | |
| Habitat or vegetation loss through unplanned clearing | As the offset site occurs within a beef production property, it is possible for unplanned/ illegal clearing to occur. This is unlikely as the landholder will enter into an offset arrangement with the approval holder.<br><br>Clearing can also occur by vehicles traversing the area off designated roads/tracks. This is also considered improbable as access to the site will be restricted.<br><br>Potential unplanned clearing could come from application of chemicals on adjacent properties which stray across the offset site boundary. | U | Ma | H | No unapproved and/or intentional clearing of vegetation within the offset area, except for clearing that is required for fencing, access, firebreaks or public safety.<br><br>Ecological thinning in the regrowth Brigalow is permitted if stem densities are greater than 10,000 stems/ha and when plant species that are not included in the 11.4.9 RE description are identified. | R | Ma | M | No unauthorised access.<br><br>No evidence of clearing within the offset area.<br><br>Offset Area is mapped as Category A on PMAV. | Any activities that are in contravention of the Voluntary Declaration.<br><br>Detection of prohibited clearing outside of established access tracks, fire control lines and fence lines (existing infrastructure). | Upon being notified or becoming aware of clearing outside of existing infrastructure, the landholder is to assess how any unauthorised clearing occurred and, where relevant, any unauthorised persons accessed the site<br><br>Report breach to the Department within 2 business days with further details of the extent of clearing within 10 business days.<br><br>Review existing access restrictions and inspect signage and offset area fencing within one fortnight of detection of the clearing.<br><br>Any corrective action identified will be implemented within 1 month of the OAMP being updated. | Monitoring and inspections will monitor and document if there is evidence of recent illegal clearing.<br><br>Monitoring will also document vegetation clearing that has occurred for fire break, access road or fence line maintenance. |
| Timber harvesting /collection | Unauthorised access to the offset area may result in timber harvesting/ collection. Such actions can remove important habitat features and harm the structure of the vegetation communities and habitat for the Ornamental Snake. | U | H | M | All signs and fences will be erected within three months of the offset being legally secured.<br><br>Signs will be erected at all entrances and potential access points to the site identifying the area as an environmental offset and stating that access to the site is forbidden. | R | H | L | No unauthorised access to the offset site.<br><br>No evidence of unapproved clearing within the offset area.<br><br>Offset area mapped as | Damaged fences associated with vehicle access.<br><br>Detection of prohibited forestry operations, native timber harvesting or clearing outside of established access tracks, fire control lines and fence lines | Upon being notified or becoming aware of prohibited forestry operations, native timber harvesting or clearing outside of existing infrastructure, the landholder is to assess who and how unauthorised persons accessed the site | The annual compliance report will document any illegal/ unauthorised timber harvesting.<br><br>All field monitoring will report on the presence of any unauthorised access and clearing. |

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | | |
| | | | | | Fences will be maintained to prevent unauthorised access, to minimise incursions by feral herbivores and to control stock presence. | | | | Category A on PMAV. | (existing infrastructure). | Report breach to the Department within 2 business days. Further details of clearing activity will be provided to the Department within 10 business days.<br><br>The approval holder is to reassess access protocols for any lessees etc., signage and general access within one fortnight. | |
| Control invasive weed species to reduce impacts to the Ornamental Snake. | Infestation of previously unidentified weeds within the offset area.<br><br>Expansion of range and abundance of existing weed species within the offset site.<br><br>Left unchecked, weed invasion and proliferation could cause significant deterioration of the offset site. | P | H | M | Access to site will be restricted to authorised persons.<br><br>Weed management and weed hygiene restrictions will be implemented across the offset site to reduce the extent of existing weeds and to control the potential introduction of new exotic weed species.<br><br>Weed hygiene and management will be undertaken in consultation with the land manager.<br><br>Chemical and/or mechanical control of all declared weeds in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets or other sources of information. | U | Mi | L | No infestations of new species in the offset area, covering more than 100 m².<br><br>No increase in the average percent (%) cover score weed species from baseline or previous monitoring events. | An increase in the average percent (%) cover score weed species from baseline or previous monitoring events.<br><br>Outbreak of infestations of weed species not previously recorded in the offset area during baseline or previous monitoring events.<br><br>An increase in the presence of weeds (relative abundance and/or area of occurrence) from photo monitoring results.<br><br>An interim performance target is not attained, or a completion criterion is not attained and/or maintained. | Review adherence to weed hygiene procedures to ensure compliance and to update restrictions where required.<br><br>Review timing and frequency of weed management measures and implement alternative weed management timeframes as required.<br><br>Investigate alternative weed management control actions (e.g. spot spraying and/or injection of herbicides, as well as intensification for most affected areas) and implement as required.<br><br>Undertake additional weed control measures and continue until weed cover is below baseline levels and in accordance with performance criteria.<br><br>Update OAMP as required. | Monitoring of weeds and non-native plants will be undertaken during the habitat quality assessment surveys using the same methodology used to monitor the baseline habitat quality as outlined in section 0, as well as incidental observations as part of routine management.<br><br>The annual report will document the weed presence, weed control measures and extent of weed cover during the reporting period and relevant responsive actions. |

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
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| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | | |
| Inappropriate grazing regimes | Inappropriate cattle grazing destroys shrubs and native grass cover and slows or reverses the regeneration of threatened fauna habitat.<br><br>Grazing can also lead to the trampling of Ornamental Snake shelter and foraging habitat. | P | H | M | Stock will be managed in accordance with section 6.4.<br><br>If and where new fencing is required to demarcate the offset area, ensure fencing is permanent and prohibit unintended grazing by cattle.<br><br>Ornamental Snake peak activity can vary depending on localised site conditions but generally peaks in the wet season (November-March).<br><br>Restricted grazing will reduce gilgai and microhabitat degradation. | U | Mi | L | Stock are removed from the offset area for it to be spelled to allow for grasses to seed and to facilitate recovery of perennial grasses and the herbaceous layer while mitigating wildfire risk by restricting fuel loads.<br><br>Ground cover always remains above the minimum cover limits (BioCondition benchmarks for the REs). | Stock are observed on site in exclusion times, outside of strategic grazing events.<br><br>Livestock located in the offset areas outside of strategic grazing events.<br><br>Livestock located in Ornamental Snake habitat during the wet season.<br><br>Damaged fencing is observed.<br><br>Habitat quality assessments indicate native grass groundcover is less than the relevant benchmark levels for each assessment unit.<br><br>If ecological surveys indicate an increased coverage of gilgai degradation outside the early to wet season. | Amend livestock management practices including amendment of stocking rates, and/or timing, and/or duration and/or frequency of strategic grazing events until native grass cover at the relevant benchmark levels for each assessment unit.<br><br>Repair offset area boundary fencing if damaged.<br><br>Remove stock from Ornamental Snake habitat.<br><br>Removing stock when excessive pugging or overgrazing is observed such that native grass cover is below benchmark levels.<br><br>Construct additional fencing if required. Additional fencing will not clear areas of Ornamental Snake habitat.<br><br>Should monitoring activities identify triggers for further action, the OAMP will be reviewed by a suitably qualified ecologist within one month and update if required.<br><br>Any corrective action identified will be implemented within 1 month of the OAMP being updated. | Regular site inspections by land manager during exclusion periods as well as to assess for signs of overgrazing and pugging.<br><br>Regular inspections of the offset area will be undertaken during normal land management and farming practices to examine fence lines when stock are grazing in the offset area and/or adjacent to the offset area.<br><br>Habitat quality assessments will be undertaken in accordance with this OAMP and will include assessment of percentage cover of native perennial grasses.<br><br>The annual offset compliance report will document vegetation condition. |

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | | |
| Increased population of feral animals in the offset area causing habitat degradation or direct impacts to Ornamental Snakes. | Pest animals pose threats to the MNES including predation (Wild Dogs, Feral Cats and Foxes) and habitat degradation (Feral pigs and Rabbits) and poisoning (Cane Toads).<br><br>Feral pigs and Rabbits can impact on Ornamental Snake habitat including understorey vegetation composition, shelter and foraging habitats. | P | H | M | Pest animal management will be undertaken in consultation with the land manager and in accordance with general pest management processes.<br><br>Pest management will include a range of best management practice actions including shooting, trapping, fencing and baiting, and will be undertaken in accordance with Queensland's Department of Agriculture and Fisheries (DAF) guidelines[9] and the requirements of the *Biosecurity Act 2014.*<br><br>If an increase in feral pest species is noted, additional pest management/ control measures will be instigated until the increased activity has ceased. | P | Mi | L | No increase in abundance of feral animals.<br><br>Maintain pest animal control program.<br><br>No evidence of new pest species. | Observed increase in sightings/signs and/or the relative abundance of pest animals above baseline levels or previous monitoring event (whichever is lower).<br><br>Observation of, or signs of, a feral animal not identified as occurring within the Project area during the baseline surveys.<br><br>Habitat quality scores for interim performance targets are not likely to be achieved by Year 5, Year 10, Year 15 and Year 20. | Review adherence to pest animal management.<br><br>Investigate potential sources or reasons for an increase in pest animal numbers and rectify.<br><br>Increase the frequency or revise the type of invasive pest animal control efforts in accordance with DAF guidelines, and in conjunction with neighbouring landowners.<br><br>Update OAMP if required. | Review adherence to pest animal management actions.<br><br>Investigate potential sources or reasons for an increase in pest animal numbers and rectify.<br><br>Increase the frequency or revise the type of invasive pest animal control efforts in accordance with DAF guidelines, and in conjunction with neighbouring landowners.<br><br>Suitably qualified ecologist to review the OAMP within one month and update if required |
| Unauthorised access | Access to the offset site by any unauthorised persons poses risks to the Ornamental Snake through habitat degradation (introduction of new weeds), incursion by feral herbivores if gates are left open, Ornamental Snake mortality through vehicle strike. | P | Mo | M | All signs and fences will be erected within three months of the offset being legally secured.<br><br>Signs will be erected at all entrances and potential access points to the site stating that access to the site is forbidden.<br><br>Fences will be maintained to prevent unauthorised access, to minimise incursions by feral | U | Mo | L | No unauthorised access to the offset site. | Evidence of unauthorised or unplanned access by persons, vehicles, and/or stock is detected during exclusion periods.<br><br>Evidence of stock is detected at any point during exclusion times. | Upon being notified or becoming aware of prohibited access to the offset area, the approval holder is to reassess access protocols and signage and general access within one fortnight.<br><br>Damage to signage will be repaired within one month of noting the damage. | Monitoring of fence lines will be undertaken by the Landholder or suitable qualified person appointed by the approval holder within 3 months of the offset area being legally secured and during quarterly inspections. |

[9] https://www.daf.qld.gov.au/business-priorities/plants/weeds-pest-animals-ants

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | | |
| | | | | | herbivores and to control stock presence. | | | | | Damage is detected to any fence or sign. | If there are areas that have been negatively impacted by unauthorised access, the areas will be allowed to naturally regenerate and those areas will be added to the ongoing monitoring sites.<br><br>Signage will be repaired and maintained as required by the Landholder or suitable qualified person appointed by the approval holder. | Inspections will monitor and document damage or loss of signs and evidence of unauthorised access to the offset area. |
| Bushfire (unplanned) | If unchecked bushfire may degrade some or all of the offset site and increase related risks such as erosion.<br><br>Fire late in the management period would also reduce the environmental improvement achieved at the offset site. | P | H | M | Controlled burns will be undertaken in consultation with the land manager and in accordance with the recommended fire management guidelines for Regional Ecosystems and will involve a range of burn strategies including patchwork burns.<br><br>Fire is to be excluded from the offset area except for planned and strategic burns as required to reduce understorey fuel loads having a detrimental impact on canopy tree recruitment and establishment and to maintain existing fire breaks.<br><br>Create firebreaks around the offset area boundary to minimise unplanned fire from adjacent lands. Utilise natural firebreaks (e.g. creek lines) where possible. | U | H | M | No unplanned fire with the offset area. | Unplanned fire within the offset area.<br><br>Planned fires become out of control or the required burning regime is not achieved.<br><br>Habitat Quality assessments indicate native grass groundcover is >15% above benchmark levels for each assessment unit (see section 7.7 and Table 20). | Occurrences of fire are to be recorded during the visual inspections undertaken during routine land management.<br><br>If an uncontrolled bushfire has impacted the offset area (including if controlled burning becomes out of control), review the grazing management and fire management strategies and adherence to these strategies and exclude cattle for nominally at least three months (depending on conditions for re-growth). All fire breaks will be inspected, maintained, and repaired if required.<br><br>To ensure compliance with performance criteria, undertake remedial action including:<br><br>Alteration to stocking rates, and/or duration and | Fire breaks are to be inspected annually in September.<br><br>Visual inspection of signs of fire during routine land management and during the habitat quality assessments.<br><br>Fuel loads will be monitored via ground cover estimates as assessed during habitat quality monitoring and will inform fire management strategies. |

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
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| | | | | | Firebreaks are to be co-located, where possible, with roads, fence lines and vehicle access tracks. No areas of Ornamental Snake will be cleared unless necessary for safety management. | | | | | | frequency of strategic grazing events; and/or<br><br>Amendments to fire management practices as required including fire safety and containment management.<br><br>Suitably qualified ecologist to review the OAMP within one month and update if required. | |
| Remnant Brigalow offset area fails to achieve the interim performance targets and completion criteria within the 5, 10, 15 and/or 20-year time intervals.<br><br>Offset site initially achieves the completion criteria but declines before the end of the approval. | The offset site has not met the requirement of the offset policy or this OAMP, nor achieved the outcomes that were key to the rationale for the approval decision. | U | C | H | Implement management measures as outlined in Table 20 and Section 6.0.<br><br>Voluntary Declaration under the VM Act will ensure that the landholder remains obliged to undertake active management of the offset until all completion criteria are achieved, leading to further management. | U | Ma | H | Completion criteria are achieved, by the timeframes established and maintained through to the end of the approval. | Interim performance targets are not achieved by year 5, 10 or 15.<br><br>Completion criteria are not achieved by year 20. | Within one month of detection of the trigger, complete an investigation into the reasons why the interim performance targets or the completion criteria were not achieved within the specified timeframes. This investigation must re-evaluate the suitability of the relevant management actions and identify appropriate corrective actions.<br><br>As soon as practicable, and within six months of detection of the trigger, implement revised corrective actions. These may include (but not limited to):<br><br>• Increasing the frequency and intensity of pest animal and weed control measures or revising the type of measures to be implemented.<br><br>• Modify fire management measures, to better | Monitoring of the offset area will be undertaken in accordance with this OAMP.<br><br>Monitoring results will be compared against the interim performance targets and completion criteria to assess progress of offset area in achieving the requirements of this OAMP. |

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
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| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | | |
| | | | | | | | | | | | support enhancement of offset values.<br>• If the investigation outlined above requires changes to the management actions, then as soon as possible, and within six months of detection of the trigger, implement a revised OAMP, as approved by the Minister, incorporating those recommended changes.<br>• Alternative and/or additional offsets may need to be sought by the approval holder, and approved by the Minister, should the above corrective actions not be successful. | |
| Regrowth Brigalow fails to achieve the annual interim performance targets within the first 5 years. | The offset site has not met the requirement of the offset policy or this OAMP, nor achieved the outcomes that were key to the rationale for the approval decision. | U | C | H | Implement management measures as outlined in Table 20 and Section 6.0. | U | Ma | H | Interim performance targets and completion criteria outlined in Table 19 achieved. | Interim annual performance targets are not achieved by year 5 and five yearly targets not achieved in years 10, 15 and 20.<br>Completion criteria are not achieved by year 20. | Within one (1) month of detection of the trigger, complete an investigation into the reasons why the interim performance targets or the completion criteria were not or are not likely to be achieved within the specified timeframes. This investigation must re-evaluate the suitability of the relevant management actions and identify appropriate corrective actions.<br>As soon as practicable, and within three months of detection of the trigger, implement revised | Monitoring of the offset area will be undertaken in accordance with this OAMP.<br>Monitoring results will be compared against the interim performance targets and completion criteria to assess progress of offset area in achieving the requirements of this OAMP. |

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
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| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | corrective actions. These may include (but not limited to):<br>• Increasing the frequency and intensity of pest animal and weed control measures or revising the type of measures to be implemented.<br>• Undertake additional active revegetation and replanting when mortality exceeds 10% as determined from the annual monitoring events.<br>• Update the OAMP as soon as practicable to include any revised management actions or interim performance targets.<br>• Depending on the investigation outcomes, either increase stem density thinning or cease thinning for a 12-month period and until the following years annual monitoring has been undertaken. | |
| **Force Majeure Events** | | | | | | | | | | | | |
| Drought | The risk posed by drought is a decrease in groundcover, an increase in the likelihood of unplanned fire due to the dry conditions from lightning strikes and an increase in weed cover when rainfall is received.<br>Reduced/ retarded plant growth may would be expected, depending on the | P | Mo | M | Limited mitigation measures can be implemented.<br>Should the offset be deemed by the approval holder or the Department to have been delayed, all parties will work together to determine an appropriate response, including extending timeframes | P | Mo | M | Achievement of 20-year completion criteria. | Drought declaration. | Allow offset area to recover post drought, particularly through the control of weeds as per section 6.7.<br>Exclude stock grazing until groundcover improves to benchmark levels immediately prior to the annual grazing period. | The annual offset compliance report will document vegetation condition and report on drought impacts. |

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
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| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | | |
| | severity of drought. This may prevent or affect achieving interim performance targets or the completion criteria within the 20-year period. | | | | for completion criteria to be met. | | | | | | Within one month of determining that the outcomes of the OAMP are likely to be delayed, consultation between Stanmore, the land manager and DCCEEW will be undertaken to develop an appropriate response, which may include extending timeframes for completion criteria. | |
| Cyclone/ severe tropical lows/ flooding | The most significant impact from tropical cyclones or tropical lows is typically flooding and destruction of habitat<br><br>The season for such weather events is between December and April. | L | Mo | M | Limited mitigation measures can be implemented.<br><br>Part of the offset site is relatively flat and may experience flooding from the nearby waterways. However, cyclones and severe tropical lows are relatively infrequent (although likely to occur at some point during the life of the offset). Although flooding is not expected to be of sufficient duration, wind speed has the potential to be severe and may cause substantial long-term harm to the site. Additionally, the increased availability of soil moisture following flood is expected to increase the growth rates of vegetation, and thus facilitate repair to damage to vegetation, following subsidence of flood waters.<br><br>Increased soil moisture may assist weed growth. The subsequent monitoring event (as per section 0) will include groundcover survey to detect | L | Mi | L | The subsequent monitoring event (as per section 0) will include habitat quality surveys and supplemented habitat features assessments, as soon as is safe and reasonably practicable to do so following any cyclone or flood. Appropriate weed management measures will be implemented, as required. | Any incident of cyclone or flood impacting the site. | As soon as reasonably practicable and safe following the cyclone or flood, undertake a monitoring event and implement management measures as required. This may include additional placement of Ornamental Snake habitat features as determined by suitably qualified ecologists. | The annual offset compliance report will document vegetation condition and report on cyclone/ flood impacts.<br><br>Notification to DCCEEW if substantial damage to offset area from cyclone or flood, to report as an incident. |

| Risk Event | Risk Description | Initial Risk Ranking | | | Management Measures / Actions | Residual Risk Ranking | | | Performance Criteria | Management Triggers | Corrective Actions | Monitoring Mechanisms |
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| | | Likelihood[1] | Consequence[2] | Result[3] | | Likelihood[1] | Consequence[2] | Result[3] | | | | |
| | | | | | any areas of increased weed density. | | | | | | | |

[1] HI - Highly Likely; L - Likely; P - Possible; U - Unlikely; R - Rare

[2] Mi - Minor; Mo - Moderate; H - High; Ma - Major; C - Critical

[3] L - Low; M - Medium; H - High; S - Severe

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**Appendix A**

# Offset Area Ecological Assessment Report

# Denham Park Ecological Assessment Report

## Offset Investigations for Stanmore SMC Pty Ltd

BASE/

Client: Stanmore SMC

Reference: J0053.3

**Document Control**

| | |
|---|---|
| Title: | Denham Park Ecological Assessment Report |
| Address: | Denham Park |
| Job Number: | J0053.3 Ornamental Snake Offsets |
| Client: | Stanmore SMC |

**Document Issue**

| **Issue** | Date | Prepared By | Approved By |
|---|---|---|---|
| **Rev A – Draft for internal review** | 28/03/2024 | Isaac Witten | Dr Craig Streatfeild |
| **Rev B – Draft for client review** | 25/04/2024 | Isaac Witten | Dr Craig Streatfeild |
| **Final** | 26/04/2024 | Isaac Witten | Dr Craig Streatfeild |

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# 1.0 Introduction

Stanmore SMC Pty Ltd (Stanmore SMC), a subsidiary of Stanmore Resources Ltd (Stanmore) owns and operates the South Walker Creek (SWC) Mine. The South Walker Creek Mulgrave Resource Access (MRA) Project (the Project) is a multi-stage progression of open-cut mining of the Mulgrave Pit at SWC Mine. Stage 2 (MRA2C) involves the progression of the Mulgrave Pit in a south-westerly direction to access coal resources within the current mining lease. The MRA2C Project was referred under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) and determined to be a controlled action, which was approved on 30 October 2019 subject to conditions which included the provision of environmental offsets under the Act for a number of matters of national environmental significance (MNES; EPBC Approval 2017/7957, dated 30 October 2019). Since the approval was granted, an additional disturbance area impacting habitat for MNES threatened species was identified, in which a variation of the conditions of the approval was sought to increase disturbance limits and deliver additional offsets to compensate for impacts. This variation of the conditions was approved on 27 November 2020. Further variations of the conditions were approved on 6 August 2021.

An assessment of significant residual impacts on MNES was prepared for the MRA2C's Environmental Impact Statement (EIS) (ELA, 2018). The conditions of approval identified MNES that require offsets as follows:

- Brigalow threatened ecological community (TEC)
- Potential habitat for threatened fauna: Ornamental Snake (*Denisonia maculata*), koala (*Phascolarctos cinereus*), Greater glider (*Petauroides volans*), Black Ironbox (*Eucalyptus raveretiana*) and Squatter Pigeon (southern) (*Geophaps scripta scripta*).

Offsets have either been approved or are being sought elsewhere for the Koala, Greater Glider, Squatter Pigeon, Black Ironbox and Stage 1 offsets for the Ornamental Snake and Brigalow TEC. Stage 2 offsets for impacts to the Ornamental Snake and Brigalow TEC were investigated within the Denham Park Property (Figure 1). This property currently has a 1020 ha offset for Ornamental Snake for a separate Stanmore related project (Figure 2).

## 1.1 Scope and Purpose of Report

Detailed ecological investigations have previously been undertaken within the Denham Park property in 2022 and 2023 (BASE, 2022). The scope of this EAR was to undertake additional and targeted baseline ecological surveys within the Denham Park Property to assess the on-ground (field verified) vegetation communities and the ability of the vegetation communities to provide offsets for the Ornamental Snake (*D. maculata*) and Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (Brigalow TEC). Offsets within Denham Park for the MRA2C Project are for the remaining impacts only associated with Stage 2 which equate to 18.7 ha of Ornamental Snake habitat (equating to 55.47% of the impacts) and 20.5 ha of Brigalow TEC (covering 62.74% of the impacts).

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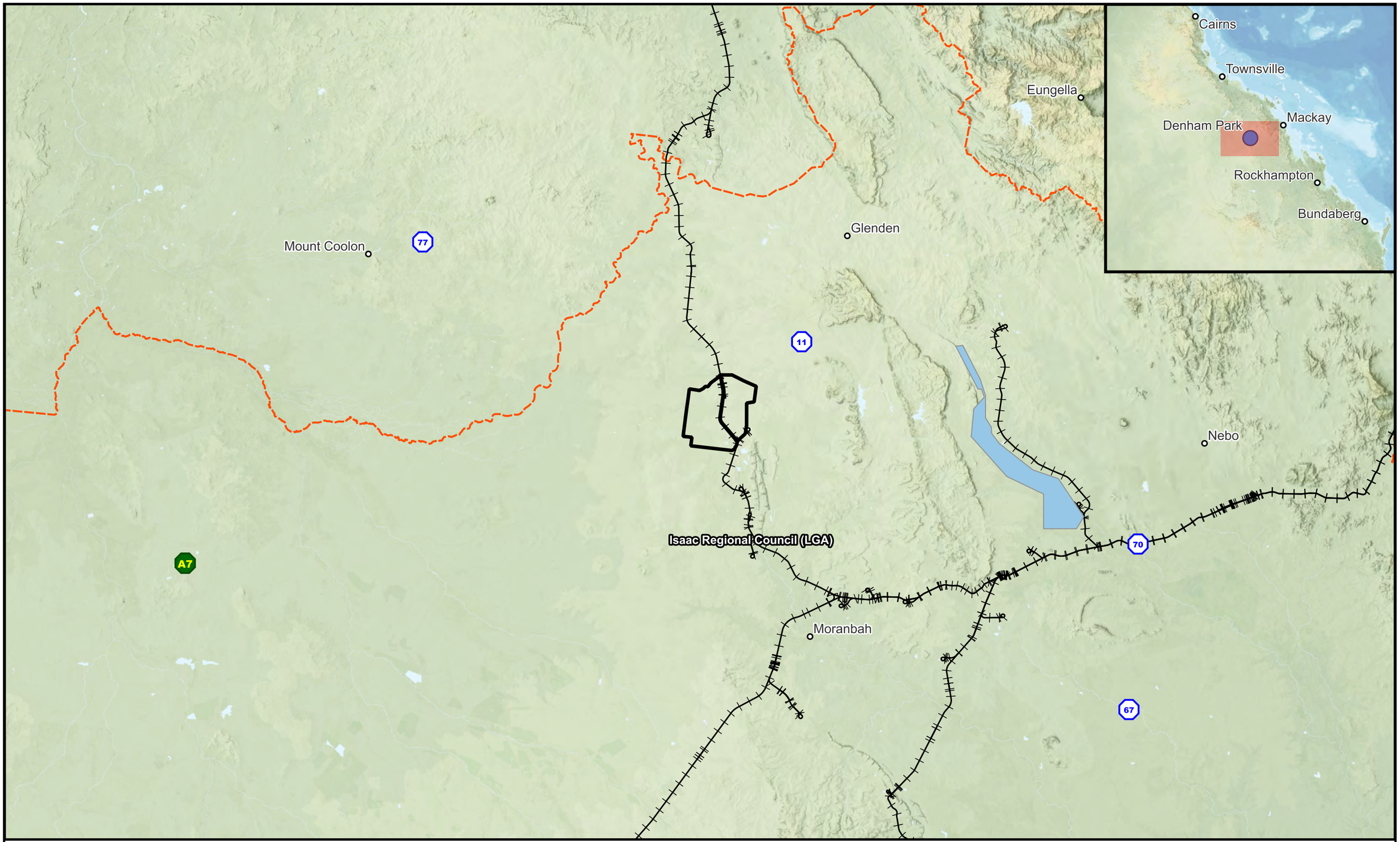


# Figure 1: Site Context

0 10 20 km

Scale @ A3: 1:500000
Date: 26/04/2024
Job: J0053.3
Drawn: Isaac Witten

N

Denham Park
SWC Mine, ML4750,
MRA2C Project on parts of ML 4750
Isaac Regional Council (LGA)
Cities and Towns
State Controlled Road
Rail

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

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# Figure 2: Proposed Offset Area

0 1000 2000 m

N

Scale @ A3: 1:50000
Date: 16/04/2024
Job: J0053.3
Drawn: Isaac Witten

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Existing Offset Area
- Proposed Offset Area
- Investigation Area
- DCDB
- Easement
- Road
- Rail

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# 2.0 Regulatory Requirements and Policy Framework

## 2.1 *Environment Protection and Biodiversity Conservation Act*

The EPBC Act is the Commonwealth Government's principal piece of environmental legislation and is administered by the DCCEEW. The EPBC Act is designed to protect MNES, which include threatened species of flora and fauna, threatened ecological communities (TECs), migratory species as well as other protected matters. The Act includes EPBC categories of threat for threatened flora and fauna, identifies key threatening processes to their survival and provides for the preparation of recovery plans for threatened flora and fauna.

## 2.2 EPBC Act 1999 Environmental Offsets Policy

This policy outlines the Commonwealth Governments approach to the use of environmental offsets under the EPBC Act. The EPBC Act Environmental Offsets Policy (October 2012), has five key aims that involve:

- Ensuring the use of offsets are efficient, effective, timely, transparent and scientifically robust.
- Providing all stakeholders with greater certainty on how offsets are determined and provided.
- Delivering improved environmental outcomes.
- Outlining the appropriate nature and scale of offsets.
- Providing guidance on acceptable offsets and their delivery.

The Policy also provides eight key principles that are applied in determining the suitability of offsets as follows:

- Deliver an overall conservation outcome that improves or maintains the viability of the MNES in question.
- Be primarily built around direct offsets but may also include other compensatory measures.
- Be in proportion to the level of statutory protection that applies to the MNES.
- Be of a size and scale proportionate to the residual impacts on the protected matter.
- Account for and manage the risks of the offset not succeeding.
- Be additional to what is already required under law or regulation.
- Be efficient, effective, timely, transparent, scientifically robust and reasonable.
- Have transparent governance arrangement including management actions, monitoring and auditing.

Considering the above policy principles and offset requirements, ecological assessments have been undertaken on Denham Park to assess the sites potential as an offset area.

## 2.3 *Vegetation Management Act 1999*

The Vegetation Management Act 1999 (Qld) (VM Act) regulates the clearing of native vegetation in Queensland and is administered by the Department of Resources (DoR). The VM Act also protects and regulates areas designated for offsets or compliance (Category A). The VM Act categorises the status

of native vegetation as remnant (Category B), high value regrowth (HVR) (Category C), reef regrowth watercourse vegetation (Category R) and non-remnant (Category X). Remnant, HVR or reef regrowth vegetation can be further classified into regional ecosystems (REs) based on bioregion, landform and dominant canopy species.

In addition, within the VM Act Regulations all RE are assigned to a Vegetation Management Class (VM Class). This is based on the current extent remaining compared to its pre-clearing extent, as gazetted under the VM Act and listed in the Regional Ecosystem Description Database (REDD) maintained by the Queensland Herbarium, Department of Environment and Science (DES).

Regional ecosystems are designated a Biodiversity Status (BD Status) through the Regional Ecosystem Description Database (REDD) based on an assessment of vegetation condition and are used for a range of planning and management applications. Table 1 summarises the criteria used to assess the VM Act class and BD status of REs.

**Table 1 Criteria Assessing VM Act Class and BD Status**

| Regional Ecosystems | BD Status Criteria | VM Class Criteria |
|---|---|---|
| Endangered | Less than 10% of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss; or | Less than 10% of its pre-clearing extent remaining, or |
| | 10–30% of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000ha; or | 10% to 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha. |
| | It is a rare regional ecosystem subject to a threatening process. | |
| Of Concern | 10% to 30% of its pre-clearing extent remaining, or | 10% to 30% of its pre-clearing extent remaining; or |
| | More than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha; and | More than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10,000 ha. |
| | 10–30% of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss. | |
| No Concern at Present | More than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is more than 10,000 ha; and | N/A |
| | the degradation criteria listed above for ‘endangered’ or ‘of concern’ regional ecosystems are not met. | N/A |

| Regional Ecosystems | BD Status Criteria | VM Class Criteria |
|---|---|---|
| Least Concern | N/A | More than 30% of its pre-clearing extent remaining and the remnant vegetation remaining is more than 10,000 ha. |

## 2.4 *Biosecurity Act 2014*

The *Biosecurity Act 2014* (Qld) (Biosecurity Act) commenced on 1 July 2016 and ensures a consistent, risk-based approach to biosecurity in Queensland. The Act provides biosecurity measures to safeguard Queensland's economy, agricultural and tourism industries and environment from:

- Pests (e.g. wild dogs and weeds).
- Diseases (e.g. foot-and-mouth disease).
- Contaminants (e.g. lead on grazing land).

Under the Biosecurity Act, invasive plants and animals are categorised as either a 'prohibited matter' or a 'restricted matter' and replaced many separate pieces of legislation that were previously used to manage biosecurity. Decisions made under the Biosecurity Act will depend on the likelihood and consequences of the risk. The *Biosecurity Regulation 2016* sets out how the Biosecurity Act is implemented and applied. Introduced flora identified during field surveys were assessed against the list of restricted invasive plants which allowed the opportunity to identify potential weed impacts to flora values across the Investigation Area.

# 3.0 Methodology

A comprehensive program, involving both desktop analysis and fieldwork, was implemented to assess the habitat quality of the Denham Park property. This EAR focuses on a specific Investigation Area within two (2) designated areas divided by a railway line (refer to Figure 2). Following survey findings and discussions with the property's owners and managers, the Investigation Area was fine-tuned into a Proposed Offset Area (refer to Figure 2). This Proposed Offset Area is designed to fulfill the offset obligations outlined in Section 1.0.

## 3.1 Desktop Assessment

### 3.1.1 Literature Review

The following literature was reviewed as part of the desktop assessment for the Investigation Area:

- Matters of National Environmental Significance (MNES) Assessment Report – QPM Energy Project (Draft in Progress) (EMM, 2022).
- Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy, Version 1.3 (DES, 2020).
- *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy (DAWE, 2012).
- BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2 (Eyre, et al., 2015).
- Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland (Nalder, et al., 2020).
- Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (DES, 2018).
- Species Profile and Threats Database – *Denisonia maculata* (DCCEEW, 2024).
- Species Profiles and Threat Database - Brigalow (*Acacia harpophylla* dominant and co-dominant) (DCCEEW, 2024).

### 3.1.2 Desktop Review

Desktop assessment was conducted to assess the suitability of the Denham Park property as an offset site, to assist in determining target areas for the field surveys and to provide data for the determination of the quality of habitat for MNES.

The following resources were reviewed as part of the desktop assessment:

- Regional Ecosystem Description Database (REDD), Version 13 (Queensland Herbarium, 2021).
- Vegetation Management Regional Ecosystem spatial layer, Version 13 (DES, 2024).
- BioCondition Benchmarks Database Version 3.1 (Queensland Herbarium, 2021).
- Atlas of Living Australia website at http://www.ala.org.au. Accessed June 2022.

- Commonwealth Protected Matters Search Tool (PMST) – accessed on search area was 20 km radius of Denham Park.
- Review of historic aerial imagery (Google Earth Pro).

## 3.2 Field Assessment

Two (2) survey events have been undertaken by suitably qualified ecologists in October 2023, and February 2024. The preliminary survey spanned four (4) days in October 2023, encompassing on-ground vegetation community classifications, assessments of habitat quality, and targeted spotlighting for Ornamental Snakes. Subsequently, a secondary survey was conducted in February 2024 to evaluate supplementary areas. This survey, which also involved on-ground vegetation community classifications, assessments of habitat quality, and targeted Ornamental Snake spotlighting, aimed to further enhance understanding of the areas ability to support offsets for MNES.

The methodologies used to describe and assess the on-ground vegetation communities and determine the baseline habitat quality and presence of the Ornamental Snake and Brigalow TEC are outlined below.

### 3.2.1 Vegetation Community Classification

The extent, classification, and condition of ground-truthed vegetation communities within the Investigation Area was validated in accordance with the Methodology for surveying and mapping regional ecosystem and vegetation communities in Queensland (Neldner, et al., 2020). Investigation included undertaking quaternary level assessments across the Investigation Area.

Quaternary-level sites were utilised to verify vegetation units and confirm dominant characteristic flora species. Structural analysis included recording the height class and life form of the dominant species within the mid and canopy strata as per (Neldner, et al., 2020). Evidence of previous disturbance, fire history, incidence of exotic species and general notes on soil type and ecological integrity were compiled for each quaternary survey site. Numerous time-encoded digital photographs were taken at each site as a reference.

RE classification was determined based on the vegetation, soil and landform characteristics identified in the field, geological mapping for the region and the REDD. Condition status for woody vegetation was evaluated utilising the definitions of remnant vegetation under the VM Act. For the purposes of this assessment, vegetation was mapped into three categories:

- Remnant: woody vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has greater than 70 % of the height and greater than 50 % of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy.
- HVR: areas previously cleared or disturbed (e.g., by wildfire) over 15 years ago and containing woody vegetation floristically and structurally consistent with the RE but typically less than 70 % of the height and less than 50 % density of the RE.
- Regrowth and non-remnant: areas previously cleared or otherwise significantly disturbed.

### 3.2.2 Habitat Quality Assessment

Habitat quality was assessed using a combination of indicators that measure the overall viability of the site and its capacity to support fauna species. The Department of Resources (DoR) vegetation management RE mapping was initially used to determine the likely number and location of habitat quality assessment plots (HQAP). These plots were refined following field verification of the mapped vegetation communities.

Following the classification of vegetation, portions of the available Investigation Area were delineated into habitat quality assessment units (AU) and condition quantified via HQAP (site condition assessments). HQAP were undertaken in accordance with the Queensland's Department of the Environment and Science (DES) Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy, Version 1.3 (DES, 2020) (the 'Guide'). A habitat quality assessment unit (AU) refers to vegetated areas with the same RE and vegetation status (remnant or regrowth) which can be grouped together to give a total area for a single RE.

Photographs were taken along the HQAP transect centreline at the ends of each plot (e.g. at 0 m and 100 m), and in the order: north (0°), east (90°), south (180°) and west (270°) at the centre of the plot (e.g. at 50 m point).

Total habitat quality is assessed through a range of habitat indicators to measure the ecological viability and habitat values of a site and its capacity to support fauna and are separated into three main categories: site condition, species stocking rate and site context. The first two categories use data collected in the field whereas site context is primarily a geospatial exercise.

In a wooded ecosystem HQAP involved the collection of twelve (12) site-based attributes as outlined in Table 2 within a 100 m x 50 m nested sampling plot (Eyre, et al., 2015). The final two attributes are derived from the scoring system which analyses species specific habitat requirements specifically for quality and availability of habitat for food and foraging, and shelter.

In general, if the BioCondition benchmark for the assessment unit gives a zero for an attribute, then the attribute is removed from the final score. In total 21 HQAPs were completed as shown on Figure **3**. Methodology for data collection of these attributes is further detailed in section 3.3.2.3.

**Table 2 Site Condition Attributes**

| Attribute | Assessment Unit Type |
|---|---|
| Site Condition | Wooded Ecosystems |
| Large trees | 100 x 50m plot |
| Tree canopy height | 100 x 50m plot |
| Recruitment of canopy species | 100 x 50m plot |
| Tree canopy cover (%) | 100 m transect |
| Shrub layer cover (%) | 100 m transect |
| Coarse woody debris | 50 x 20 m plot |

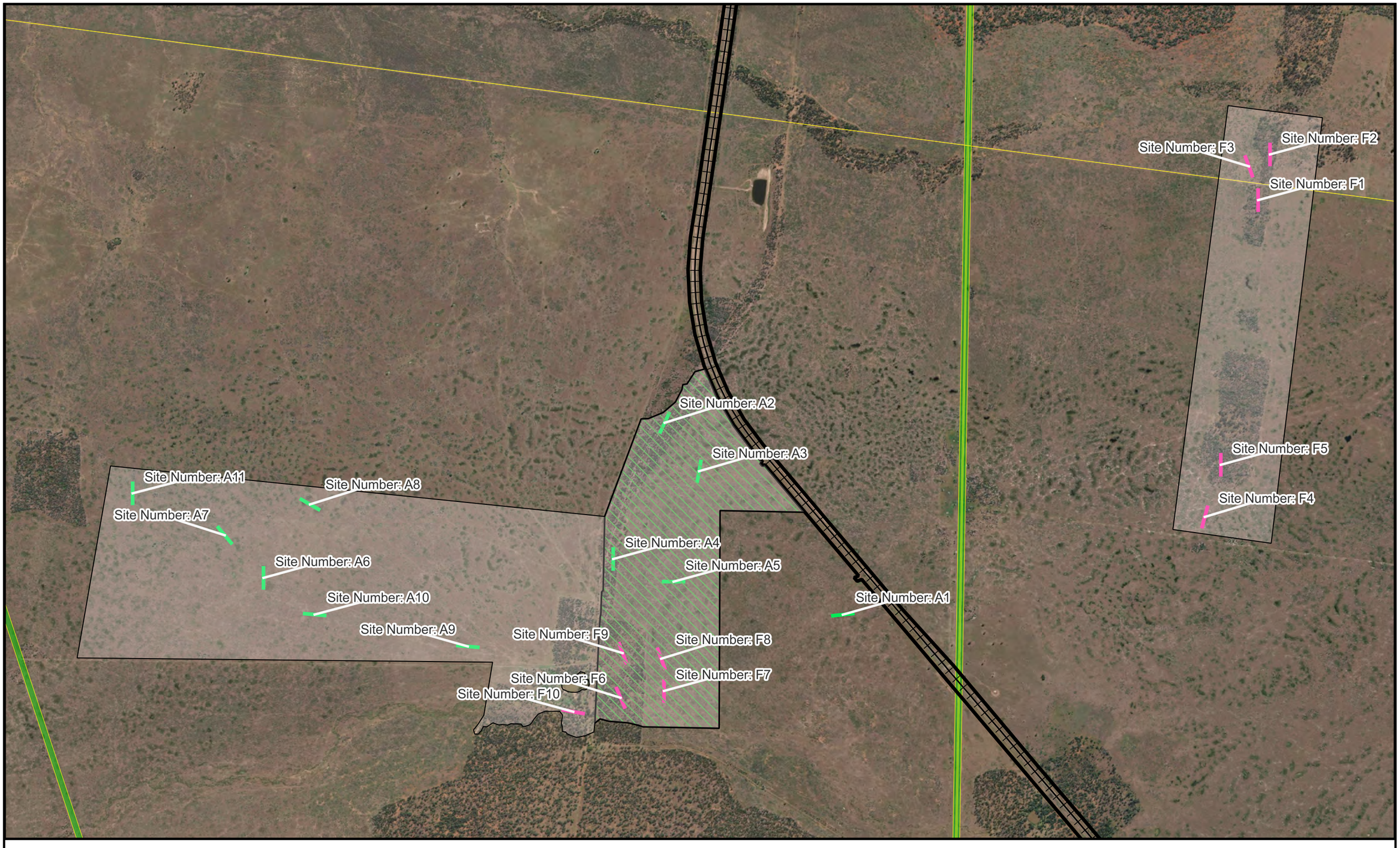
| Attribute | Assessment Unit Type |
|---|---|
| Site Condition | Wooded Ecosystems |
| Native plant species richness for four life forms | 100 x 50 m (trees)<br>50 x 10 m (shrubs, grasses and forbs) |
| Non-native plant cover | 50 x 10 m plot |
| Native perennial grass cover (%) | 1 x 1 m quadrat |
| Organic litter cover | 1 x 1 m quadrat |
| Quality and availability of habitat for food and foraging* | 100 x 50 m plot |
| Quality and availability of habitat for shelter* | 100 x 50 m plot |

### 3.2.3 Spotlighting

Fauna spotlighting assessments targeting Ornamental Snake habitat were held at two separate times, approximately four (4) months apart. The first of these surveys was undertaken over four (4) days and nights between October 9th and 12th 2023, whilst the second additional survey was held in February 2024, and was undertaken over four (4) days/nights between February 5th and 8th, 2024. Surveys were undertaken by a team of two suitably qualified ecologists, with the October survey led by Paul Fox, an expert in fauna ecological surveys with over 20 years of experience and supported by Isaac Witten who has previous experience in Ornamental Snake surveys and habitat quality surveys at Denham Park. The February survey was led by Isaac Witten and supported by Adam Walter.

The purpose of the spotlighting assessments was to confirm the presence of the Ornamental Snake and its prey species, within the Investigation Area.

Both surveys involved four (4) nights of non-intrusive targeted nocturnal surveys, and were undertaken using spotlights, totalling 30 person hours spread over the four (4) consecutive nights in each survey. Spotlighting involved meandering transects through areas that were considered suitable for the Ornamental Snake within the Investigation Area. The spotlighting technique involved walking through suitable gilgai and Brigalow habitats and scanning the ground for the presence of the species and its prey.




# Figure 3: Habitat Quality Assessment Plots

0 500 1000 m

N

Scale @ A3: 1:15000
Date: 16/04/2024
Job: J0053.3
Drawn: Isaac Witten

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Proposed Offset Area
- DCDB
- Easement
- Rail
- HQAPs (October 2023)
- HQAPs (February 2024)

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## 3.3 Data Analysis

### 3.3.1 GIS analysis

Spatial data collected during the field surveys were imported into GIS software (QGIS) to map vegetation communities and habitat boundaries as well as calculate areas of the respective Brigalow vegetation communities and Ornamental Snake habitat. Target values identified during the field survey were attributed to the appropriate vegetation communities and habitat types.

### 3.3.2 Habitat Quality Assessment Plot Scoring

Habitat quality assessments were conducted in each HQAP to determine habitat quality within the field verified REs/assessment units as per the requirements of the Guide. The Guide uses a range of habitat indicators to measure the ecological viability and habitat values of a site and its capacity to support a prescribed environmental matter. These are separated into three main categories: site condition, species stocking rate and site context. Site condition and species stocking rate uses data collected from field surveys whereas site context is a generally a geospatial application.

#### 3.3.2.1 Site Condition

Site condition attributes were collected in accordance with the BioCondition Assessment Manual (Eyre, et al., 2015) and compared against corresponding benchmark data (data from a representative vegetation community i.e. RE in an undisturbed state) and scored accordingly. Benchmark data was sourced from BioCondition Benchmarks for Regional Ecosystem Condition Assessment (Queensland Herbarium, 2021). Site condition attributes are displayed in Table 3.

**Table 3 Site Condition Scoring Matrix**

| Attribute | Maximum score |
|---|---|
| Recruitment of woody perennial species | 5 |
| Native plant species richness: | |
| Trees | 5 |
| Shrubs | 5 |
| Grasses | 5 |
| Forbs | 5 |
| Tree Canopy Height | 5 |
| Tree Canopy Cover | 5 |
| Shrub canopy cover | 5 |
| Native perennial grass cover | 5 |
| Organic litter cover | 5 |

| Attribute | Maximum score |
|---|---|
| Large trees | 15 |
| Coarse woody debris | 5 |
| Weed cover | 10 |
| Quality and availability of habitat for food and foraging<br>(Ornamental Snake) | 55 |
| Quality and availability of habitat for shelter<br>(Ornamental Snake) | 15 |
| Total Maximum Score | 140 |

The following steps were undertaken to determine the site condition score for the AU associated with each HQAP:

- Site condition attribute scores for each HQAP are summed per survey site; and
- An average site condition score for the AU is derived by summing the score and dividing by the number of HQAP in each AU; and
- Site Context The average site condition scores are divided by the total maximum score and then multiplied by 10 to give an AU site condition score.

#### 3.3.2.2 Site Context Scoring

Ground-truthed mapping was used to undertake site context assessments to provide a quantitative assessment of the landscape values. The first three site context attributes were analysed in accordance with the Guide (DES, 2020). This involves calculating size of patch, connectivity and context following the methodology described in Eyre et al. (2015), while categorising ecological corridors as described in the guideline. The final two attributes use a combination of field data and GIS analysis. Table 4 displays the site context attributes utilised for this assessment.

**Table 4 Site Context Scoring Matrix**

| Attribute | Maximum score |
|---|---|
| Size of patch | 10 |
| Context | 5 |
| Connectivity | 5 |
| Threats to species<br>(Ornamental Snake) | 15 |

| Attribute | Maximum score |
|---|---|
| Species mobility capacity<br>(Ornamental Snake) | 15 |
| Total Maximum Score | 50 |

#### 3.3.2.3 Species Habitat Attributes

Species habitat attributes are used to indicate an area's ability to support a specific species for all or part of its life cycle. A scoring system was developed for the species habitat attributes which is based on the SPRAT profile, published research and field-based knowledge of the targeted species. A detailed account of the scoring matrix is available in Appendix A. Species habitat attributes are species specific and therefore are only attributed to the Ornamental Snake habitat quality score and are excluded from Brigalow TEC.

#### 3.3.2.4 Species Stocking Rate

**Species stocking rate as outlined in the EPBC offsets calculator guide, replaces species habitat index as a measure of the presence of a species at the impact and offset site. Species stocking rate is to be assessed on a scale of 0 - 4 as categorised in Table 5 and**

Table 6. Species stocking rate does not apply to the habitat quality score of Brigalow TEC.

**Table 5 Species Stocking Rate Calculation Method**

| Species Stocking Rate (SSR) | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | |
| | | No | Yes - adjacent | | Yes - on site | |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | |
| | | Not habitat | Dispersal | Foraging | Breeding | |
| Role/importance of species population on site* | Score (*Total from supplementary table below*) | 0 | 5 | 10 | 15 | |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 40) | | | | | 40 | |
| **SRR Score (out of 4)** | | | | | | |

**Table 6 Species Stocking Rate Supplementary Table**

| *SSR Supplementary Table | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | |
| | | No | Yes/ Possibly | |
| *Key source population for dispersal | Score | 0 | 5 | |
| | | No | Yes/ Possibly | |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | |
| | | No | Yes/ Possibly | |
| *Near the limit of the species range | Score | 0 | 15 | |
| | | No | Yes | |

#### 3.3.2.5 Area Weighted Habitat Quality Scoring

The investigation area is split into separate AUs which are not of equal size. Therefore, in order to calculate a habitat quality score that accurately represents the site on a 'per hectare' scale, the scores must be area weighted. This was done following the methodology set out in the Guide (DES, 2020).

## 3.4 Specimen Identification

Where plant species could not be identified in the field, fruiting and / or flowering specimens were taken to assist with identification. For those species not field identified during the surveys, samples were pressed, and dried, and positive identifications of plant specimens were subsequently made under laboratory conditions or submitted to the Queensland Herbarium for identification.

## 3.5 Nomenclature

The names and conservation statuses of Queensland mammals, birds, reptiles, and amphibians are based on DES WildNet database. Taxonomic nomenclature used for the description of floral species is according to Census of the Queensland Flora 2021. Exotic flora and fauna species are signified in text by an asterix (*).

## 3.6 Limitations

Data acquisition during flora surveys generally has inherent limitations associated with variability of vegetation communities across a site, and changes to the detectability and presence of species with time. A high level of confidence in comprehensiveness is implicit in this study as survey sites were strategically located to capture representative samples of all communities. Further, the seasonal conditions during which this survey was undertaken were conducive to a relatively high degree of detectable floral diversity. However, given the above, it is recognised that field studies with a temporal limitation cannot always account for 100% of potential floral diversity present within a site.

# 4.0 Results

## 4.1 Desktop Survey Results

### 4.1.1 Ornamental Snake (*Denisonia maculata*)

#### 4.1.1.1 Species profile (Ornamental Snake)

Ornamental Snakes are found in close association with frogs which form much of its prey and is known to favour woodlands and open forests associated with moist areas, particularly gilgais with clay soils but is also known from lake margins, wetlands and waterways. This species is associated with Brigalow vegetation communities and commonly found in brigalow (*A. harpophylla*), gidgee (*A. cambagei*), blackwood (*A. argyrodendron*) or coolabah (*Eucalyptus coolabah*) – dominated vegetation communities or pure grassland associated with gilgais (DCCEEW, 2022).

Ornamental Snakes tend to shelter in logs, under coarse woody debris and in ground litter and seem to prefer a diversity of gilgai size and depth, with some fringing groundcover vegetation and timber debris, where soils are of a high clay content with deep-cracking characteristics. Habitat patches greater than 10 ha and connected to larger areas of remnant vegetation are preferred and higher abundance of the species has been found in shallow water where aquatic vegetation is present or where fringing groundcover is inundated, such as shallow wetlands (DCCEEW, 2022). Further, the Draft Referral guidelines for the nationally listed Brigalow Belt reptiles describes gilgai depressions and mounds as being important habitat with habitat connectivity between gilgai and other suitable habitats also being important (DSEWPC, 2011b).

Soil cracks on the high ground of gilgai development provide shelter for Ornamental Snakes during dry periods, and an abundance of frogs in gilgai areas provide food resources during wet. Ornamental Snakes prefer areas with ground cover such as logs and coarse woody debris, and ground litter, which it uses for shelter (TSSC, 2014).

The primary threats to the Ornamental Snake are historical broad-scale habitat clearing for grazing and habitat degradation by cattle, particularly around gilgai habitats (Cogger H. , 2000; TSSC, 2014; Cogger, Camerson, Sadlier, & Eggler, 1993) combined with ongoing habitat loss for agriculture and development (Cogger, Camerson, Sadlier, & Eggler, 1993). Feral pigs are also of great concern, given their degradation of wet areas, competition for frog prey (TSSC, 2014) and potential predation on snakes they encounter. Additional threats include alteration of landscape hydrology and water quality in gilgai environments (which affect the primary prey species of the Ornamental Snake), invasive weeds, and predation by feral predators (Foxes and cats) (ELA, 2015).

#### 4.1.1.2 Suitable Habitat within the Investigation Area (Ornamental Snake)

Desktop assessment including a review of the DES WildNet and Atlas of Living Australia (ALA) historic records, show multiple records of the Ornamental Snake occurring within the Investigation Area, the wider Denham Park property and surrounds (Figure **4**). The records running linearly north to south along the western edge of Denham Park were recorded during construction of a gas pipeline in 2004, whilst the other records towards the eastern side of the property were recorded in 2006. Ornamental Snakes have also been recorded from 2003 through to 2024. Recent surveys (2022) undertaken by EMM for a potential gas pipeline undertaken for a third-party, recorded the species within the Denham Park property (Figure 4) (EMM, 2022). Spotlighting during the EMM (2022) surveys following heavy rainfall identified nine (9) Ornamental Snakes on the first survey night and a further 30 on the second night of surveys. Furthermore, surveys were undertaken over four (4) nights in early February 2023 by BASE This survey observed the four Ornamental Snakes in areas of regrowth 11.4.9 and one individual was found in an area of low regrowth Brigalow mapped as a non-remnant. All of the Ornamental Snakes were in close proximity to inundated gilgai depressions, which was expected given the timing of the survey and their propensity to favour these areas during the wet season. Targeted surveys conducted in October 2023 and February 2024, confirmed the presence of the Ornamental Snake within the Investigation Area including the Proposed Offset Area.

On-ground ecological assessments determined an abundance of suitable habitat for the Ornamental Snake including shelter habitat in the form of woody debris, leaf litter and cracking clay soils, and foraging habitat in the form of interconnected gilgais of varying size and structure. Furthermore, the vegetation communities on site are known to support the Ornamental Snake when the full spectrum of habitat requirements are considered.

Habitat suitability models (HSM) for Matters of State Environmental Significance (MSES) species are available from DES and the Ornamental Snake is among the species which has a HSM. HSM's depict areas within the landscape that are important habitat areas for a species rather than just broad species distributions. To do this, habitat is classified into four habitat value categories: preferred habitat known (PHK); preferred habitat possible (PHP); general habitat known (GHK); or general habitat possible (GHP) (DES, 2020). As seen in Figure 5, the vast majority of the Proposed Offset Site including areas of RE 11.4.9 and RE 11.9.1, is classed as PHK, which is defined as *"known where the taxon is present (based on high accuracy records/expert advice) and there are indications of reproduction, or where a significant number of individuals are present, or important resources (such as nest sites, roost caves, major food sources) are present, or where important movement corridors for breeding and/or non-breeding (including migratory) individuals have been identified"* (DES, 2020).

There are additional historic records of the Ornamental Snake to the north and south of the Denham Park property, which indicates the Proposed Offset Area could be a corridor for the Ornamental Snake between these two areas.

### 4.1.2 Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC

#### 4.1.2.1 Species profile (Brigalow TEC)

The Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (the Brigalow ecological community) occurs within Queensland (Qld) and New South Wales (NSW). *A. harpophylla*, known as brigalow, is easily recognisable with its silver-foliaged appearance, and it typically thrives as the primary species in various open forests and woodlands collectively known as brigalow woodlands.

This ecological community is distinguished by the prevalence of *A. harpophylla*, which often stands as the most abundant tree species (DOE, 2013). Within the community, *A. harpophylla* can either dominate the tree layer or share dominance with other species such as *Casuarina cristata* (belah), different Acacia species, or various Eucalyptus species. Occasionally, these other species may surpass *A. harpophylla* in prevalence within the broader spectrum of brigalow woodlands vegetation. Despite this variability, the Brigalow ecological community exhibits a diverse range of vegetation structures and compositions, characterized by a commonality of species that thrive in acidic and saline clay soils (DCCEEW, 2024).

### 4.1.3 State Mapped Regional Ecosystem

State RE mapping was reviewed to determine the extent of vegetation communities within the Investigation Area. In total, six (6) vegetation communities occur including five (5) REs mapped within the Investigation Area (refer to Table 7). Figure 6 shows the current State mapped REs within the Investigation Area.

**Table 7 State Mapped RE Within the Investigation Area**

| Regional Ecosystem | Description |
|---|---|
| 11.3.4 | *Eucalyptus tereticornis* and/or *Eucalyptus spp*. woodland on alluvial plains |
| 11.4.8 | *Eucalyptus cambageana* woodland to open forest with *Acacia harpophylla* or *A. argyrodendron* on Cainozoic clay plains |
| 11.4.9 | *Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains. |
| 11.4.11 | *Dichanthium sericeum* and *Astrebla spp*. grassland with patchy *Acacia harpophylla* or *Eucalyptus coolabah* on Cainozoic clay plains |
| 11.5.3 | *Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces |
| Non-remnant | - |

# Figure 4: Ornamental Snake Records

0 500 1000 m

Scale @ A3: 1:15000
Date: 16/04/2024
Job: J0053.3
Drawn: Isaac Witten

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DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Existing Offset Area
- Proposed Offset Area
- DCDB
- Easement
- Rail

**Historic Ornamental Snake Sightings**

- Ornamental Snake (WildNet)
- Ornamental Snake (EMM) (2022)
- Ornamental Snake Sighting (February 2023)
- Ornamental Snake Sighting (October 2023)
- Ornamental Snake Sighting (February 2024)

- Spotlighting and Active Searchs (February 2024)
- Spotlighting (October 2023)

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# Figure 5: Habitat Suitability Modelling (Ornamental Snake)

0 1 2 km

Scale @ A3: 1:50000
Date: 25/04/2024
Job: J0053.3
Drawn: Isaac Witten

N

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Proposed Offset Area
- Easement
- Rail

**DES Distribution Habitat Suitability Modelling**

- General Habitat Known
- General Habitat Possible
- No longer habitat
- Preferred Habitat Known
- Preferred Habitat Possible

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# Figure 6: State Mapped Regional Ecosystems

0 500 1000 m

N

Scale @ A3: 1:15000
Date: 25/04/2024
Job: J0053.3
Drawn: Isaac Witten

DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- Proposed Offset Area
- DCDB
- Easement
- Rail

**Vegetation management regional ecosystem - all**

- Category A or B area containing endangered
- Category A or B area containing of concern
- Category A or B area that is least concern
- Category C or R area containing endangered
- Category C or R area containing of concern
- Category C or R area that is of least concern
- Non-remnant

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## 4.2 Field Survey Results

Two (2) field assessments to determine suitability of vegetation communities within Denham Park to provide offset for the significant residual impacts to the Ornamental Snake were undertaken by suitably qualified ecologists from BASE as follows:

- Survey event 1: (habitat quality assessments, spotlighting for Ornamental Snake): five (5) days; 09 – 13 October 2023.
- Survey event 2: (habitat quality assessments, spotlighting for Ornamental Snake): five (5) days; 05 – 09 February 2024.

### 4.2.1 Field Verified Vegetation Communities

The field surveys confirmed the presence of two (2) distinct vegetation communities within the Investigation Area that were considered as potential habitat for the Ornamental Snake and Brigalow TEC. These areas make up the two Assessment Units (AU) referred to when completing the HQAPs (Table 8, Figure 7).

**Table 8 Assessment Unit Area**

| AU# | AU definition | BioCondition Benchmark RE used | Total area (ha) within the Investigation Area | Total area (ha) within the Proposed Offset Area |
|---|---|---|---|---|
| 1 | Low regrowth brigalow | 11.4.9 | 393.1 | 79.9 |
| 2 | Remnant brigalow | 11.4.9 | 78.9 | 29.4 |
| Total | | | 472 | 109.3 |

Each of the vegetation communities recorded contained the potential to provide habitat for the Ornamental Snake and Brigalow TEC. A description of the vegetation communities, the habitat values each supports and the averaged habitat quality score for the AU are exhibited in Table 9.

On-ground ecological surveys conducted within the Investigation Area found the vegetation structure to support a dominate canopy of *A. harpophylla*. Following the surveys, the Investigation Area underwent remapping based on on-ground findings, revealing that it consisted of vegetation consistent with remnant RE 11.4.9 alongside regrowth RE 11.4.9. The species observed composition suggests that, with suitable management practices, the regrowth RE 11.4.9 will transition back to remnant RE 11.4.9.

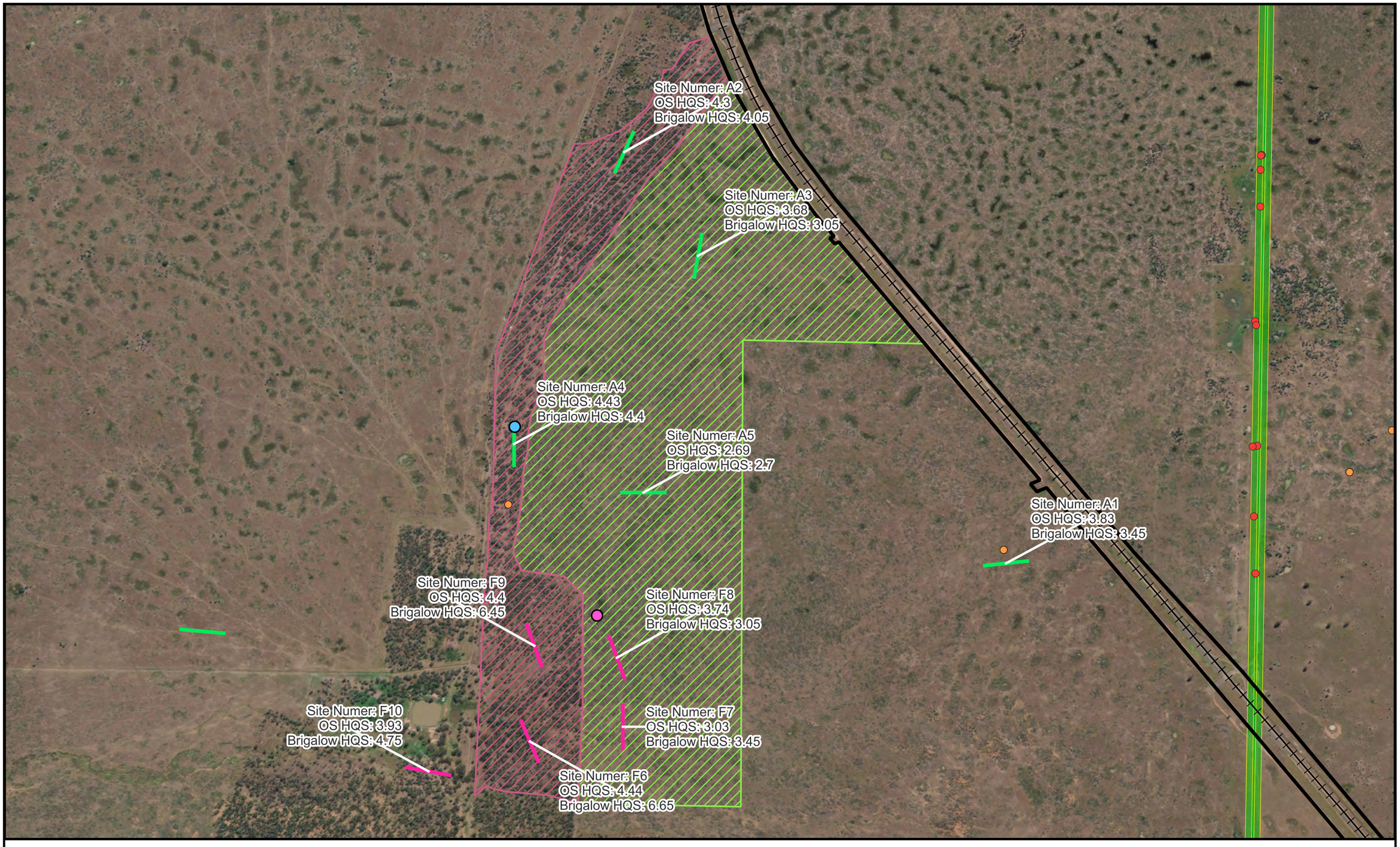
A thorough survey was conducted to assess the suitability of the eastern section surveyed (denoted as F1-F5 in Figure 3) for the potential provision of offsets for both the Brigalow TEC and the Ornamental snake. The area featured a significant presence of large, diverse gilgai, necessary for sustaining the population of Ornamental snake. However, this area contained limited regrowth *A. harpophylla* in the non-remnant area. Whilst the eastern section of the Investigation Area does show promise as suitable habitat for the Ornamental Snake, there was limited habitat for Brigalow TEC. Hence, this area was discounted as a suitable offset area for co-location of Ornamental Snake and Brigalow offsets.

The furthest western section surveyed in October 2023, denoted by A6-A11 in Figure **3**, was considered to contain a lesser abundance of suitable *A. harpophylla* recruitment compared with A2-A4 and F6-F9. In these areas, habitat suitability for *A. harpophylla* was considerably better, with greater recruitment and canopy dominance. This area was also considered to have larger and more diverse gilgai. This area

comprises 109.3 ha and based on habitat values for both the Ornamental Snake and Brigalow TEC, is considered the preferred option as a Proposed Offset Area (refer to Figure **3** and Figure 7).

**Table 9 Field Verified Vegetation Communities and Habitat Values**

| Assessment Unit | Description and habitat values | Image |
|---|---|---|
| AU 1 – Low regrowth brigalow with recruitment species synonymous with RE 11.4.9 | Previously cleared paddock with low (to 2m) regrowth with a cover between 10 and 60%, usually around 20%. *Acacia harpophylla* dominates the regrowth with other commonly occurring species such as *Terminalia oblongata, Carissa ovata, Atalaya hemiglauca, Santalum acuminatum, Capparis anomala, Capparis lasiantha, Citrus glauca* and *Eremophila spp.* The ground layer is dense and often dominated by exotic grasses such as *Cenchrus ciliaris** and *Urochloa mosambicensis**. In areas dominated by native species the most abundant native grass is *Bothriochloa decipiens.* Other native ground layer species include *Aristida spp., Sporobolus spp., Enneapogon spp., Dichanthium sericeum, Chloris truncata, Parsonsia lanceolata, Portulaca australis, Sida cunninghamii, Clematicissus opaca.*<br><br>Gilgais are common throughout this Assessment Unit and typical species surrounding gilgais include *Oryza australiensis, Eragrostis tenellula, Brachyachne convergens, Cyperus exaltatus,* and *Marsilea drummondi.*<br><br>This Assessment Unit typically occurs on clay plains, with cracking clay soils and regular gilgais of varying sizes and depths. Provides foraging and shelter habitat for the Ornamental Snake. Shelter habitat in the cracking clay soils and foraging habitat around the gilgais where prey species occur.<br><br>The species composition observed suggests that, with suitable management practices, this area will transition back to remnant RE 11.4.9. Regional Ecosystem 11.4.9, described as "*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains" is strongly associated with Brigalow TEC (DOE, 2013). |  |
| AU 2 – High regrowth brigalow with species synonymous with RE 11.4.9 | Low open forest to low woodland dominated by *A. harpophylla* with associated species such as *Terminalia oblongata, Casuarina cristata, Flindersia dissosperma, Atalaya hemiglauca, Lysiphyllum spp.* and *Santalum acuminatum.* A sparse shrub layer is present with mixed native species including *A. harpophylla, Carissa ovata, and Terminalia oblongata*. The ground layer is mid-dense and is typically dominated by non-native pastural grasses such as *Cenchrus ciliaris** and *Urochloa mosambicensis**. Native species occurring in the ground layer include various forbs and grasses such as *Bothriochloa decipiens. Aristida spp., Sporobolus spp., Enneapogon spp., Achyranthes aspera, Chloris truncata, Parsonsia lanceolata, Portulaca australis, Sida cunninghamii,* and *Alternanthera nana.*<br><br>Gilgais are common throughout this Assessment Unit, typical species surrounding gilgais include *Oryza australiensis, Eragrostis tenellula, Brachyachne convergens, Cyperus exaltatus,* and *Marsilea drummondi.*<br><br>This Assessment Unit typically occurs on clay plains, with cracking clay soils and regular gilgais of varying sizes and depths. Provides foraging and shelter habitat for the Ornamental Snake. Shelter habitat in the cracking clay soils, large woody debris and leaf litter and foraging habitat around the gilgais where prey species occur.<br><br>Regional Ecosystem 11.4.9, described as "*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains" is strongly associated with Brigalow TEC (DOE, 2013). |  |




# Figure 7: Assessment Units and Habitat Quality Plots

0 200 400 m

Scale @ A3: 1:7000
Date: 23/04/2024
Job: J0053.3
Drawn: Isaac Witten

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DATA SOURCE: QSPATIAL 2022; The State of Queensland (Department of Resources) 2022; Esri, DigitalGlobe, GeoEye, i-cubed, USDA FSA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community, DATSIP

- Denham Park
- DCDB
- Easement
- Rail

**Assessment Units**

- Assessment Unit 1: Cleared paddock / Regrowth 11.4.9
- Assessment Unit 2: Remnant 11.4.9
- HQAPs (October 2023)
- HQAPs (February 2024)

**Historic Ornamental Snake Sightings**

- Ornamental Snake (WildNet)
- Ornamental Snake (EMM) (2022)
- Ornamental Snake Sighting (October 2023)
- Ornamental Snake Sighting (February 2024)

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### 4.2.2 Habitat Quality Assessment Plot Results

Two (2) AUs were confirmed throughout the Investigation Area and the Proposed Offset Area. During the October and February survey events, 21 HQAPs were established in the Investigation Area and eight in the Proposed Offset Area (Figure 3 and Table 10). The number of HQAPs was in accordance with the Guide and to provide insight into which area within the Investigation Area is most suited to deliver the best conservation outcome for the Ornamental Snake and Brigalow TEC.

**Table 10 Number of HQAPs per Assessment Unit**

| AU | Benchmark RE | Within Investigation Area | Within Proposed Offset Area |
|---|---|---|---|
| 1 | 11.4.9 (regrowth) | 13 | 4 |
| 2 | 11.4.9 (remnant) | 8 | 4 |

The field data recorded at each of the HQAPs was used to determine a baseline site condition score. The data was then compared against BioCondition benchmarks for the corresponding REs within the AUs to give a site condition score. Site context was calculated post field surveys using a combination of GIS analysis and field data. These scores were then converted into a score out of 10 using the methodology outlined in the Guide and as outlined in section 3.3.2.

The averaged habitat quality scores (HQS) for each AU within the Proposed Offset Area are displayed in Table 11. A full account of the HQS is provided in Appendix B. As the AU are not all equally sized, they must be area-weighted in order to gather a HQS for the entire Proposed Offset Area see Table 11 and Table 12. The final area weighted habitat quality score for the Proposed Offset Area is 5.7 (rounded to a six) for the Ornamental Snake and 3.7 (rounded to a four) for Brigalow TEC.

**Table 11 Habitat Quality Scores Within the Proposed Offset Area for the Ornamental Snake**

| Final habitat quality score (weighted) | AU1 | AU2 | Average/Final |
|---|---|---|---|
| Site Condition (out of 3) | 1.48 | 1.82 | |
| Site Context (out of 3) | 0.82 | 1.73 | |
| Species Stocking Rate (out of 4) | 3 | 3 | |
| Habitat Quality Score (unweighted) | 5.3 | 6.5 | |
| AU Area (ha) | 79.91 ha | 29.37 ha | |
| Total Proposed Offset Area (ha) | 109.3 ha | | |
| Size weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | **3.88** | **1.76** | **5.64 (6)** |

**Table 12 Habitat Quality Scores Within the Proposed Offset Area for Brigalow TEC**

| Final habitat quality score (weighted) | AU1 | AU2 | Average/Final |
|---|---|---|---|
| Site Condition | 2.81 | 4.17 | |
| Site Context | 0.20 | 1.45 | |
| Habitat Quality Score (unweighted) | 3.0 | 5.6 | |
| AU Area (ha) | 79.91 | 29.37 | |
| Total Proposed Offset Area (ha)[1] | 109.3 ha | | |
| Size weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | **2.20** | **1.51** | ***3.71 (4)*** |

### 4.2.3 Spotlighting

The below sections for the Ornamental Snake surveys are split into the two survey periods, in October 2023 and February 2024, to delineate locations and timing of observations, considering seasonal and climatic variance between the surveys and their significance on the species. Ornamental snake sightings for both surveys are shown in Figure **4**.

#### 4.2.3.1 October 2023

A total of two (2) Ornamental Snakes were observed in approximately 30 hours of spotlighting within remnant RE 11.4.9 and previously cleared paddocks that comprise regrowth 11.4.9.

One (1) Ornamental Snake was observed on the first night of spotlighting on the western section of the Investigation Area (see Figure 3). Whilst there were less Gilgais on the southern portion of the section surveyed on the first night compared to the northern portion, the Ornamental Snake was observed in the southern part of the surveyed remnant RE 11.4.9, within cracking clay soils in a dry.

The second night of spotlighting focused on the regrowth RE 11.4.9 to the west of the previous nights survey. One (1) Ornamental Snake was observed within proximity of several large and diverse but dry gilgai. This sighting is within the Proposed Offset Area.

The third and fourth night of spotlighting focused on a similar location, slightly east of the previous night. However, no Ornamental Snakes were observed during this survey.

#### 4.2.3.2 February 2024

A total of four (4) Ornamental Snakes were observed in approximately 32 hours of person hours of spotlighting within remnant and regrowth RE 11.4.9.

[1] The required offset area is 76.76 ha. However, this will be co-located within the 109.3 ha offset area for the Ornamental Snake.

A total of three (3) Ornamental Snakes were observed on the first night of spotlighting in the eastern section of the Investigation Area (see Figure 4). Of these, one (1) was identified within remnant RE 11.4.9, in a mostly dry gilgai, whilst two (2) were identified during searches of the regrowth 11.4.9. The Ornamental Snake individual identified within the patch of remnant RE 11.4.9 was observed on the predominantly dry bed of a gilgai, atop cracking clay soils with ample cracks to be used as potential habitat. The other two (2) identified Ornamental Snakes were observed in an area of low regrowth brigalow, mapped as non-remnant.

The second night focused on the western section of the Investigation Area, to the south of the first days spotlight location in the October 2023 surveys. Diurnal surveys revealed diverse gilgai amongst the previously cleared paddocks with regrowth brigalow. The remnant RE 11.4.9 contained several dry gilgai depressions, as well as wet gilgai, where numerous frog species were observed, including the prey species Ornate burrowing frog (*Platyplectrum ornatum*), New Holland frog (*Cyclorana novaehollandiae*), Striped burrowing frog (*Cyclorana alboguttata*) and the Australian Green-tree frog (*Litoria caerulea*).

The third night focused on the same location as the previous night, given the large inundated gilgai and the considerable presence of prey species observed and heard during the previous days diurnal and spotlighting surveys. A focal point of the spotlighting was a large, inundated gilgai in the regrowth brigalow, where one (1) Ornamental Snake was observed sheltering in the cracking clay soil in close proximity to the gilgai. An abundance of prey species could be observed and heard in proximity to the location of this snake.

### 4.2.4 Weed Species (Flora)

A total of 16 non-native species were recorded during the HQAPs within the Investigation Area of which, three (3), *Harrisia martini, Opuntia tomentosa,* and *Parthenium hysterophorus* are considered 'restricted matter' under the Queensland *Biosecurity Act 2014* of which all three (3), are also identified as a Weed of National Significance (WONS). A full list of weed species is included in Appendix C.

### 4.2.5 Pest Species (Fauna)

A total of six (6) pest fauna species were detected from a combination of direct observations (i.e., physically observed) and indirect (i.e., tracks observed) methods. Four (4) of these are listed as 'restricted matter' under the *Biosecurity Act 2014.* Details of all pest species detected during surveys are shown in Table 13.

**Table 13 Introduced Fauna Species Observed**

| Scientific Name | Common Name | Method of Detection | *Biosecurity Act 2014* |
|---|---|---|---|
| *Bos taurus* | Domestic cow | Observed | |
| *Canis lupus* | Dog | Scats and tracks | Category 3, 4, 6 |
| *Felis catus* | Cat | Observed | Category 3, 4, 6 |
| *Sus scrofa* | Feral pig | Observed, scats, diggings | Category 3 ,4, 6 |
| *Oryctolagus cuniculus* | Rabbit | Observed, scats | Category 3 ,4, 5 and 6 |
| *Rhinella marina* | Cane toads | Observed | |

# 5.0 Summary

A comprehensive program, involving both desktop analysis and fieldwork, was implemented to assess the habitat quality of the Denham Park property. Two (2) survey events have been undertaken by suitably qualified ecologists in October 2023, and February 2024 to assess the on-ground (field verified) vegetation communities and the ability of the vegetation communities to provide offsets for the Ornamental Snake (*D. maculata*) and Brigalow (*A. harpophylla* dominant and co-dominant) Threatened Ecological Community (Brigalow TEC).

Multiple records of the Ornamental Snake within and surrounding the Denham Park property (see Figure 4) were identified during desktop assessment. Previous surveys by BASE in February 2022 observed the species in regrowth 11.4.9, and non-remnant Brigalow, in close proximity to gilgai depressions (BASE, 2022). Desktop assessment of the Investigation Area also found considerable areas of remnant and regrowth RE 11.4.9 which is strongly associated with the Brigalow TEC (DOE, 2013).

Two field surveys to determine the suitability of vegetation communities to provide offsets for the Ornamental Snake and Brigalow TEC were conducted in October 2023 and February 2024. These surveys identified the potential for low regrowth and remnant brigalow (RE 11.4.9) to provide habitat for the Ornamental Snake and Brigalow TEC. Further, it is considered that with suitable management practices, regrowth RE 11.4.9 will successfully transition back to remnant RE 11.4.9.

Spotlighting was conducted across the October 2023 and February 2024 survey periods, targeting the Ornamental Snake. A total of two (2) Ornamental Snakes were observed in the October survey within the western section of the Investigation Area, whilst a total of four (4) Ornamental Snakes were observed within remnant and regrowth RE 11.4.9, on both eastern and western sections of the Investigation Area during the February 2024 survey. An abundance of prey species were observed around a large, inundated gilgai within the western section of the offset area.

# 6.0 References

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**Appendix A**

# Species Habitat Indices/Rationale

## Quality and availability of foraging habitat

| Indicator | Description | | | Score |
|---|---|---|---|---|
| Presence, abundance and variety of gilgai | 5<br>Sparse, isolated gilgai with minimal surrounding deep cracking soil or no gilgai present | 20<br>Multiple gilgai present within assessment unit with some variety of depth and size. Deep cracking soil present. | 40<br>Abundant connected gilgai with a variety of size and depth. | **40** |
| Vegetation Structure | 1<br>Cleared paddocks dominated by exotic grass species. | 7<br>Regrowth vegetation with some areas of leaf litter and woody debris. | 15<br>Remnant or advanced regrowth with abundant areas of deep leaf litter, course woody debris and native tussock grasses. | **15** |
| Total | | | | **55** |

The species appears to be is a habitat specialist with few records occurring outside of gilgai and cracking clay habitats. This species is most commonly found in vegetation communities that occur on Cainozoic clay plains, with REs 11.4.3, 11.4.6, 11.4.8 and 11.4.9 representing the most common Regional Ecosystems in which this species has been recorded (DCCEEW, 2024). This species has also been recorded on REs 11.3.3 and 11.5.16 (DCCEEW, 2024), as well as RE 11.9.5 and non-remnant vegetation where gilgai are prevalent (Marston pers comms). The capacity of soils within gilgai systems to form deep cracks and retain ponded areas following rainfall, appears to be the main criteria for the distribution and preferential selection of gilgai habitats by the species (Veary, Veary, Burgess, & Fell, 2011).

The diet of this species consists predominately of frogs and particularly frogs of the Cyclorana genus (TSSC, 2016). The prey species of Ornamental Snake are associated with gilgai, cracking clay soils and ephemeral water bodies. As an example, a high abundance of snakes at a site near Nebo was observed to coincide with an abundance of young frogs emerging from an ephemeral pool (DCCEEW, 2024).

The quality of gilgai habitat will be assessed during field surveys and will be determined by assessing the presence, abundance and variety of gilgai habitat within an assessment unit. Gilgai presence will require consultation of current and historic aerial photographic imagery and walking areas of the assessment unit with apparent gilgai formations. This indicator will be measured qualitatively based on the combination of size, depth, bank angle and vegetation structure of gilgai within the assessment unit. Assessment units that show no indication of gilgai and cracking soils and are not on land zone 4 (with an exemption for gilgai formations on land zone 9) will not be considered suitable habitat for the species.

## Quality and availability of habitat required for shelter and breeding.

| Indicator | Description | | | Score |
|---|---|---|---|---|
| Presence, abundance and variety of gilgai | 0<br>Sparse, isolated gilgai with minimal surrounding deep cracking soil. | 5<br>Multiple gilgai present within assessment unit with some variety of depth and size. Deep cracking soil present. | 10<br>Abundant connected gilgai with a variety of size and depth. Abundant areas of deep cracking soil. | **10** |
| Presence of ground timber, deep leaf litter and tussock grass | 0<br>Sparse tussock grass and coarse woody debris | 3<br>Abundant tussock grass and coarse woody debris particularly adjacent or close to gilgai | 5<br>Abundant tussock grass and coarse woody debris particularly adjacent or close to gilgai | **5** |
| Total | | | | **15** |

The species is known to seek refuge during dry periods in deep cracking clay associated with gilgai habitat (DCCEEW, 2024). The species is not known to leave gilgai habitat for breeding purposes. The presence and abundance of gilgai habitat within an assessment unit is the most important characteristic of quality and availability of habitat required for shelter and breeding. While the habitat conducive to the species is likely to be governed by underlying soil, in periods of extreme rainfall the species has been observed utilising the dense cover of tussock grasses for diurnal shelter (Veary, Veary, Burgess, & Fell, 2011). The species is also thought to shelter in logs and under course woody debris and ground litter (DCCEEW, 2024).

Both of these indicators will be determined during field survey assessments through habitat quality plots and visual qualitative assessments.

## Quality and availability of habitat required for mobility.

| Indicator | Description | | | Score |
|---|---|---|---|---|
| Presence, abundance and variety of gilgai | 1<br>Sparse, isolated gilgai with minimal surrounding deep cracking soil. | 5<br>Multiple gilgai present within assessment unit with some variety of depth and size. Deep cracking soil present. | 10<br>Abundant connected gilgai with a variety of size and depth. Abundant areas of deep cracking soil. | **10** |
| Patch size | 1<br>No adjacent suitable habitat. Habitat patch <10 Ha. | 3<br>Some adjacent suitable habitat. Habitat patch >10 Ha. | 5<br>Significant adjacent suitable habitat. Habitat patch >20 Ha. | **5** |
| Total | | | | **15** |

A study conducted in Central Queensland in 2009 found that the species is primarily restricted to gilgai habitat and does not move in or out of adjacent habitats during seasonal variation of (Veary, Veary, Burgess, & Fell, 2011). Therefore, the abundance, variety and connectivity of gilgai habitat within an assessment unit is a vital aspect of habitat quality required for mobility. Sites where the species have been recorded in abundance are also in habitat patches that are typically greater than 10 hectares in area and are within or connected, to larger areas of remnant vegetation (DCCEEW, 2024).

## Absence of threats

| Indicator | Description | | | Score |
|---|---|---|---|---|
| Potential for habitat loss or fragmentation | 1<br>Habitat within the assessment unit is located in an area that is likely to be degraded for infrastructure of agriculture. | 3<br>Habitat within the assessment unit is located in an area that will be potentially degraded. | 5<br>Habitat within the assessment unit not likely to be degraded. | **5** |
| Presence and abundance of livestock or feral pigs | 1<br>Livestock or pigs abundant with obvious ground compaction and over grazing in gilgai habitat. | 3<br>Livestock or pigs abundant with obvious ground compaction and over grazing in gilgai habitat. | 5<br>Livestock or pigs not present | **5** |
| Presence and abundance of Cane Toads | 1<br>Cane toads present throughout habitat. Toad tadpoles present in standing water | 3<br>Occasional mature cane toads observed. | 5<br>No Cane Toads observed. | **5** |
| Total | | | | **15** |

The Approved Conservation Advice for the species (TSSC, 2016) lists the main threat identified to the Ornamental Snake is a continued legacy of past broadscale land clearing and habitat degradation. As the species appears to reside at shallow depths within the soil profile, any process which disturbs the land form of gilgai habitats such as clearing, ploughing or the development of access tracks has the potential to significantly impact the species (Veary, Veary, Burgess, & Fell, 2011). The species is highly susceptible to the impacts of cattle grazing during periods when gilgai support water as cattle access can significantly alter the structure and integrity of gilgai form and function (Veary, Veary, Burgess, & Fell, 2011). The destruction of wetland habitats by feral pigs is also likely a threat (TSSC, 2016). The species has been observed to persist in areas where Cane Toads are present, however the species is susceptible to the Cane Toad toxin and death is highly likely if a Cane Toad is bitten or consumed (Veary, Veary, Burgess, & Fell, 2011). The risk habitat loss, fragmentation and degradation will be determined by assessing the state and federal status of the vegetation which defines an assessment unit. Threatened regional ecosystems (state) and threatened ecological communities (Commonwealth) have a greater level of legislative protection and hence the likelihood of that patch being cleared is reduced. There are numerous factors that can contribute to the degree of risk that an assessment unit might be cleared, such as;

- the vegetation within the assessment unit is on freehold land and is listed as Category X (non remnant vegetation) or Category B (remnant vegetation),
- the assessment unit is located under an existing PMAV,
- the assessment unit is located on a mining lease or within an infrastructure corridor.,

- the assessment unit is protected under an approved offset management plan and tenure arrangement.

This indicator will be determined through desktop analysis of relevant local, State and Commonwealth databases.

The presence and abundance of cattle, feral pigs and Cane Toads will be estimated by indicators such as direct observation, scats and tracks during field surveys.

**Appendix B**

# Habitat Quality Data

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | benchmar | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | 100 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | 2 | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Native plant species richness - shrubs | 5 | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | 5 | 4 | 80% | 2.5 | 4 | 80% | 2.5 | 11 | 220% | 5 | 5 | 100% | 5 | 127% | 3.75 |
| Native plant species richness - forbes | 10 | 1 | 10% | 0 | 4 | 40% | 2.5 | 6 | 60% | 2.5 | 5 | 50% | 2.5 | 37% | 1.875 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | 10 | | 0% | | | 0% | | | 0% | | | 0% | | 0% | |
| Tree canopy height subcanopy | 6 | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | 25 | | 0% | | | 0% | | | 0% | | | 0% | | 0% | |
| Tree canopy cover subcanopy | 11 | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Shrub canopy cover | 5 | 17.1 | 342% | 3 | 10.6 | 212% | 3 | 19.5 | 390% | 3 | 57 | 1140% | 3 | 315% | 3 |
| Native grass cover | 16 | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | 45 | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | 47 | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | 980 | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | 0 | 40 | | 3 | 75 | | 0 | 30 | | 3 | 35 | | 3 | | 2.25 |
| Quality and availability of food and foraging habitat | | 41 | | 41 | 21 | | 21 | 21 | | 21 | 41 | | 41 | | 31 |
| Quality and availability of shelter | | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 82.5 | | | 54 | | | 59.5 | | | 80.5 | | 69.125 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **1.77** | | | **1.16** | | | **1.28** | | | **1.73** | | **1.48** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Threats to the species | | | | 10 | | | 5 | | | 5 | | | 10 | | 6.666667 |
| Species mobility capacity | | | | 5 | | | 5 | | | 5 | | | 5 | | 5 |
| Site Context Score | | | | 17 | | | 10 | | | 14 | | | 19 | | 13.66667 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.02** | | | **0.60** | | | **0.84** | | | **1.14** | | **0.82** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | benchmar | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | 100 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | 2 | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 275% | 5 |
| Native plant species richness - shrubs | 5 | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 80% | 5 |
| Native plant species richness - grasses | 5 | 2 | 40% | 2.5 | 2 | 40% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 80% | 3.75 |
| Native plant species richness - forbes | 10 | 2 | 20% | 0 | 4 | 40% | 2.5 | 7 | 70% | 2.5 | 7 | 70% | 2.5 | 55% | 1.875 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | 10 | 4.5 | 45% | | 4.5 | 45% | | 11.5 | 115% | | 8.5 | 85% | | 54% | |
| Tree canopy height subcanopy | 6 | | 0% | 0 | | 0% | 0 | 4 | 67% | 5 | 3 | 50% | 3 | 0% | 2 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | 25 | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 155% | |
| Tree canopy cover subcanopy | 11 | | 0% | 5 | | 0% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 33% | 3.75 |
| Shrub canopy cover | 5 | 0.6 | 12% | 3 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 37% | 5 |
| Native grass cover | 16 | 0.6 | 4% | 0 | | 0% | 0 | 29 | 181% | 5 | 28 | 175% | 5 | 28% | 3.333333 |
| Organic litter | 45 | 2.6 | 6% | 0 | 3.8 | 8% | 0 | 2 | 4% | 0 | 6 | 13% | 3 | 20% | 1 |
| Large trees (euc plus non-euc) | 47 | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 0% | 1.666667 |
| Coarse woody debris | 980 | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 17% | 2.333333 |
| Non-native plant cover | 0 | 35 | | 3 | 35 | | 3 | 55 | | 0 | 25 | | 3 | | 2 |
| Quality and availability of food and foraging habitat | | 47 | | 47 | 47 | | 47 | 27 | | 27 | 27 | | 27 | | 33.66667 |
| Quality and availability of shelter | | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.666667 |
| Site Condition Score | | | | 86.5 | | | 90 | | | 85.5 | | | 83.5 | | 85.04167 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **1.85** | | | **1.93** | | | **1.83** | | | **1.79** | | **1.82** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | | | | 5 | | | 6 | | | 9 | | | 9 | | 7.25 |
| Site Context Score | | | | 27 | | | 28 | | | 30 | | | 30 | | 28.75 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.62** | | | **1.68** | | | **1.80** | | | **1.80** | | **1.73** |

| Species Stocking Rate (SSR) | | | | | | | Site Scores |
|---|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | | 5 | | 10 | 10 |
| | | No | | Yes - adjacent | | Yes - on site | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | | 5 | 10 | 15 | 15 |
| | | Not habitat | | Dispersal | Foraging | Breeding | breeding |
| Role/importance of species population on site* | Score | 0 | | 5 | | 10 | 15 | 5 |
| | (Total | 0 | | 5 - 15 | 20 - 35 | | 40 - 45 | |
| Total SRR score (out of 70) | | | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | | | 3 | | | |

| *SSR Supplementary Table | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| Final habitat quality score (weighted) | AU1 | AU2 | Total |
|---|---|---|---|
| Site Condition score (out of 3) | 1.48 | 1.82 | 1.65 |
| Site Context Score (out of 3) | 0.82 | 1.73 | 1.27 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *5.3* | *6.5* | *5.9* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***3.88*** | ***1.76*** | ***5.64*** |

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | benchmar | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 4 | 80% | 2.5 | 4 | 80% | 2.5 | 11 | 220% | 5 | 5 | 100% | 5 | 127% | 3.75 |
| Native plant species richness - forbes | **10** | 1 | 10% | 0 | 4 | 40% | 2.5 | 6 | 60% | 2.5 | 5 | 50% | 2.5 | 37% | 1.875 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | | 0% | | | 0% | | | 0% | | | 0% | | 0% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | | 0% | | | 0% | | | 0% | | | 0% | | 0% | |
| Tree canopy cover subcanopy | **11** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Shrub canopy cover | **5** | 17.1 | 342% | 3 | 10.6 | 212% | 3 | 19.5 | 390% | 3 | 57 | 1140% | 3 | 315% | 3 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 40 | | 3 | 75 | | 0 | 30 | | 3 | 35 | | 3 | | 2.25 |
| Quality and availability of food and foraging habitat | | | | | | | | | | | | | | | |
| Quality and availability of shelter | | | | | | | | | | | | | | | |
| Site Condition Score | | | | 28.5 | | | 27 | | | 30.5 | | | 26.5 | | 28.125 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 3** | | | | **2.85** | | | **2.70** | | | **3.05** | | | **2.65** | | **2.81** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Threats to the species | | | | | | | | | | | | | | | |
| Species mobility capacity | | | | | | | | | | | | | | | |
| Site Context Score | | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 3** | | | | **0.20** | | | **0.00** | | | **0.40** | | | **0.40** | | **0.20** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score | benchmar | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | 100 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | 2 | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | 5 | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | 5 | 2 | 40% | 2.5 | 2 | 40% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 80% | 3.75 |
| Native plant species richness - forbes | 10 | 2 | 20% | 0 | 4 | 40% | 2.5 | 7 | 70% | 2.5 | 7 | 70% | 2.5 | 50% | 1.875 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | 10 | 4.5 | 45% | | 4.5 | 45% | | 11.5 | 115% | | 8.5 | 85% | | 73% | |
| Tree canopy height subcanopy | 6 | | 0% | 0 | | 0% | 0 | 4 | 67% | 5 | 3 | 50% | 3 | 29% | 2 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | 25 | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | 11 | | 0% | 5 | | 0% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 82% | 3.75 |
| Shrub canopy cover | 5 | 0.6 | 12% | 3 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 137% | 5 |
| Native grass cover | 16 | 0.6 | 4% | 0 | | 0% | 0 | 29 | 181% | 5 | 28 | 175% | 5 | 90% | 3.333333 |
| Organic litter | 45 | 2.6 | 6% | 0 | 3.8 | 8% | 0 | 2 | 4% | 0 | 6 | 13% | 3 | 8% | 1 |
| Large trees (euc plus non-euc) | 47 | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.666667 |
| Coarse woody debris | 980 | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.333333 |
| Non-native plant cover | 0 | 35 | | 3 | 35 | | 3 | 55 | | 0 | 25 | | 3 | | 2 |
| Quality and availability of food and foraging habitat | | | | | | | | | | | | | | | |
| Quality and availability of shelter | | | | | | | | | | | | | | | |
| Site Condition Score | | | | 28.5 | | | 30 | | | 50.5 | | | 48.5 | | 41.70833 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 3** | | | | **2.85** | | | **3.00** | | | **5.05** | | | **4.85** | | **4.17** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | | | | | | | | | | | | | | | |
| Species mobility capacity | | | | | | | | | | | | | | | |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 3** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| Final habitat quality score (weighted) | AU1 | AU2 | Average/Final |
|---|---|---|---|
| Site Condition score | 2.81 | 4.17 | 3.49 |
| Site Context Score | 0.20 | 1.45 | 0.83 |
| Habitat Quality score (out of 10) | *3.0* | *5.6* | 4.32 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***2.20*** | ***1.51*** | ***3.71*** |

**Appendix C**

# Weed Species List

| Botanical Name | Common Name | Legislation |
|---|---|---|
| *Bothriochloa pertusa* | Indian couch | |
| *Cenchrus ciliaris* | buffel grass | |
| *Chloris inflata* | purpletop chloris | |
| *Chloris virgata* | feathertop rhodes grass | |
| *Gomphrena celosioides* | gomphrena weed | |
| *Harrisia martinii* | harrisia cactus | WONS and Restricted Matter category 3 |
| *Malvastrum americanum* | malvastrum | |
| *Melinis repens* | red natal grass | |
| *Opuntia tomentosa* | velvet tree pear | WONS and Restricted Matter category 3 |
| *Parthenium hysterophorus* | parthenium | WONS and Restricted Matter category 3 |
| *Portulaca oleracea* | portulaca | |
| *Sida acuta* | common wireweed | |
| *Sida cordifolia* | flannelweed | |
| *Sida spinosa* | spiny sida | |
| *Stylosanthes scabra* | stylo | |
| *Urochloa mosambicensis* | sabi grass | |

**Appendix B**

# Suitably Qualified Ecologist CVs

# Dr Craig Streatfeild

Principal Environmental Scientist

**Training/Qualifications:**

Erosion and Sediment Control IECA recognised training course, 2017

Lead Auditor- Integrated Management Systems: Quality, Environmental Management and Health and Safety, 2016

Post-doctoral Research Fellow, Miami University, Ohio, USA, 2004-2008 – Behavioural Ecology, Habitat Utilisation and Behavioural Genetics of Prairie Voles.

Doctor of Philosophy, (Ecology) Queensland University of Technology, 2009 – Population Biology, Habitat Utilisation and Population Genetics of the Giant White-tailed Rat

Bachelor of Science (1st Class Hons) (Environmental Science and Ecology), Griffith University, QLD, 2000 – Population Biology and Space Use of the Giant Barred Frog and Great Barred Frog.

Dr Craig Streatfeild is a Principal Environmental Scientist with over 20 years' experience in providing leadership and technical expertise in environmental impact assessments, environmental legislation, permitting and approvals, preparation of environmental management plans and environmental management, monitoring, compliance, fauna and flora assessments and mitigating impacts to fauna. Craig has been trained in quality, environmental management and health and safety systems auditing, erosion and sediment control and conflict resolution.

Although vertebrate population ecology (primarily for amphibians and small mammals/rodents), habitat utilisation and habitat fragmentation is Craig's initial area of expertise where he has extensive research experience with endangered species, particularly frogs and small mammal species, Craig has in recent years focused on delivering infrastructure, resource and development projects from early planning inception to final construction delivery including environmental impact assessments statements (EIA and EIS), post EIA/EIS tier 2 approvals, environmental offsets, environmental management plans and environmental compliance and ongoing compliance monitoring. Craig is also heavily involved in government liaison including negotiating approvals conditions, approval exemptions as well as project management, project development and delivery, coordination and management of multidisciplinary environmental impact assessments and monitoring programs and post EIA/EIS project approval processes.

Craig has extensive experience with environmental and biodiversity offsets and environmental approvals and permitting and has a strong understanding of the permitting requirements associated with a range of industries through his role as Environmental and Approvals Manager for the Rookwood Weir Project (Sunwater), Environmental Team Lead for the Road Relocations Design Phase of the Traveston Dam Project, Environmental Team Lead for the Goonyella to Abbott Point Rail Project, Environmental Approvals Advisor for various components of the QCLNG Project Stages, Project Manager for over 30 EIAs including strategic approvals pathway advice. These projects also required liaising with numerous stakeholders (such as design teams, client representatives and local, state and commonwealth government agencies) and preparing and maintaining approvals and compliance management registers.

Craig has also undertaken numerous environmental assessments primarily ecological and fauna related but also for soils, surface water and sediment and groundwater.

BASE/

**RECENT PROJECT EXPERIENCE**

**Fitzroy to Gladstone Pipeline (FGP)**. The FGP is being delivered by the Gladstone Area Water Board (GAWB) and includes the design and construction of a 116 km long pipeline. Craig's involvement is providing approval and environmental support as part of the project team. Key tasks include reviewing and providing technical input into third party development applications, ecological assessment reports, preparing offsets documentation and liaising with a range of stakeholders including Federal and State Government agencies.

**Rookwood Weir Environmental Approvals and Compliance**. Environmental and approvals manager for the project. Initial works including a detailed GAP analysis and approvals and compliance matrices that assessed all required approvals including exemptions. Works involved managing and coordinating the development of all tier 2 approvals as well as authoring and/or providing technical reviews for a range of key secondary approvals associated with the Water Act, Vegetation Management Act, Environmental Protection Act, Nature Conservation Act, Fisheries Act and Local Government Planning Schemes.

Craig also managed and coordinated the development of compliance documentation to address EIS approval conditions and liaised with State and Commonwealth government departments in relation to amending current EIS approval conditions including biodiversity offsets and preparing EIS change reports for the Coordinator General. Craig was also heavily involved in preparing a detailed and strategic overarching offsets strategy that incorporated terrestrial, water quality and aquatic offsets and preparation of Offset Delivery Plans.

**Private Landowner Species Management Plans and Offset Management Plan.** Prepared and managed the species management plan (Cth), species management program (State) and offset management plan (Cth) to address an expansion of the current high-value agricultural practices as required by Commonwealth approval requirements for a range of EVNT species.

**Stanmore Coal Offset Management Plans and Offset strategies.** Prepared and managed species management plans (Cth), species management programs (State) and offset management plans (Cth) to address both State and Commonwealth approval conditions for a range of projects and EVNT species.

**Tier 2 approvals for private developments.** Prepared and managed the approval process for a range of tier 2 approvals for several private developments in and around Hervey Bay.

**Confidential Industrial Land Investigation for a Queensland State Government Department.** Reviewed and provided input into the required approvals associated with the project.

**Confidential Impact Assessment Investigation for a Privately-Owned Quarry.** Undertook detailed assessment for the presence of the Endangered Giant Barred Frog and habitat assessments for the species as part of presumed illegal disturbances.

**Confidential Infrastructure Corridor for Investigation for a Queensland State Government Department.** Technical review of the advice documentation, including likely approvals for a multi-user linear infrastructure corridor for the co-location of water, power and rail.

**Abbot Point Strategic Port Land Use Planning and Statutory Approvals**. Technical review of the post EIS approvals required including operational works applications and the requisite assessments required to support approval documentation.

**Metro Mining Bauxite Hills Bauxite EIS**. Projected managed and co-authored the EIS for submission to Queensland's EHP and the Commonwealth's DoEE for a bauxite mining operation in north Queensland. Works involved assessing and addressing impacts to a range of environmental factors as well as determining the scope of the post EIS approvals that were likely to be required. The project also

involved submission of an EPBC referral to the DoEE for both marine and terrestrial MNES and the development of an overarching environmental offsets advice statement.

**Metro Mining Skardon River Bauxite Project**. Authored and reviewed management plans as required by the project's approvals conditions including the overarching environmental management plan and an offsets delivery plan advice statement.

**Shandong Energy Hillalong Coal Mine EIS.** EIS and management plans lead author and project manager for the project that involved an open cut and underground mine, haul road and train load out facility. Responsibilities also included Government liaison with both State and Commonwealth Departments and identification of post EIS tier 2 approvals and likely management plans.

**Metro Mining Bauxite Hill Bauxite Mine Site Specific Environmentally Relevant Activity Impact Assessment**. Project Managed and co-authored the environmental assessment and management plans which involved submission to EHP of a Site-Specific EA application for a bauxite mining operation in north Queensland. EHP subsequently decided that an EIS was required for this project.

**Bandanna Energy's EIA Projects**. Lead author, EIS coordinator and project manager for the Springsure Creek Coal Mine project that involved several Site-Specific EAs, an EIS under the *Environmental Protection Act 1994* and a Commonwealth EIS. Works also involved assessment of likely post EIS approvals and management plans associated with a water offtake pipeline.

**Adani T0 Abbot Point Port Expansion.** This project involved a Commonwealth EIS for the development of a new port berth at the existing Abbot Point in north Queensland. Craig was the lead technical reviewer of several technical reports and associate chapters including marine ecology, terrestrial ecology and coastal processes.

**MetroCoal Bundi EIS Project**. Lead author, EIS coordinator and project manager for the Bundi Underground Coal Mine project. Part of Craig's involvement also included submission of an EPBC referral to the then SEWPaC and advice on the likely post EIS approvals and management plan required.

**QCLNG Project**. Approvals and environmental team lead for the consultant engaged by the principal contractor involved in delivering the Narrows component of the gas export pipeline. The role involved coordination of permits and approvals downstream of the EIS and EA, coordination of environmental issues including relating to the preparation of environmental management plans, preparation of environmental approvals and liaison with assessment officers within various state government agencies.

**CoalConnect Northern Missing Link Rail Project**. This project involved connecting the current Goonyella and Newlands rail lines and upgrading the existing Newlands to Abbot Point section. Craig's involvement initially included ecological environmental assessments and which later progressed the Environmental Team Leader for the design phase of the project This entailed coordinating all environmental related issues including undertaking environmental assessments, technically reviewing environmental assessment reports under QRs EPPM process (PEPAs, EPSs, EMPs, DRs), preparation of environmental approvals and liaison with QR's environmental and approvals managers and assessment officers within various state government agencies.

**Road infrastructure for the Traveston Crossing Dam, Queensland**. This multifaceted project involved the upgrade, realignment and construction of numerous roads that would be inundated during Stage 1 of the dam. Craig was lead author for two several REFs and management plans as well as numerous approvals/permits under Queensland State Legislation.

**EMPLOYMENT HISTORY**

AUGUST 2018 TO PRESENT – SECONDMENT TO SUNWATER – Environment and Approvals Manager for the Rookwood Weir.

AUGUST 2017 TO AUGUST 2018 – SECONDMENT TO GAWB – Environment and Approvals Manager for the Rookwood Weir.

JUNE 2017 TO CURRENT – BASE CONSULTING GROUP PTY LTD, BRISBANE – Principal Environmental Scientist.

MAY 2011 TO MAY 2017 – CDM SMITH AUSTRALIA PTY LTD, BRISBANE – Associate Environmental Scientist in the Environment and Approvals Team.

MAY 2007 TO MAY 2011 – KELLOGG BROWN & ROOT PTY LTD, BRISBANE – Senior Environmental Scientist in the Environment, Planning and Water Resources Group.

2004 TO 2007 – MIAMI UNIVERSITY, OXFORD, OHIO, USA – Postdoctoral Reserch Fellow.

# Mr Andrew Craig

Senior Ecologist

**Training/Qualifications:**

Bachelor of Science , University of Queensland 1997

BAM accredited (NSW) Assessor Number BAAS19022

Apply/Senior First Aid and CPR

RIIVEH (201B) Operation of light Vehicle

Standard 11 Generic Coal Induction

AHCBIO201 Insoect and clean machinery for plant,animal and soil material.

**Specialisation**

Ecological surveys (Terrestrial and aquatic environments.

EVNT flora and fauna survey and monitoring for linear, residential and port infrastructure projects.

**Years in industry**

20

Andrew is a senior ecologist with over 20 years of practical experience in the areas of flora and fauna surveys throughout New South Wales, Queensland, and the Northern Territory. Andrew's main area of expertise is the identification and classification of flora and fauna and the management of threatened species and communities as listed under the *Environment Protection and Biodiversity Conservation Act 1999, Nature Conservation Act 1992* and *Vegetation Management Act 1999.*

Andrew has significant experience in some of New South Wales, and Queensland's largest infrastructure projects including coordinating geotechnical surveys for rail, power and gas projects, on-ground flora assessments and development of weed and vegetation management and rehabilitation strategies.

**Relevant Projects**

- FFJV Inland Rail (Northstar to Border) vegetation assessment for Borrow pit areas. Surveys required identifying vegetation types in proposed borrow pit areas and assessing using the NSW BAM assessment and reporting methodology.
- FFJV Inland Rail Geotechnical clearances and Protected Plant surveys. Surveys required identifying potential EVNT flora species that may occur within the proposed alignment and assessing geotechnical test locations for the presence/absence of identified flora species
- Flora and fauna surveys at three (3) proposed mine sites within the Emerald region. Surveys included identification of EPBC listed threatened ecological communities, identification of state and federal EVNT flora and fauna species and assistance in establishment of fauna trapping and flora monitoring programs.
- Establishment and monitoring of EVNT translocation program for *Masdenia coronata* within the Springfield development area. This project involved the development of translocation methodology in conjunction with nursery staff, identification and marking of in-situ plants of *Marsdenia coronata* prior to translocation, development of salvage requirements in conjunction with nursery staff and the pre- and post-translocation health monitoring of transplanted individuals within the recipient site at Mardenia Lookout Springfield.
- Ecological Assessment Report and Protected Plant survey for future road widening in Gutchy creek area within the Gympie region for DTMR. Surveys identified the presence of *Samadera bidwillii* within the proposed works footprint resulting in submissions to relevant state and federal departments.

BASE/

# Project Experience

## July 2019 to present

### Base Consulting Group

### Senior Ecologist

Vegetation clearances for geotechnical surveys for Adani rail feasibility investigations.

Determination of vegetation values for state offsets within Bowen region.

EVNT Flora and fauna surveys and waterway assessments for 1200km linear infrastructure project within northern Queensland.

Ecological assessment reports and Biodiversity and Offset management plans for Stanmore Coal Pty Ltd

Bird and bat management plans, vegetation assessment and ecological assessment reports for proposed windfarm in northern Queensland.

## October 2018 to July 2019

### Aurecon Australasia Pty Ltd, Brisbane, Australia

### Senior Ecologist

FFJV Inland Rail Geotechnical clearances and Protected Plant surveys. Surveys required identifying potential EVNT flora species that may occur within the proposed alignment and assessing geotechnical test locations for the presence/absence of identified flora species

FFJV Inland Rail (Northstar to Border) vegetation assessment for Borrow pit areas. Surveys required identifying vegetation types in proposed borrow pit areas and assessing using the NSW BAM assessment and reporting.

Firebreak ecology field survey and reporting at Abbott Point Coal terminal Bowen. Survey involved the identification of vegetation within the proposed firebreak and determining clearing requirements for its construction.

Protected Plant Surveys, Ecological Assessment Reports and Rehabilitation Plans for NBN towers throughout South-east Queensland.

Ecological Assessment Report and Protected Plant survey for future road widening in Gympie region for DTMR.

Ecological Assessment Report for SunCoast Power Project as part of a Ministerial Infrastructure Designation Amendment.

## July 2010 to October 2018

### Saunders Havill Group

### Senior Ecologist

Vegetation clearances for geotechnical surveys for Adani rail feasibility investigations.

Vegetation clearances for geotechnical surveys for Alpha coal mine.

Field assessment for EPBC referrals and Offset reports.

Nature Conservation Act protected plant surveys throughout Queensland.

Monitoring of EVNT translocation programs for *Masdenia coronata* and *Melaleuca irbyana* within the Springfield and Ipswich Regional Council areas.

Ecological equivalence assessments for biodiversity offsets.

Flora and fauna surveys along 270km of natural gas pipeline including mapping of EVNT species, weed distribution and verification of Regional Ecosystem mapping.

Flora and fauna surveys at three (3) proposed mine sites within the Emerald region. Surveys included identification of EPBC listed threatened ecological communities, identification of EVNT flora species and assistance in establishment of fauna trapping and monitoring.

Collection of flora field data utilising the Queensland Herbarium, “Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland”.

Field survey and report preparation of Property Maps of Assessable Vegetation (PMAV’s) for a number of development sites throughout Queensland.

Field survey and preparation of EVNT flora translocation plans including site survey, GPS mapping of populations and reporting and monitoring.

Preparation of extensive weed management plans for development and quarry sites in southern and central Queensland. Weed management plans included weed identification, comprehensive mapping of weed polygons, weed control strategies and reporting and monitoring.

Preparation of Quarry Rehabilitation Plans for sand and hard rock quarries in central and southern Queensland. Rehabilitation plans included site survey, soil amelioration methodologies, species requirements and spacing and monitoring and reporting.

Basic and comprehensive ecological assessment reports for development and ULDA site. Ecological assessments included identification of flora species, mapping of remnant and regrowth vegetation, wetland survey, weed identification and site ecological constraints analysis.

Preparation of code responses for vegetation clearing permits and koala SPRP reports including determination of offset requirements.

National, State and Local environmental searches including ‘environmentally sensitive areas’ mapping, regional ecosystem mapping, referable wetlands mapping, geological and soils searches, EPBC Protected Matters and Wildnet searches.

## July 2007 to July 2010

### Australian Farm Forestry Pty Ltd

### General Manager

Coordination and management of over 35 staff including field and nursery staff.

The overseeing of the production of over 500,000 plants in the Australian Farm Forestry nursery facilities in 2009. Plants were utilised for revegetation/rehabilitation projects and forestry and carbon off-set plantations.

Preparation of Environmental Rehabilitation Plans, Environmental Management Plans, EVR Management Plans, Quality Management Policy and Procedures and OH&S Policy and Procedures.

Monitoring of cash flow, wages, time in motion studies and budgets for all nursery, revegetation, rehabilitation and forestry projects.

Ensuring all environmental works including rehabilitation and revegetation works comply with all local, state and federal legislation.


# PAUL FOX

## *DIRECTOR and PRINCIPAL ECOLOGIST*

*B.Sc App (Env) – Hons*

*Paul is an experienced environmental scientist / fauna ecologist. Paul is the sole director of Fox & Co Environmental, with over twenty-three years' experience working within professional environmental consulting firms. His key skills include survey design and implementation, project management, desktop and ecological assessments (terrestrial and aquatic), targeted threatened species surveys and environmental impact surveys and assessment.*

*Paul has undertaken extensive environmental survey work across Northern Australia and Papua New Guinea. Surveys and subsequent environmental assessment reports include targeted threatened species surveys and Significant Residual Impact Assessment (SRIA) and Significant Impact Assessment (SIA) for Matters of State Environmental Significance (MSES) and Matters of National Environmental Significance (MNES).*

## QUALIFICATIONS + ACCREDITATIONS

- Bachelor of Science (Applied Environmental Science) Hons, University of Queensland
- DES Spotter / Catcher Permit (WA0017386)
- Scientific Purposes Permit (SPP) (WA0017792)
- General Fisheries Permit (208323)
- Animal Ethics Permit (CA 2019/06/1283)
- Scientific User (SUR001583)
- Vaccination for Lyssavirus
- Senior First Aid and CPR
- Venomous Snake Handling Course, ERMQ
- Industry Safety Induction (ISI)
- S11 – Certificate of Attainment (11/3/21)
- Defensive Driver Certification (RIIVE201D, TLIC1051)

## MEMBERSHIPS

- Environment Institute of Australia and New Zealand
- Ecological Society of Australia
- Australasian Bat Society

## WORK HISTORY

**Fox & Co Environmental** | Director and Principal Ecologist *(2019 - present)*
**O2 Marine** | Director *(2013 - 2021)*
**Premise** (same company as O2 following mergers, acquisitions and rebrand) | Environment Manager and Principal Ecologist *(2016 - 2019)*
**02 Ecology** | Managing Director *(2011 - 2016)*
**GHD** | Environmental Manager / Senior Ecologist *(2007 - 2011)*
**GHD** | Environmental Scientist / Ecologist *(2001 - 2007)*

## PROJECT EXPERIENCE

- Expert witness for ecological impacts to herpetofauna from daming an arid zone ephemeral creek, Mt Isa, Qld
- Targeted EVNT surveys including Plains Death Adder (*Acanthophis hawkei* – EPBC Act/NC Act – Vulnerable) and Gouldian Finch (*Erythrura gouldiae* - EPBC Act/NC Act – Endangered) in the Northern Territory of gas exploration projects (2011 – present)

## PROJECT EXPERIENCE (cont.)

- Project Manager and lead ecologist for 200km NT Link gas pipeline in western Qld (from Mt Isa to Qld / NT border). Targeted assessments for Plains Death Adder (*Acanthophis hawkei* – EPBC Act/NC Act – Vulnerable)
- Cu-string (Mt Isa – Townsville) threatened species habitat verification (ongoing)
- Project Manager, lead ecologist and author for seasonal targeted reptile and mammal surveys (including feral animal surveys) on numerous Sunshine Coast Council Environmental Reserves (Kirbys Road (Obi Obi), Racemosa (Landsborough), Doonan Creek, (Verrierdale), Triunia (Woombye) and Kawana Bushland Reserve. Each reserve was surveyed seasonally for 5 days/4 nights.
- Project manager and lead ecologist for the Department of Transport and Main Roads (DTMR) Toowoomba Second Range Crossing (TSRC) specialist fauna surveys
- Targeted threatened species surveys for TSRC, DTMR
- Translocation Management Plan for *Delma torquata*, TSRC, DTMR
- Post-wet season fauna surveys for proposed mine site for Chalco Bauxite Project. Based in the Chalco compound in Aurukun, Paul lead the terrestrial fauna surveys in close collaboration with the terrestrial flora and social impact assessment studies.
- Post-wet season fauna surveys for proposed port, Chalco Bauxite Project. Based from the Chalco compound in Aurukun and from Weipa, Paul lead the terrestrial fauna surveys for a proposed port facility.
- Dry season fauna surveys. Paul lead the terrestrial dry season fauna surveys for the proposed mine and port facilities. Paul and the team worked closely with the Traditional Owners (TO's) and built upon the solid rapport developed during previous surveys.
- Project manager, lead ecologist and lead author for the Forest Wind Farm Project, Wide Bay, Queensland. Paul undertook all the surveys since 2016 (ongoing) and prepared the reports and impact assessment for the State MCU approval and EPBC referral. The project has currently received State Approval. Conducted over 300 (Bird Utilisation Surveys (BUS)).
- Significant Impact Assessment (SIA) for MNES for Forest Wind Farm Project
- Forest Wind Transmission Line Ecology Assessments and associated reporting, including SRIA on MSES/MNES. Surveys also included collection of water samples for e-DNA analysis for threatened fish, reptile and amphibian species.
- Bird and Bat Utilisation Report and Management Plan, Forest Wind
- Wambo wind farm – targeted avifauna surveys (BUS)
- Wambo wind farm, targeted *Nyctophilus corbeni* (south-eastern long-eared bat) surveys
- Hughenden Wind Farm, targeted bird and bat surveys (BUS). Peer review of project Bird & Bat Management Plan
- Dalby Solar Farm, targeted koala and *N.corbeni* (south-eastern long-eared bat) surveys and impact assessment
- XRE Solar Farm. Flora and Fauna surveys, including targeted EVNT surveys. SRIA for MSES / MNES and supporting reports
- Glenden Wind Farm fauna survey
- Glenalpine Wind Farm fauna survey
- Mt View Wind Farm fauna survey
- Environmental Management Plan (EMP) and Land Clearing Permit (LCP) for EP187 exploration program in the Northern Territory (NT), Imperial Oil & Gas (IOG)
- Sandy Creek waterway realignment, reporting and subsequent 2 year post-construction assessment, Saunders Havill Group (ongoing)
- Fishway passage assessment of rubber baffle effectiveness, Bowen, BRC (2 years – ongoing)
- Coolum Pipeline Project. Acid frog assessments. 2 – year program. Commenced 2021 – ongoing.
- Seasonal fauna survey, Peak Down Mines Expansion Project
- Threatened Species and Weed Surveys, Arnhem Land, NT, IOG (2013 – present)
- Weed Management Plans and yearly weed surveys, Northern Territory (ongoing)
- Gouldian finch habitat mapping, ground-truthing and impact assessment, EP187, EP167, EP168, Northern Territory, IOG (2020 – present)
- Weed Management Plans, EP187, EP167, EP168, IOG
- Environmental Assessment Surveys and Reports, EP184, EP187, EP167, EP168, NT, IOG
- Annual offset monitoring (including greater glider and koala), Shell QGC Offset (Valkyrie) (2021 – ongoing)
- Cooroy Creek low-flow fish passage post-construction monitoring (2-years of monitoring), WM Projects
- Imbil mapped (low-risk) waterway assessment, Aquaintel
- Aquatic ecology assessment & fish passage options for mapped waterways on Pacific View Estate (PVE), Goldcoast
- Ecological (terrestrial flora and fauna) surveys and reporting, including protected plant survey, waterway assessments, bird & bat management plan, Crossroads Energy Hub, Western Downs area (ongoing)
- Pre-construction weed surveys and weed management plan, Western Downs Solar Farm
- Threatened species surveys, marine plant surveys, MSES assessment, Glendale Road Reserve, Russell Island
- Ecology scouting surveys and assessments for wells, access and gathering, Western Downs, Shell QGC (ongoing).
- Wallum froglet, wallum rocketfrog and koala assessment including SRIA, TSL Family farms
- Fire Ant Management Plan, Mt Lindsay Highway, Hazell Bros
- Protected plant and aquatic assessment, Mountain Creek bypass options, MPE
- Powerful Owl and Greater Glider targeted surveys, Gympie Area, Forest Wind Farm Project
- Targeted Pineapple Zamia surveys, Gympie Area and Wide Bay Military Training Area
- Twin Waters aquatic assessment and Maroochy River seagrass assessment, Saunders Havill Group (for Stocklands)
- *Tenuibranchiurus glypticus* (swamp crayfish) targeted survey, Wide Bay
- Marine Plant survey for proposed sea-wall, Mackay
- Marine Plant survey, sea-wall, Airlie Beach
- Protected plant and terrestrial threatened fauna survey and reporting, Indaba Eco-resort, Hydeaway Bay, Whitsundays
- 4-Mile Creek aquatic assessment, Bowen, Mulgowrie Farming Company
- Whites Road aquatic assessment, Buderim, Halcyon
- Greenbank aquatic fauna salvage, large urban dam, Everleigh, Mirvac
- Groundwater investigation, Northern Territory, IOG

- Environmental Impact Assessment (terrestrial and marine), Lorengau Town Sewerage Project, Papua New Guinea
- Project manager for Carmichael Rail pre-clearance spotter catcher surveys.
- Carmichael Mine terrestrial and aquatic ecology assessment, central Queensland

## PROJECT EXPERIENCE (cont.)

- Project Manager for Waratah Coal Abbot Point to Alpha Rail Project, Addendum EIS flora and BioCondition surveys along the entire proposed rail alignment
- Targeted threatened species surveys (NC Act/EPBC Act) on 9 EPC's in Central Queensland, Vale Exploration
- Environmental Impact Assessment, Nebo, Qld, seasonal terrestrial ecology surveys, ELP
- Environmental Impact Assessment, Fitzroy River, seasonal terrestrial and freshwater aquatic field surveys
- Environmental Impact Assessment, Port Alma, seasonal terrestrial and freshwater aquatic field surveys
- Chinchilla field surveys for proposed 50 km water pipeline
- Sonoma Coal Mine Fauna Survey (including squatter pigeon surveys) (Collinsville), Senior ecologist
- Environmental Impact Assessment, Blaire Athol State Forest, Qld, seasonal terrestrial ecology
- Seasonal Baseline Field Surveys (terrestrial, aquatic and water quality), Arnhem Land, Imperial Oil & Gas
- Nerang Aquatic Assessment, Saunders Havill Group
- Sunshine Coast Airport Expansion Threatened Species Assessment, Marcoola Bund, SCRC
- Sippy Downs Terrestrial Fauna Survey, NCE
- Fauna Impact Assessment, University of the Sunshine Coast (USC)
- Bunker Road Aquatic Assessment, Victoria Point, Brisbane Land Developments
- *T. glypticus* (swamp crayfish) Assessment, Noosa Golf Club
- Baseline Weed and Threatened Species Surveys, McArthur River, NT, IOG
- Andromache River Bridge Upgrade, Approvals Assessment, Whitsunday Regional Council
- Greenbank (Everleigh) Aquatic Fauna Assessment, Saunders Havill Group
- Springfield Aquatic Fauna Assessment, Saunders Havill Group
- Waterlea Dam De-watering Fauna Management Plan, Walloon, RBG
- Project Manager for Gympie Koala Mapping Project, Gympie Regional Council (GRC)
- Project Manager for Gympie Koala Conservation Plan, GRC
- Project Manager, Gympie Threatened Species Prioritisation and Mapping Project
- Project Manager and lead ecologist for Coolum, Yandina Road EVNT surveys, DTMR
- Species Management Program (SMP) for *Crinia tinnula*, DTMR
- Targeted wallum froglet, koala and tusked frog surveys for Dr Pages Rd Project, Noosa Council
- Valdora Fauna Management Plan and pre-clearance surveys, NuVue
- Aquatic fauna salvage plan and fauna management plan, Flagstone, Saunders Havill Group
- Cooroy to Curra (Stage D), targeted threatened species surveys, DTMR
- Vegetation health monitoring and ecosystem function analysis (EFA), Savannah and Copernicus Mines (Kimberley), Panoramic Resources
- Threatened fauna (koala and black-breasted button quail (BBBQ)) pre-clearance survey, Warrego Highway, Toowoomba Range, DTMR
- Wallum froglet, koala and BBBQ survey, Lenthalls Dam, Maryborough, Ergon Energy
- Targeted Wallum Froglet Survey, Hervey Bay, Ergon Energy
- Targeted Wallum Froglet Surveys, Burpengary, MSC
- Pre-clearance threatened fauna survey, Coolum, O'Leary Pipe & Civil
- Environmental Impact Assessment, Pilbara, Western Australia, terrestrial seasonal field surveys
- Environmental Impact Assessment, Cape York, seasonal terrestrial and freshwater aquatic field surveys (including feral animal surveys)
- Seasonal Baseline Field Surveys, McArthur River, Northern Territory, Armour Energy
- Preclearance Surveys, The Narrows, Gladstone (Water mouse)
- Department of Environment and Resource Management (DERM), Numerous koala surveys on the Sunshine Coast
- Warrego Highway Review of Environmental Factors, DTMR, Senior ecologist
- Southern Access Corridor Black-throated Finch (BTF) and threatened fauna survey, Townsville, DTMR, Senior ecologist
- Bedarra Island Fauna Survey, Senior ecologist
- Cooroy to Curra Review of Environmental Factors survey, DTMR, Senior ecologist (previous employment)
- Environmental Management Plans, South West Queensland, Ergon Energy, Senior ecologist
- Weed and threatened species surveys, Ergon Energy, Warwick, Stanthorpe, Qld
- Landsborough seasonal fauna survey and targeted acid frog assessments, SCRC
- Burrum River Natural Bypass Fishway, Project Manager, Wide Bay Water Corporation (WBWC)
- Environmental Management Plans (EMP) for Powerline Corridors, Project Manager, Ergon Energy
- Community Infrastructure Designation Projects, Project Manager, Ergon Energy
- Contaminated Land Assessments, Stage 1 Site Contamination Assessments, Project Manager, Ergon Energy
- Project Manager, Coastal Biodiversity Mapping Assessment, Fraser Coast Regional Council (FCRC)
- Project Manager, Habitat and Biodiversity Individual Planning Study, FCRC
- Great Sandy Biosphere Links Project, Project Manager, Fauna Flora International (FFI) / Burnett Mary Regional Group (BMRG)
- Environmental site audits for Grahams Creek rail crossing, Queensland Rail
- Agnes Waters Erosion Prone Area Assessment, 1770 Group

**Appendix C**

# Impact Area Ecological Assessment Report

BHP

# South Walker Creek Mulgrave Resource Access: Stage 2C (MRA2C)

## EPBC 2017-7957

# Appendix E:
# Ecological Impact Study

# Mulgrave Stage 2C Ecological Impact Study

## Assessment of Matters of National Environmental Significance

Prepared for
**BHP**

19 July 2018

## DOCUMENT TRACKING

| Item | Detail |
|---|---|
| Project Name | Mulgrave Stage 2C Ecological Impact Study / MRA2C Preliminary Documentation |
| Project Number | 2251 / 8852 |
| Project Manager | Liz Fisher<br>(07) 3503 7194<br>471 Adelaide St, Brisbane QLD 4000 |
| Prepared by | Loren Appleby, Renee Whitchurch, Jessie McCudden & Liz Fisher |
| Reviewed by | Ailsa Kerswell & Tom Kaveney |
| Approved by | Ailsa Kerswell |
| Status | FINAL |
| Last saved on | 19 July 2018 |
| Cover photo | Carborough Creek, ELA 2016 |

This report should be cited as 'Eco Logical Australia 2018. *Mulgrave Stage 2C Ecological Impact Study*. Prepared for BHP.'



Template 29/9/2015

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# Abbreviations

| Abbreviation | Description |
|---|---|
| BMC | BHP Billiton Mitsui Coal |
| DoEE | Commonwealth Department of the Environment and Energy |
| EA | Environmental Authority |
| ELA | Eco Logical Australia Pty Ltd |
| EPBC | *Environment Protection and Biodiversity Conservation Act 1999 (Clth)* |
| ERE | Endangered Regional Ecosystems |

| Abbreviation | Description |
|---|---|
| ESA | Environmentally Sensitive Area |
| GIS | Geographic Information System |
| GPS | Geographical positioning system |
| ML | Mining Lease |
| MNES | Matters of National Environmental Significance |
| MRA | Mulgrave Resource Access |
| RE | Regional Ecosystem |
| REDD | Regional Ecosystem Description Database |
| SWC | South Walker Creek |
| TEC | Threatened Ecological Community |
| VM Act | *Vegetation Management Act 1999* |

# Executive summary

South Walker Creek (SWC) Mine is a BHP Billiton Mitsui Coal (BMC) owned and operated open cut coal mine located in the Northern Bowen Basin subregion of Central Queensland. To allow for continued development of the coal resource, the Mulgrave Pit located in the north-central portion of the mine's operational land has been identified as requiring further progression. Referred to as MRA Stage 2C (Project), the project will encompass approximately 1,279 ha of land disturbance, which includes disturbance associated with diversion of about 8km of Walker Creek, progressive mining of the Mulgrave coal resource, and associated works.

Matters of National Environmental Significance (MNES) protected under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) have been previously identified in ecological studies across the project disturbance footprint. This included:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (TEC)
- One threatened flora species – Black Ironbox (*Eucalyptus raveretiana*)
- Four threatened fauna species – South-eastern Long-eared Bat (*Nyctophilus corbeni*); Koala (*Phascolarctos cinereus*), Ornamental Snake (*Denisonia maculata*) and Squatter Pigeon (*Geophaps scripta scripta*)

Current database searches confirmed the potential presence of these MNES values as well as an additional three threatened species and ten migratory species. Recently de-listed MNES values previously identified were also confirmed in the current database results.

Based on additional field validation surveys, the following MNES values or associated habitat were confirmed within the project disturbance footprint of MRA Stage 2C:

- Brigalow TEC
- Black Ironbox
- Habitat for Koala, Ornamental Snake, Greater Glider (*Petauroides volans*) and Squatter Pigeon

Further analysis identified critical habitat for the Brigalow TEC, as well as critical habitat and an important population of Ornamental Snake within the MRA Stage 2C disturbance footprint. The determination of critical habitat for the Brigalow TEC is attributed to the extent of area that the study area provides for the endangered ecological community. For the Ornamental Snake, the presence of high value habitat within the disturbance footprint and nearby confirmed records determined both critical habitat and an important population of the species.

Koala and Greater Glider were both confirmed to be present within the study area during field assessments in 2018. The presence of these species and the types of habitat present (including high density tree hollows), suggests the study area supports important populations and habitat critical to the survival of both species.

The occurrence of Black Ironbox and Squatter Pigeon were not determined to be part of an important population as larger habitat areas with the ability of supporting a source population occur outside of the disturbance footprint and within the surrounding region. Habitat for these species within the project disturbance footprint was also not determined to be critical due to the availability of higher quality habitat in the surrounding area and therefore the ability of the species to still persist in the surrounding region. No species were considered to be near the limit of their range.

The level of dependency that Black Ironbox has on groundwater sources at SWC Mine is also not considered to be high. The interaction with groundwater is likely to be intermittent, seasonally and situationally dependent at best. Due to the lower level of reliance on groundwater, the severity of threat of potential groundwater drawdown is considered to be low.

Based on these determinations and/or potential disturbance limits associated with the project, significant impacts were assessed to be likely for Brigalow TEC, Ornamental Snake, Koala and Greater Glider. The implementation of mitigation measures will limit the severity and magnitude of significant impacts; however residual impacts will remain significant. Significant residual impacts associated with MRA Stage 2C are:

- Clearing of Brigalow TEC – 32.7 ha
- Ornamental Snake habitat clearing– 33.7 ha
- Koala habitat clearing – 212.2 ha
- Greater Glider habitat clearing – 149.3 ha

In accordance with the EPBC Act, the residual significant impacts for these MNES values will be offset as per the EPBC Act Environmental Offset Policy.

# 1 Introduction

## 1.1 Project Background

South Walker Creek (SWC) Mine is a BMC operated open cut coal mine located in the Northern Bowen Basin subregion of Central Queensland, approximately 125 km south-west of Mackay within the Isaac Regional Council Local Government Area (herein referred to as the Project Area) (**Figure 1**).

The mining activities at SWC operate under Environmental Authority (EA) MIN100552107, and are conducted on Mining Lease (ML) 4750 across five active pits. The Mulgrave Pit is located in the north-central portion of the mine's operational land and has been identified in the mid-long term mine planning process as requiring further progression to allow for continued development of the coal resource.

An earlier progression project extending 778 ha from the western boundary of the Mulgrave Pit (MRA Stage 2A) has previously been referred to the Department of the Environment and Energy (DoEE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral process (EPBC 2014/7272). The proposed action was decided to be a "controlled action" in 2014, with relevant controlling provisions relating to listed threatened species and communities (sections 18 & 18A). The proposed action was assessed and approved with conditions under the EPBC Act on 16 January 2015.

The current progression project, referred to as MRA Stage 2C, will encompass 1,279 ha of land disturbance within the total study area of 1,775.8 ha. The MRA2C Project Area overlaps the approved MRA2A (2014/7272) Project Area by approximately 98 ha.

Much of the MRA2C area has been previously disturbed by grazing activities; however the proposed activity will require clearing of some previously undisturbed vegetation and the diversion of Walker Creek, which currently traverses through the Project Area.

This ecological impact assessment has been prepared to identify and quantify likely impacts to ecologically related MNES within the MRA Stage 2C 'study area' **(Figure 1**).

### 1.1.1 EPBC Act process to date

The project was referred to the Department of the Environment and Energy (DoEE) in June 2017 and was determined to be a controlled action (EPBC2017/7957). The controlling provisions were listed as threatened species (section 18 and 18A) and protection of water resources (i.e. 'the water trigger' section 24D and 24E).

Further assessment via Preliminary Documentation (PD) is required and DoEE has provided a list of additional information requirements that should be addressed in the PD. Relevant to this report, are a number of threatened species, as well as potential groundwater dependent ecosystems (GDEs).

## 1.2 Objectives and Scope of Works

The objective of this assessment is to identify and quantify potential impacts associated with the project on ecological values, specifically MNES protected under the EPBC Act. The assessment includes both desktop and existing information previously reported for the area as well as additional field verified data.

Scope of works specific to this objective include:

- Reviewing and confirming the suitability of previous ecological studies in determining the presence of MNES values within the study area

- Confirming the type and extent of vegetation communities and habitats within the study area
- Validating the habitat values, particularly in relation to supporting previously identified threatened species as well as species recently listed under the EPBC Act
- Assessing the condition and extent of Threatened Ecological Communities (TECs) that have been reported as occurring within the study area
- Collecting population data on previously identified threatened flora species
- Undertaking targeted threatened species assessments for a number of species highlighted by DoEE as being potentially impacted by the project
- Evaluating potential presence of Groundwater Dependent Ecosystems (GDEs) and associated ecological values
- Determining the likelihood of significant impacts to MNES
- Providing avoidance, mitigation and management strategies to reduce the severity and magnitude of potential impacts
- Evaluating significant residual impacts and developing an environmental offsets strategy that will sufficiently compensate for the impacts

## 1.3 Study Area

The study area includes both the project and surrounding adjacent areas and is located within the southern portion of ML 4750 (granted in 1978) and a small area in the northern portion of ML70131 (granted in 1996) (**Figure 1**). The study area encompasses approximately 1,775.8 ha of land and is divided into three areas – a northern, central and southern area. The central area is the largest component of the study area and is bounded by the existing Mulgrave pit and haul road to the north and east, Central Pit to the south-east, Carborough Creek to the north-west and the mine lease boundary to the west. The northern area is surrounded by a current grazing lease and the southern area is bounded by the north by Walker Creek, to the east by rail and to the south and west by operational mining land. The study area falls within Surface Areas 1,2,4 and 5 formally described as Lot 7 on SP155252, Lot 2 on SP162563 and Lot 2 on WHS16.

The study area is predominantly vegetated and consists of remnant and regrowth vegetation as well as cleared areas. Walker Creek and associated drainage lines traverse through the central portion the study area. Existing mine site infrastructure within the study area includes powerline easements, easement and exploration access tracks, fugitive emission drainage facility and dragline road.

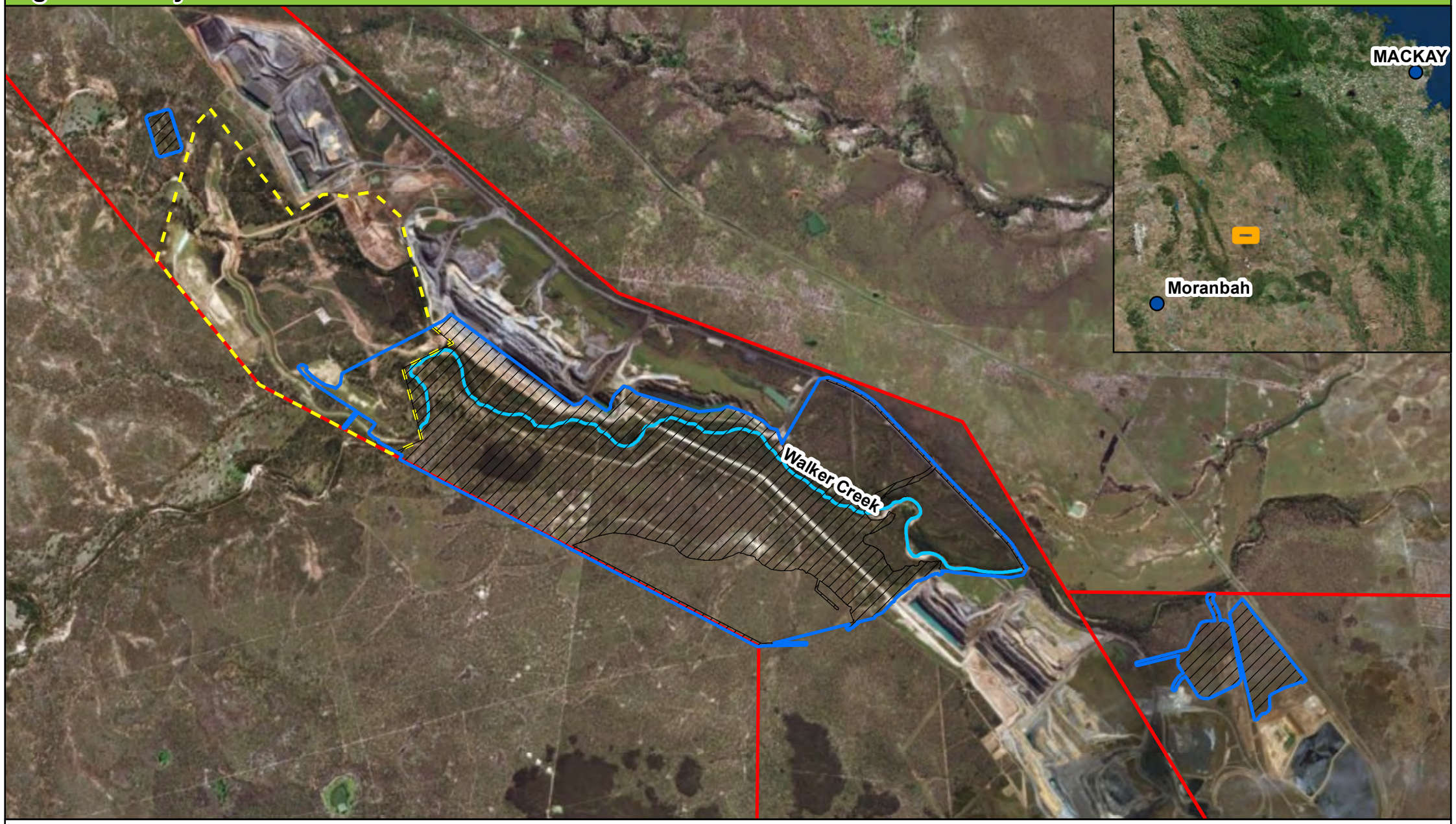
### 1.3.1 Project Disturbance Footprint

The Project will require the disturbance of approximately 1,279 ha of land for mine pit extension, diversion of approximately 8 km of Walker Creek, levee, northern and southern water storage dam development, and associated works (**Figure 1**).

Previously studies have been conducted on the watercourse diversion for Walker Creek, which has resulted in the preferred option of utilising an existing tributary of Walker Creek to divert water flows. The diversion is about 8 km long and has been designed to be a functioning and sustainable diversion that meets regulatory requirements. The creek diversion will connect to Carborough Creek, directly adjacent to the approved and developed MRA Stage 2A diversion and make the new confluence with Walker Creek about 6.4 km downstream from its current confluence. An overland flow bund will be constructed along the south-western length of the diversion channel with associated batter drains to receive overland flow runoff. Levees will be required at sections along the north-eastern length of the diversion channel to retain functionality of the diversion.

The expansion of the Mulgrave pit will involve clearing of vegetation and the continuation of mining activities in the Mulgrave Pit via south-west migration of the existing highwall. Associated mine related infrastructure will disturb vegetation, including for an approximate 2GL water storage dam in the south of the Project Area, and an approximately 0.5GL water storage in the northern.

# Figure 1: Study area and location




**Legend**

- Mining Lease
- Study area
- Impact area
- EPBC approved area (MRA Stage 2A)
- Walker Creek

0 550 1,100 2,200

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

N

eco logical AUSTRALIA

www.ecoaus.com.au

Prepared by: RW Date: 03/05/2018

N:\17BRI\GIS\8852 MRA2C Preliminary Documentation\mxd\Prelim Doc\Fig1 MRA2C Study Area.mxd

# 2 Method

This report has been developed over several iterations between 2016 and 2018 to accommodate the requirement of the EPBC Act assessment and approvals process. It has included a desktop assessment to evaluate available literature and data (e.g. database searches) as well as the review of a number of previous field assessments undertaken within and around the study area. Three field surveys have also been undertaken in 2016, 2017 and 2018 to specifically investigate particular aspects of the ecology of the study area. The methods for both the desktop and field assessments are detailed below.

## 2.1 Desktop Assessment

A desktop assessment and review of previous ecological studies, as well as associated literature, was undertaken to evaluate existing data and identify the presence of information gaps relating to MNES within the study area.

### 2.1.1 Databases

The following databases were reviewed to determine potential MNES values occurring within the study area:

- Protected Matters Search Tool (PMST) Report from a central coordinate of -21.77785, 148.47047 (10 km buffer)[1]
- Wildlife Online Search from a central coordinate of -21.77785, 148.47047 (10 km buffer)
- Protected Plants Flora Survey Trigger Map
- Regional Ecosystem (RE) mapping version 9.0
- Queensland geological digital data, Clermont mapping tile (DNRM, 2012)
- Isaac-Comet land-systems mapping (CSIRO, 1967)
- Essential Habitat mapping
- Referrable Wetland mapping
- Environmentally Sensitive Area (ESA) Map
- *Vegetation Management Act 1999* (VM Act) watercourse data
- Matters of State Environmental Significance mapping
- VM Act wetland data
- GDE Atlas
- Queensland GDE mapping
- Atlas of Living Australia species search

### 2.1.2 Previous Studies

Five previous ecological studies have been conducted within or within close proximity to the study area. These previous ecological studies, including associated mapping and data, were reviewed in order to confirm their suitability in determining the presence of MNES values within the study area. This also included cross-checking results with database results (**Section 2.1.1**). Each previous study and survey effort has been summarised in **Table 2-1**.

[1] A number of PMST searches have been undertaken over the course of the project. The latest was undertaken on 8 May 2018 and provides the most up to date list of threatened and migratory species relevant to the project

**Table 2-1: Summary of Previous Studies**

| Previous Study | Aim | Method & Survey Effort |
|---|---|---|
| Threatened Terrestrial Fauna Species Assessment Report for Mulgrave Pit Expansion Project (Footprints Environmental Consultants, 2013) | The survey focused on determining the presence of EPBC Act or NC Act listed species identified as potential occurrences. | Targeted threatened fauna species surveys were undertaken within the study area during 5th – 14th April and 22nd – 26th April 2013. The survey methods and effort were reported to be in accordance with the Commonwealth threatened species survey guidelines. Survey techniques utilised in the survey included:<br>• Brigalow Scaly-foot – pits & areas searches five pits / three nights<br>• Yakka Skink – area searches, Elliott trapping, three days / three nights<br>• Ornamental Snake – nocturnal area searches (throughout survey period)<br>• Red Goshawk – 80 hrs over 10 days<br>• Squatter Pigeon – 15 hrs of area searches, 10 hours of flushing<br>• Cotton Pygmy-goose – waterbody survey (throughout survey period)<br>• Little Pied Bat – active and passive searches, harp trapping (20 traps), Anabat (six nights, nine locations)<br>• Greater Long-eared Bat – harp trapping (20 traps), Anabat (six nights, nine locations)<br>• Koala – Area searches, spotlighting (throughout survey period) |
| Walker Creek Diversion Biodiversity Assessment Report – Stage 1 (Cardno, 2012a) | Assess biodiversity values within the study area and associated environmental constraints (Commonwealth and State). | The study area incorporated a 100 m wide buffer area either side of the high bank of Walker and Carborough Creeks (totalling 17 km). The assessment included both desktop and a field survey conducted from 14th – 16th March 2012. |
| Walker Creek Diversion Biodiversity Assessment Report – Stage 3 (Cardno, 2012b) | Assess ecological values of terrestrial habitats within mining lease of South Walker Creek Mine (ML 4750) | The assessment included desktop searches and a field survey conducted from 23rd – 28th April 2012, to review terrestrial vegetation communities and the distribution of significant species within the study area.<br>Vegetation communities were recorded in accordance with Neldner *et al* 2012, whilst significant flora recognised as being of conservation significance at the Commonwealth and / or State level were recorded. |
| South Walker Mine Biodiversity Assessment – Bee Creek Section (Cardno, 2012c) | Quantify the presence of Black Ironbox (*Eucalyptus raveretiana*) along a 4.3 km section of Bee Creek | A two day survey (5th – 6th June 2012) along Bee Creek. The survey area extended 100 m either side of the centre line of the creek. The survey was undertaken in order to gain an understanding of potential biodiversity offset |

| Previous Study | Aim | Method & Survey Effort |
|---|---|---|
| | | options should disturbance to Black Ironbox be proposed along Walker Creek (upstream of Bee Creek). |
| Koala Kemmis II (Vital Signs Environmental Services, 2014) | Assess Koala presence and utilisation across the Kemmis II project area (approximately 7.5km north-west of MRA2C) and in surrounding area, including east of Walker Creek within MRA2C study area. | A four day (July 2014), two person field survey adopting the 'Koala Rapid Assessment Methodology' where direct sightings, and indirect evidence e.g. faecal evidence, scratches, were recorded across 30 x 2,000m$^2$ quadrats that represented all vegetation community types within the project area. |

### 2.1.3 Literature Review

Database searches and previous studies informed an assessment of the MNES values likely to occur within the study area. From this list, further information was obtained on each MNES. The literature reviewed included:

- Relevant previous ecological studies listed in **Table 2-1**
- Species Profile and Threats Database (SPRAT), to determine the distribution, habitat requirements, population statistics and ecology of each species identified
- Survey guidelines for Australian's threatened reptiles (for the Ornamental Snake)
- National Koala Conservation Management Strategy 2009-2014
- EPBC Act Referral Guidelines for Vulnerable Koala (2014)
- Commonwealth Conservation Advice and / or Commonwealth Listing Advice, for each threat-listed species identified in the desktop assessment
- Priority Threat Management for Imperilled Species of the Queensland Brigalow Belt (Ornamental Snake, Koala and Squatter Pigeon)
- Species Management Program – Koala. (Transport and Main Roads, Queensland Government, 2015)
- Australian Koala Foundation (AKF) National Koala Tree Planting List (2015)
- Draft Assessing Groundwater-Dependent Ecosystems: IESC Information Guideline Explanatory Note (2018)
- Commonwealth Significant Impact Guidelines (Version 1.1).

## 2.2 Field Survey

Three field surveys were undertaken to develop this report. Each survey was undertaken by two qualified ecologists and included a number of survey techniques. The details of each survey are provided in **Table 2-2**, with details of specific survey elements provided in the sections below. Survey sites are illustrated in **Figure 2 and Figure 3.**

**Table 2-2: Field survey program**

| Field survey & dates | Purpose | Survey techniques |
|---|---|---|
| 2016 – 4 to 8 May | Address information gaps identified in the desktop analysis (incl. updates to threatened species listings) | Flora, TEC and targeted habitat assessments |

| | | |
|---|---|---|
| 2017 – 20 to 21 April | Assess additional impact areas | Flora, TEC and targeted habitat assessments |
| 2018 – 9 to 13 February | Undertaken targeted threatened fauna surveys, particularly for species of interest to DoEE | Targeted threatened fauna species surveys |

### 2.2.1 Flora Assessment

Information gaps identified in the previous studies included no population data on previously recorded threatened flora species and the lack of detailed vegetation mapping with associated condition rating, including TEC status. These gaps were addressed in the flora assessment during the field surveys.

*Targeted Flora Survey*

A targeted flora survey to record individuals of Black Ironbox was undertaken along a 7 km section of Walker Creek in order to determine the extent and density of the species. The search was restricted to the riparian zone of Walker Creek as well as instream bars.

Direct counts of identified Black Ironbox individuals were taken using hand-held GPS units. Fertile material (fruit) was present to confirm the species identification. Accuracy of the GPS units at the time of the survey was noted to be ±5 m.

*Site Condition Assessments*

In accordance with the BioCondition Assessment Manual '*A Condition Assessment Framework for Terrestrial Biodiversity in Queensland'* (Eyre, T.J. *et al* 2015), 25 site condition assessments were conducted across 16 assessment units identified on site. Assessment units were based on ground-truthed vegetation communities within the study area that had associated MNES values.

Site condition assessments involved the collection of the following eight site based attributes within a 100 m x 50 m nested sampling plot:

- Large trees
- Tree canopy height
- Recruitment of dominant canopy species
- Native species richness
- Tree canopy cover
- Native shrub cover
- Course woody debris
- Ground cover (native shrub, grass, forbs, non-native cover and organic litter cover)

*Quaternary surveys*

Quaternary surveys were conducted to validate the extent, classification and condition of ground-truthed vegetation communities and habitat types within the study area, as well as increase spatial coverage of the survey. Quaternary surveys were undertaken in accordance with the '*Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland'* (Nelder *et. al.* 2012). At each survey point, the following information was recorded:

- RE classification
- Vegetation status (remnant, high-value regrowth or non-remnant).

A total of 191 quaternary surveys were conducted across the study area.

*TEC Assessments*

Specific condition assessments were conducted for Brigalow patches to determine whether patches met the thresholds for classification as the TEC, which had not been previously recorded. Assessments were conducted in accordance with condition thresholds outlined within the *Approved Conservation Advice for the Brigalow (dominant or co-dominant) Ecological Community* (DoE, 2013). Thresholds included, species composition of patches (dominance or co-dominance of *Acacia harpophylla*) and species condition including patch size and percentage exotic perennial grass cover.

A total of nine TEC assessments were conducted across the study area.

### 2.2.2 Targeted Habitat Assessments

To further confirm and validate threatened fauna species values within the study area, targeted habitat assessments were conducted for the Squatter Pigeon (*Geophaps scripta scripta*), Koala (*Phascolarctos cinereus*) and Ornamental Snake (*Denisonia maculata*) to quantify the extent of habitat within the study area. Targeted habitat assessments were not conducted for the Greater Glider during the May 2016 survey, as the survey occurred prior to the species listing under the EPBC Act. Targeted Greater Glider habitat assessments were conducted during the April 2017 survey. Habitat assessments were species specific and included identifying the presence of key values such as:

- Habitat condition (i.e. remnant or regrowth)
- Presence of foraging resources (e.g. Koala food trees)
- Presence and proximity to water
- Soil type
- Occurrence of species specific habitat features (deep cracking clays, gilgai, percentage of bare ground and native vegetation cover)
- Species specific threats

For Greater Glider habitat assessments, tree hollow density quadrats (50 x 100 m) were conducted in areas of suitable habitat. Within the quadrat, total number of small (<8 cm), medium (8 to 15 cm) and large (>15 cm) hollows were counted and recorded. Density data was used to map areas of suitable denning habitat.

A total of 24 Squatter Pigeon, 27 Koala, six Ornamental Snake and 32 Greater Glider targeted habitat assessments were conducted. **Appendix A** describes the targeted habitat assessment criteria considered for each species. Species specific habitat attributes targeted during the field survey was from relevant literature for each species (**Section 2.1.3**).

### 2.2.3 Targeted fauna survey

Further field surveys were undertaken in February 2018 to provide additional information for key threatened species that were highlighted by DoEE as having the potential to be impacted by the project. Review of the list of species provided by DoEE in the information request (provided by DoEE to BHP on 25 October 2017) was undertaken and it was deemed necessary to undertake targeted threatened species surveys for Greater Glider and Star Finch (*Neochmia ruficauda*).

*Greater Glider*

Survey Guidelines for Threatened Mammals recommend the following for Greater Glider:

- Spotlighting
    - At least two 200 m transects per 5 ha site within suitable habitat (at least 100 m apart)

    - Repeated over two separate nights
- Stag watch
    - Observe a potential shelter site (hollow) 30 minutes before dusk and 60 minutes after sunset.

For this survey, spotlighting was conducted over four consecutive nights, for a minimum of two hours by two qualified ecologists, equating to a total survey effort of 16 spotlighting hours. Spotlighting transects included a combination of driving and walking. Where suitable habitat was present alongside driving tracks, these areas were driven at slow speed and eye-shine searched for by two ecologists. Walking transects were also conducted within and alongside of Walker Creek. Any eye-shine that was detected was investigated to confirm species. Stag watches were conducted at the beginning of each spotlighting evening (30 minutes before sunset).

*Star Finch*

EPBC Act Survey Guidelines for Threatened Birds (DEWHA 2010) recommends the following survey effort for Star Finch:

- Area searches or transect-point surveys (15 hours over five days)
- Broadcast surveys (15 hours over three days)
- Targeted waterhole surveys (10 hours over four days)

A combination of all survey types was conducted over six days by two qualified ecologists. The site was initially searched for dam sites or any areas of Walker Creek that may be holding water where targeted surveys were conducted either early morning or late evening. Transect surveys were conducted throughout the day within riparian and open woodland habitats. Broadcast surveys were conducted using calls available on the eGuide to The Birds of Australia (Morecombe & Stewart 2014) phone application. Total survey effort for each survey technique equated to the following:

- Transect bird survey – 30.5 hours over six days
- Broadcast surveys – 15.5 hours over five days
- Targeted surveys – 16.5 hours over five days

## 2.3 Data Analysis

### 2.3.1 GIS Analysis

Spatial data collected during the field survey was imported into ArcMap GIS (Version 10.2) and analysed. Where necessary, vegetation community and habitat boundaries were refined using the collected spatial data to produce a final ground-truthed map.

This mapping was then used to undertake a landscape-scale attribute assessment to provide a quantitative assessment of the landscape values of the study area as well as an overall condition score for each assessment unit as per Eyre *et.al.* (2015).

*Landscape-scale Attributes Assessment*

In accordance with the BioCondition Assessment Manual, landscape-scale attributes were assessed within a ‘Fragmented Landscape’. Attributes calculated included:

- Patch Size
- Connectedness
- Context

The spatial layers used to assess the site context attributes were:

- Ground-truthed vegetation mapping of the study area (ELA, 2016 and ELA, 2017)
- Regulated Vegetation Mapping (Version 9.0)

### 2.3.2 BioCondition Scoring

BioCondition scoring was conducted in accordance with Eyre *et. al.* 2015. This involved accumulating the site condition and landscape attributes score and dividing the total against the maximum score for the ecosystem type (i.e. woodland = maximum score of 100) to provide a total BioCondition score.

Benchmark data to complete the comparison value assessment for the site condition assessment was sourced from Queensland Herbarium prepared benchmarks for each assessment unit's ground-truthed RE (or closest RE benchmark within the same Broad Vegetation Group). Where multiple field survey sites were assessed for one assessment unit, site condition scores were averaged.

# Figure 2: Flora survey sites

**Legend**

- Mining Lease
- Study area

**Flora survey sites**

- Quarternary sites
- BioCondition sites
- TEC assessment sites
- Threatened flora sites

0 500 1,000 2,000

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

N

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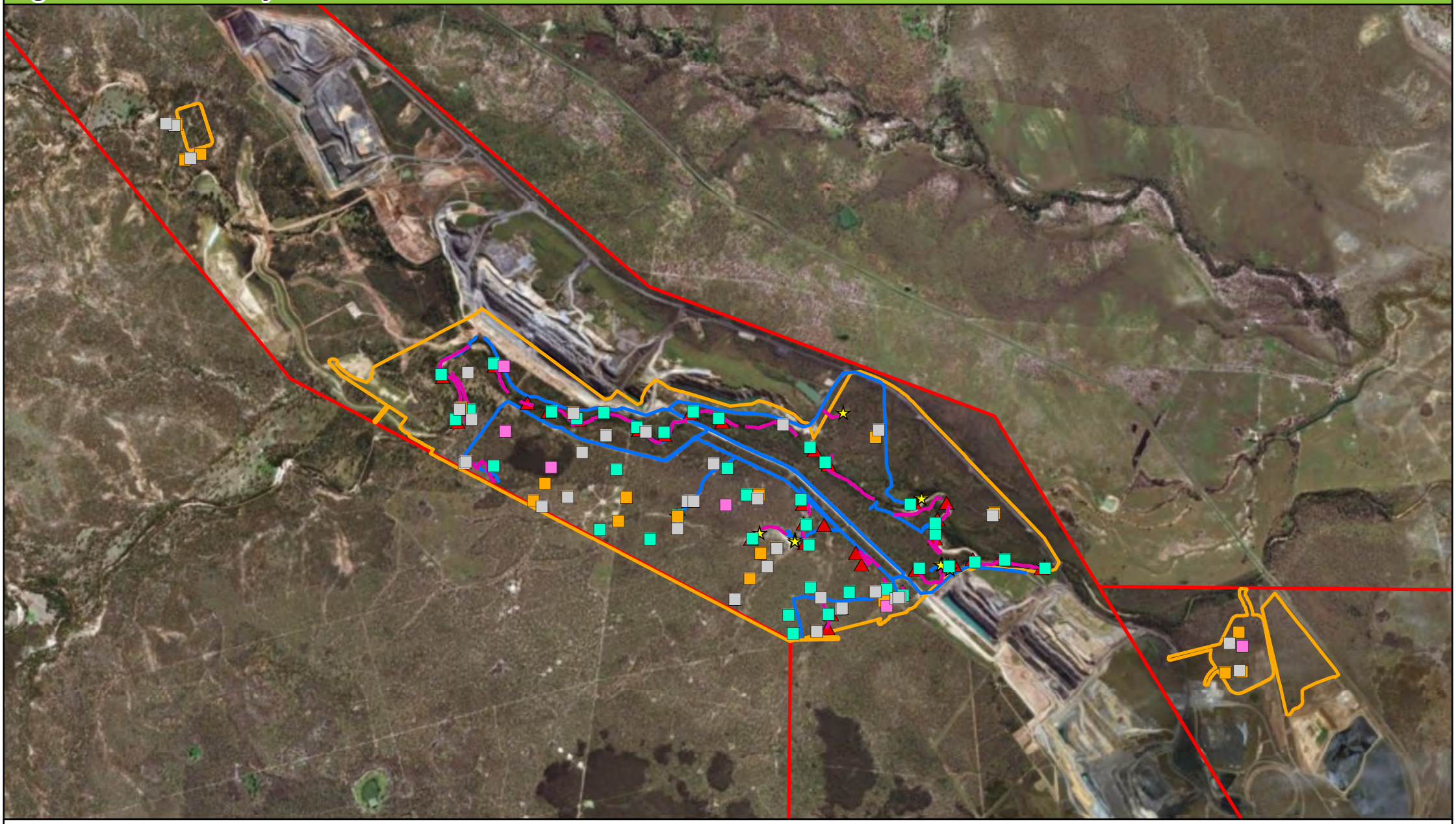
# Figure 3: Fauna survey sites



**Legend**

- Mining Lease
- Study area

**Fauna survey sites**

- Koala habitat assessment sites
- Ornamental Snake habitat assessment sites
- Squatter Pigeon habitat assessment sites
- Greater Glider habitat assessment sites
- Bird survey - targeted waterhole watch
- Bird survey - area searches
- Hollow bearing tree density quadrats
- Spotlighting survey transects

0 550 1,100 2,200

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

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# 3 Desktop Assessment Results

## 3.1 Previous Ecological Assessments

Previous ecological studies across the study area identified a number of MNES values either as occurring or likely to occur. These included:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC
- One threatened flora species – Black Ironbox
- Four threatened fauna species – South-eastern Long-eared Bat (*Nyctophilus corbeni*); Koala, Ornamental Snake and Squatter Pigeon

MNES values considered unlikely to occur were so determined due to a lack of detection during field surveys or the absence of ground-truthed suitable habitat.

## 3.2 Database Results

Results from the desktop assessment confirmed the potential occurrence of MNES values identified in previous ecological assessments with the exception of two threatened species and five migratory species that have since been reclassified and are no longer listed under the EPBC Act. This includes the following species:

- Brigalow Scaly-foot (*Paradelma orientalis*)
- Finger Panic Grass (*Digitaria porrecta*)
- Australian Cotton Pygmy-goose (*Nettapus coromandelianus albipennis*)
- Cattle Egret (*Ardea ibis*)
- Great Egret (*Ardea modesta*)
- Rainbow Bee-eater (*Merops ornatus*)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*)

In addition to this, four new threatened fauna species have been recently listed under the EPBC Act and identified as potentially occurring within the study area. These species are the Curlew Sandpiper (*Calidris ferruginea*; also listed as migratory), Greater Glider (*Petauroides volans*), Ghost Bat (*Macroderma gigas*) and the Southern Snapping Turtle (*Elseya albagula*). Furthermore, potential habitat for seven migratory species has recently extended to include the range of the study area. These species are the Common Sandpiper (*Actitis hypoleucos*), Sharp-tailed Sandpiper (*Calidris acuminata*), Pectoral Sandpiper (*Calidris melanotos*), Oriental Cuckoo (*Cuculus optatus*), Osprey (*Pandion haliaetus*) and Yellow Wagtail (*Motacilla flava*).

The full extent of desktop government database results are provided in **Appendix B.** The likelihood of occurrence for all threatened and migratory species identified on the current databases has been assessed, with the results provided in **Section 4.3** and **Section 4.5**.

# 4 Field Results

## 4.1 Vegetation Communities

The majority of the study area was found to comprise remnant vegetation (approximately 1,392.2 ha), in which 15 vegetation communities were ground-truthed (**Figure 4**). All ecosystem types present are wooded ecosystems, dominated by either *Eucalyptus*, *Corymbia* or *Acacia* species. This includes a Brigalow dominated community described as the listed Brigalow TEC RE 11.4.9. Vegetation communities ground-truthed within the study area are described in **Table 4-1** as per the Regional Ecosystem Description Database (REDD).

Vegetation communities were found to range in functional biodiversity condition, with some areas scoring within the highest BioCondition Class through to areas scoring within the medium Class of 3. However, the majority of vegetation communities (60%) within the study area were found to be in functional condition and a BioCondition Class of 2.

The higher BioCondition scoring for vegetation communities is predominantly attributed to the landscape context of the study area. Over 85% of the vegetation communities are part of a larger tract of vegetation (>200 ha of remnant vegetation) which continues outside of the study area. Connectivity and context of vegetation communities to other adjacent vegetation also ranged from medium to very high connectivity. However, at a site level the condition of the vegetation communities is reflective of the historical and on-going long-term grazing disturbances that are present within the study area. Extensive weed incursion occurs within the understorey of riparian communities along Walker Creek and portions of the Eucalypt woodland communities are in a state of regrowth and regeneration from previous thinning and clearing activities.

BioCondition Score and BioCondition Class for each vegetation community is provided in **Table 4.1**. Detailed BioCondition data is provided in **Appendix C**.

**Table 4-1: Ground-truthed vegetation communities within the study area**

| RE | Short Description | Area (ha) | TEC RE* | BioCondition Score / Class** |
|---|---|---|---|---|
| 11.3.2 | *Eucalyptus populnea* woodland on alluvial plains | 82.75 | - | 0.81 / 1 |
| 11.3.25a | Riverine wetland or fringing riverine wetland. *Eucalyptus raveretiana, Melaleuca fluviatilis* woodland | 66.66 | - | 0.69 / 2 |
| 11.3.25 | *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines | 29.2 | - | 0.53 / 3 |
| 11.3.27 | Freshwater wetlands | 6.14 | - | 0.77 / 2 |
| 11.3.4 | *Eucalyptus tereticornis* and/or *Eucalyptus spp*. woodland on alluvial plains | 15.73 | - | 0.54 / 3 |
| 11.3.4a | Floodplain (other than floodplain wetlands). *Corymbia tessellaris* woodland. | 244.49 | | |
| Analogous to 11.3.4a | *Corymbia tessellaris* open woodland. | 8.32 | | - |

| RE | Short Description | Area (ha) | TEC RE* | BioCondition Score / Class** |
|---|---|---|---|---|
| 11.3.9 | *Eucalyptus platyphylla, Corymbia spp*. woodland on alluvial plains | 33.65 | - | 0.73 / 2 |
| 11.4.9 | *Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains | 37.17 | Brigalow | 0.74 / 2 |
| 11.4.13 | *Eucalyptus orgadophila* open woodland on Cainozoic clay plains | 5.5 | - | - |
| 11.5.2a | *Allocasuarina luehmannii* low tree layer with or without emergent woodland. | 11.33 | - | 0.87 / 1 |
| 11.5.3 | *Eucalyptus populnea +/- E. melanophloia +/- Corymbia clarksoniana* woodland on Cainozoic sand plains and/or remnant surfaces | 358.94 | - | 0.82 / 1 |
| Analogous to 11.5.3 | *Eucalyptus populnea* regrowth. | 2.97 | - | - |
| Analogous to 11.5.3 and 11.5.8b | Mix polygon (50/50%) comprising of *Eucalyptus populnea* and *E. platyphylla* regrowth. | 119.75 | - | 0.62 / 2 |
| 11.5.8b | *Corymbia clarksoniana*, *Eucalyptus exserta, E. crebra, E. tereticornis, E. platyphylla* woodland with low tree layer dominated by *Melaleuca viridiflora, M. nervosa, Allocasuarina littoralis, Grevillea banksii, Acacia flavescens +/- Acacia leiocalyx.* | 78.17 | - | 0.82 / 1 |
| 11.5.8c | *Eucalyptus platyphylla* woodland on white-yellow weathered sands, with grassy ground layer. Occurs on Quaternary sediments. | 336.23 | - | 0.71 / 2 |
| 11.5.9 | *Eucalyptus crebra* and other *Eucalyptus spp*. and *Corymbia spp*. woodland on Cainozoic sand plains and/or remnant surfaces | 85.55 | - | 0.80 / 2 |
| 11.9.2 | *Eucalyptus orgadophila* woodland on fine-grained sedimentary rocks | 0.68 | - | - |
| - | Eucalypt spp. Regrowth | 1.96 | - | - |
| **Total** | | 1,525.19 | | |

* TEC listed REs as per EPBC Act Conservation Advice

**Rating of 1 (for 'functional' biodiversity condition) to 4 (for 'dysfunctional' biodiversity condition)

## 4.2 Threatened Ecological Communities

Two TECs were identified in the desktop assessment as potentially occurring within the study area, including:

- Brigalow (*Acacia harpophylla* dominant and co-dominant) endangered community
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin

Field surveys only identified the listed Brigalow TEC RE11.4.9 within the study area. This RE was ground-truthed to be in remnant condition and comprising patches >0.5 ha in size.

Further assessment of the other key diagnostic and condition thresholds during the survey determined four patches of RE11.4.9 to be dominated by *A. harpophylla* and with an exotic perennial groundcover of <50%. These patches were validated to meet TEC status (**Figure 4**). Additional patches of RE11.4.9 were found to be dominated by *Casuarina cristata* (Belah) and therefore did not meet the key diagnostic criteria for the Brigalow TEC.

The findings of the Brigalow TEC assessments across the study area are provided in **Appendix D**.

## 4.3 Threatened Flora Species Presence

The current database results identified five threatened flora species as potentially occurring within the study area. Of these five species, one was identified as occurring within the study area, whilst the remaining four were considered unlikely due to the lack of associated vegetation communities and soil substrates (**Table 4.2**).

The identified threatened species, Black Ironbox, was located along portions of Walker Creek's riparian zone. Targeted surveys along Walker Creek identified 525 individuals (both mature and immature) within a 6.8 km section within the study area. The species was recorded throughout the majority of the length of Walker Creek downstream of the confluence with Carborough Creek, however, the species was found to be absent along a 2 km reach of the creek. A particularly dense patch within the far westerly section of the creek was identified that contained over 100 individuals over ~370 m. The location of the species is illustrated in **Figure 4**.

The riparian vegetation in which the species was recorded was ground-truthed as RE 11.3.25a, described in short as *Eucalyptus raveretiana, Melaleuca fluviatilis* woodland. In some locations, the species was co-dominant with *Melaleuca* species, Queensland Blue Gum (*E. tereticornis*) and River Red Gum (*E. camaldulensis*). The ecosystem was noted to be heavily invaded by an introduced grass, Guinea Grass (*Megathyrsus maximum*). This exotic species has the potential to impact on germination and growth success for Black Ironbox seeds and saplings along Walker Creek through shading and outcompeting of resources.

It should be noted that field validation of vegetation communities and habitat values did not detect any significant inconsistencies with previous likelihood assessments conducted as part of the preceding studies (**Table 4.2**).

**Table 4-2: Likelihood of occurrence results for threatened flora species**

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| **Flora** | | | | | |
| Black Ironbox *Eucalyptus raveretiana* | V | Black Ironbox occurs on the banks of rivers, creeks and other watercourses, on clayey or loamy soil (TSSC 2008). | Known | Known | Species recorded along Walker Creek within the study area. |
| Bluegrass *Dichanthium setosum* | V | *Dichanthium setosum* is associated with heavy basaltic black soils and stony red-brown hardsetting loam with clay subsoil and is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture. The extent to which this species tolerates disturbance is unknown (TSSC 2008). | Unlikely | Unlikely | The study area does not contain soils derived from either basalt or fine-grained sedimentary rock. |
| *Cycas ophiolitica* | E | *Cycas ophiolitica* grows on hills and slopes in sparse, grassy open forest at altitude ranges from 80–400 m above sea level. Although this species reaches its best development on red clay soils near Marlborough, it is more frequently found on shallow, stony, infertile soils, which are developed on sandstone and serpentinite (DoE 2015). | Unlikely | Unlikely | The study area does not contain soils derived from sandstone and serpentinite. |
| King Blue-grass *Dichanthium queenslandicum* | E | King Blue-grass is poorly studied but is known to occur as a component of Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin (Natural Grasslands TEC) and is associated with other species of blue grasses (Dichanthium spp. and Bothriochloa spp.). The grassland community occurs on fine textured soils, typically cracking clays on derived from either basalt or fine-grained sedimentary rocks, on flat of gently undulating rise. These grasslands occur in areas with relatively high summer rainfall and where a tree canopy is usually absent (TSSC 2013). | Unlikely | Unlikely | The study area does not contain natural grassland habitat or soils derived from either basalt or fine-grained sedimentary rock |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| Quassia<br>*Samadera bidwillii* | V | Quassia is endemic to Queensland and is known to occur in several coastal locations between Mackay and Goomboorian, north of Gympie. The species commonly occurs in lowland rainforest or rainforest margins, but can also be found in open forest and woodland. The species is commonly found near both permanent and ephemeral watercourses. | - | Unlikely | Species generally occurs in coastal areas with nearest records in Mackay, approximately 125km to the north-east. |

[1] Current status under the EPBC Act: E = Endangered; V = Vulnerable

[2] Known: Records from the study area.

Likely: Preferred habitat observed or mapped in the study area and known to occur in the region surrounding the study area and distribution overlaps with the study area.

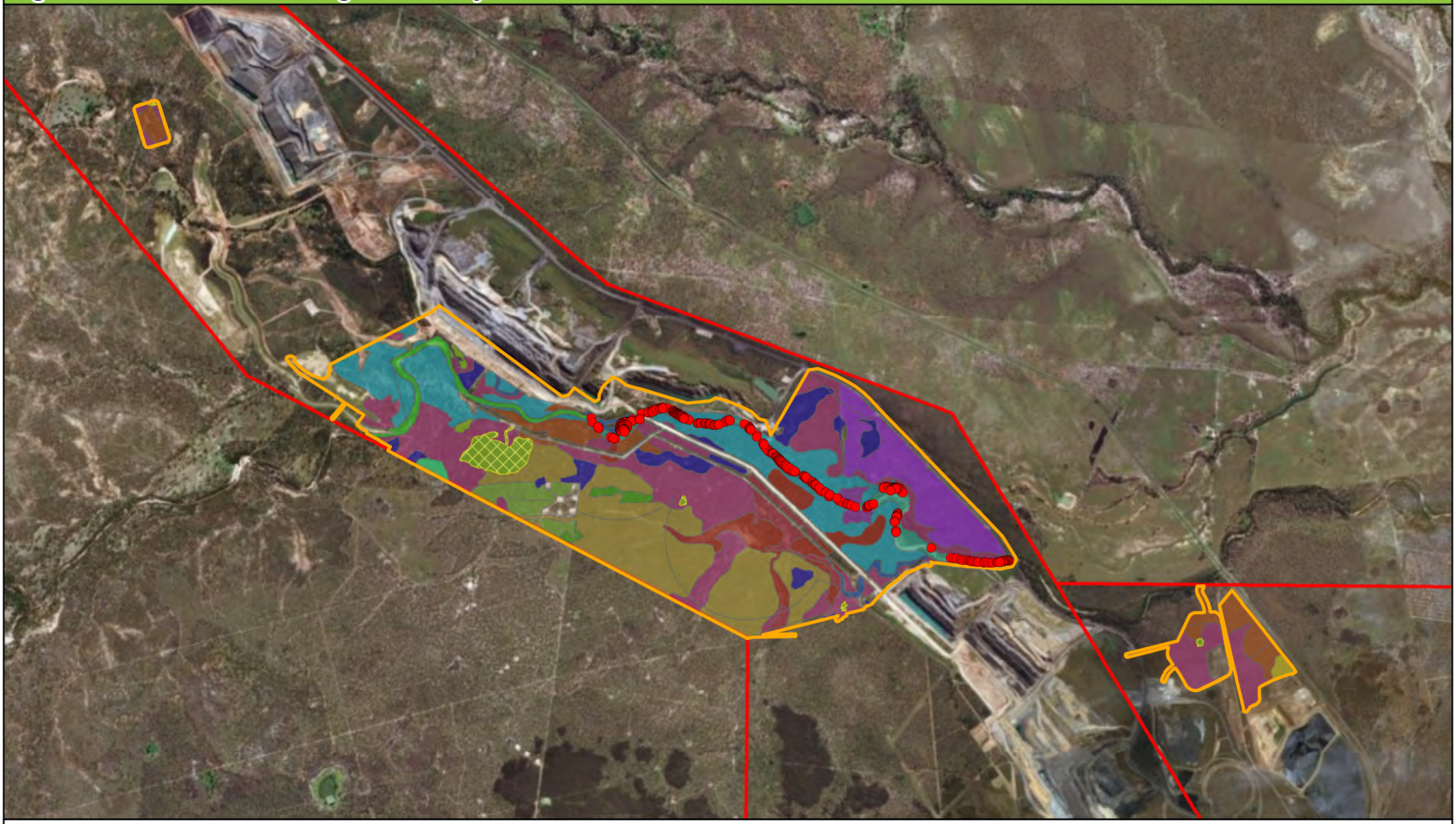
Potential: Marginal habitat observed or mapped in the study area and known to occur in the region surrounding the alignment corridor and distribution overlaps with the study area.

Unlikely occurring: Not known from surrounding region or distribution does not overlap with the study area but at least marginal habitat present.

Does not occur. Not known from the surrounding region and distribution does not overlap with the study area (usually associated with errors in databases searched) or no habitat present on the study area.

* Derived from Species Profile and Threats Database (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl) or A-Z of animals (https://www.ehp.qld.gov.au/wildlife/animals-az/index.html)

# Figure 4: Ground-truthed Regional Ecosystems & threatened flora records



**Legend**

Mining Lease

**Threatened flora records**

- Black Ironbox
- Brigalow

**GTRE**

- Mature Regrowth, 11.5.3/8b
- Mature regrowth, 11.5.3
- Non-rem, 11.3.4a
- Regrowth, 11.5.3/8b
- Regrowth, 11.5.8c
- Remnant, 11.3.2
- Remnant, 11.3.25
- Remnant, 11.3.25a
- Remnant, 11.3.27
- Remnant, 11.3.4
- Remnant, 11.3.4a
- Remnant, 11.3.9
- Remnant, 11.4.13
- Remnant, 11.4.9
- Remnant, 11.5.2a
- Remnant, 11.5.3
- Remnant, 11.5.8b
- Remnant, 11.5.8c
- Remnant, 11.5.9
- Remnant, 11.9.2

0 500 1,000 2,000

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

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## 4.4 Habitat Values

Habitat occurring within the study area can be classified into five distinct habitat types:

- Fringing riparian forest
- Floodplain Eucalypt forest
- Dry Eucalypt forest
- Brigalow woodland
- Wetland

*Fringing Riparian Forest*

Fringing riparian forest habitat occurs on the stream banks of Walker Creek and Carborough Creek (**Figure 5**). This habitat was found to have well developed canopy (77% cover) and sub-canopy layers (13% cover) but a more open understorey structure with the shrub layer predominantly absent. The ground layer was also found to lack complexity with woody debris coverage (185 m per ha) and leaf litter cover (22% cover) recorded as low. The groundcover within this habitat is dominated by the exotic Guinea Grass.

Whist the more open understorey layer and low ground layer complexity limits the use of the habitat for some fauna species, the well-developed canopy layer was found to contain numerous hollow bearing trees providing sheltering, nesting and breeding habitat for hollow dependent birds, arboreal mammals and microbats.

This habitat is highly connected to adjacent vegetation, contributing to a landscape in which fauna species can readily move between areas of suitable habitat.

*Floodplain Eucalypt Forest*

Floodplain Eucalypt forest habitat occurs on the Quaternary alluvial plains of the Walker Creek and Carborough Creek (**Figure 5**), adjacent to the riparian forest. This habitat was found to have a well-developed canopy (62.5% cover) and sub-canopy layers (14.5% cover) but a more open understorey structure with the shrub layer predominantly absent. The ground layer was found to be moderately complex with moderate woody debris coverage (128 m – 384 m per ha), high leaf litter cover (51% cover) and presence of native grass tussocks (26% cover).

The complex ground layer provides suitable foraging and nesting habitat for numerous mammals and reptiles. However, the more open understorey layer limits the use of the habitat for some fauna species. In addition, the well-developed canopy layer was found to lack the density of hollow bearing trees found within the adjacent riparian forest habitat.

This habitat is highly connected to adjacent vegetation, contributing to a landscape in which fauna species can readily move between areas of suitable habitat.

*Dry Eucalypt Forest*

Dry Eucalypt forest encompasses the majority of the study area and is associated with the Tertiary loamy and sandy plains of the older alluvial terraces of Walker Creek and Carborough Creek (**Figure 5**). This habitat occurs both in remnant and regrowth states.

Within the remnant areas, structural complexity varied with some areas providing a diverse shrub layer whilst in other areas it was absent. A more open canopy layer was recorded compared to other habitat types within the study area and large hollow-bearing trees were limited. Across all areas the ground layer was found to be moderately complex and would provide suitable foraging and nesting habitat for

numerous mammals and reptiles. Similar habitat resources were recorded within the regrowth areas; however due to the regenerating stage of the area, a mature canopy layer was absent.

*Brigalow / Belah Woodland*

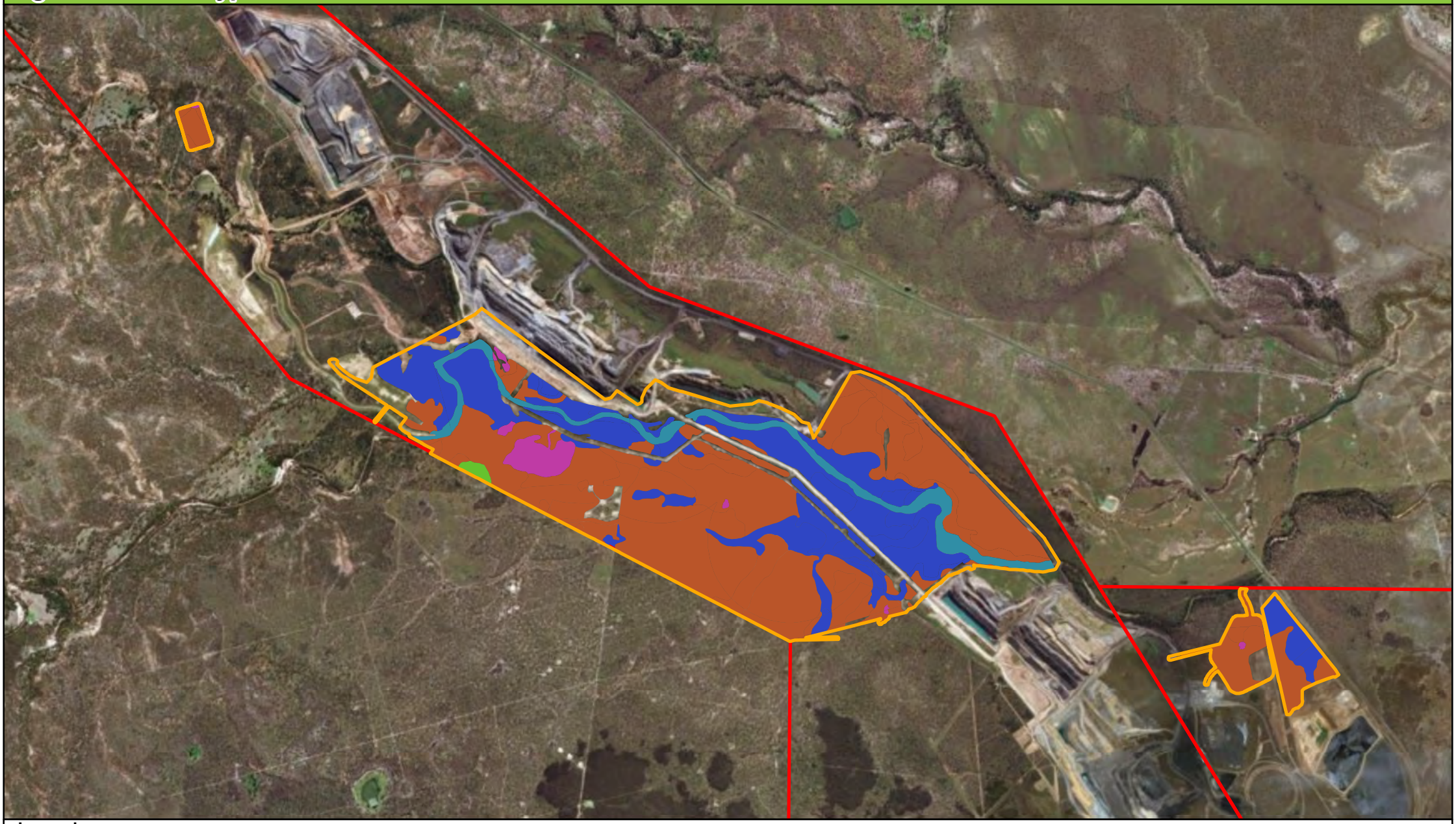
Brigalow / Belah woodland habitat occurs in discrete patches across the study area and is associated with the Cainozoic clay plains situated on the older alluvial terraces of Walker Creek (**Figure 5**). This habitat was found to have a high structural complexity consisting of a moderately dense canopy layer (61.3% cover) and a moderate shrub layer (17.6% cover). This habitat also contains a relatively complex ground layer, with extensive woody debris (1,685 m per ha) and moderate organic litter cover (66.1% cover) present, although grass cover was low / absent. A gilgai landform was present within some areas of the habitat, which during rainfall events would become an ephemeral wetland providing habitat for frog species.

This high level of structural complexity provides suitable foraging and nesting habitat for numerous woodland birds, mammals and reptiles. However, the low number of hollow bearing trees within this habitat means there is limited sheltering, nesting and breeding habitat for hollow dependent birds, arboreal mammals and microbats.

*Wetlands*

Wetland habitat within the study area is limited to a palustrine wetland located within the western outer limits (**Figure 5**), comprising of approximately 4 ha. The wetland is ephemeral, experiencing varying degrees of inundation throughout the year. The habitat predominantly consists of a disturbed Buffel Grass (*Cenchrus ciliaris*) depression with fringing large River Red Gum and *E. platyphylla* (Poplar Gum). Canopy die back was noted to be severe within this habitat.

# Figure 5: Habitat types



**Legend**

- Mining Lease
- Study area

**Habitat types**

- Brigalow Woodland
- Dry Eucalypt Forest
- Floodplain Eucalypt Forest
- Fringing Riparian Forest
- Wetland

0 550 1,100 2,200

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

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## 4.5 Threatened Fauna Species Presence

The current database results identified 15 threatened fauna species and 10 migratory species as potentially occurring within the study area. Of the 15 threatened species, three were identified as occurring within the study area, the Greater Glider, Koala and Squatter Pigeon. Ornamental Snake was not identified within the study area; however due to the presence of suitable habitat and species records in adjacent areas, this species is considered likely to occur within the study area.

Of the 10 migratory species, none were identified as occurring with the study area. All migratory species were considered unlikely to occur due to the lack of detection of the species during field surveys and lack of suitable species habitat or key habitat features.

The complete assessment of the likelihood of occurrence is provided in **Table 4-3**. It should be noted that field validation of vegetation communities and habitat values did not detect any significant inconsistencies with previous likelihood assessments, with two exceptions. The South-eastern Long-eared Bat was previously assessed as a potential occurrence. The validated marginal habitat coupled with the study area occurring outside of the likely distribution of the species makes it an unlikely occurrence. The re-assessment of the South-eastern Long-eared Bat likelihood of occurrence is provided in **Table 4-3**. The Koala was listed in previous assessments as being a 'transient species', however it was recorded within the study area during the 2018 survey.

Surveys conducted in February 2018 were undertaken to target the presence of the Star Finch in the study area, to address the DoEE information request for the Preliminary Documentation. The eastern sub-population of the Star Finch is poorly known due to small number of records in scattered areas. However it is believed to extend north to Bowen, west to Winton and south to near Wowan. The population is likely severely fragmented with an estimate of 50 or less breeding birds and the species is believed to be locally extinct in many areas of its range (DoE 2018, DEWHA 2008). The Star Finch occurs mostly in grassy woodlands close to bodies of fresh water (DoE 2018). Seeds of native grasses are the main food source for the Star Finch (DoE 2018). Major threats to the species are degradation of habitat and reduction of native grass seeds through weed incursion and overgrazing by cattle (DEWHA 2008).

The species was not confirmed within the study area during the 2018 survey and is considered unlikely to occur. There are no recent records within the surrounding area (ALA 2018) and the species' distribution is now highly fragmented and potentially locally extinct. Ground-truthed potential habitat within the study area was considered to be of poor quality, with a high abundance of non-native grasses (Buffel and Guinea Grass) and a lack of permanent watering holes. Bird surveys also found a distinct lack of other common finch species, such as Double-barred Finch (*Taeniopygia bichenovii*) or Zebra Finch (*Taeniopygia guttata*), suggesting the study area does not contain suitable habitat for finches more generally. Abundance of bird species observed during the survey is shown in **Appendix E**.

As the Star Finch is considered unlikely to occur within the study area, impact of the project on the species is not assessed further.

A description of the habitat extent based on targeted field assessments for each known or likely occurring species is provided below. Detailed results of the targeted habitat assessments are provided in **Appendix A**.

*Greater Glider*

Greater Glider has been observed in various habitat types along Walker Creek within the study area on several occasions (**Figure 6**). Greater Glider has been previously recorded within the study area during detailed fauna surveys (Footprints, 2013) and pre-clearance surveys across the mine have also recorded five individuals north of the study area along Walker Creek. During the February 2018 survey 22 Greater Gliders were recorded within the study area.

Records of Greater Glider during the 2018 survey indicate a preference for habitat along a small section of the riparian corridor of Walker Creek (**Figure 6**). Adjacent Eucalypt floodplain areas were found not to be utilised by Greater Glider, despite containing a high abundance of hollows. Other arboreal species such as Sugar Gliders, Squirrel Gliders and Brush-tail Possums, which utilise similar habitats (i.e. hollow bearing Eucalypts), were found not to overlap with Greater Glider records, and tended to occur in the floodplain or lower reaches of Walker Creek, indicating potential competition for areas containing hollows suitable for Greater Glider.

Hollow bearing tree transects found a high abundance of tree hollows suitable for Greater Glider (i.e. medium 8 to 15 cm or large >15 cm diameter). These were found to occur both within riparian corridors (average of 24 medium and nine large per hectare), as well as adjacent floodplain eucalypt woodlands (average of 23 medium and 11 large per hectare). Whilst these numbers are greater than the hollow densities that are considered suitable for Greater Glider use (2 to 4 for every two hectares of suitable habitat (TSSC 2016)), assessing the number of suitable hollows during on-ground surveys may be overestimated, as the extent to which the hollow has established and its suitability for the species is difficult to determine.

Overall, the fringing riparian habitat within the study area provides both the foraging and breeding habitat required to support the Greater Glider (**Figure 6**).

*Squatter Pigeon*

Squatter Pigeon was recorded within the Dry Eucalypt Forest habitat in study area during the field survey in 2016 (**Figure 6**). Targeted Squatter Pigeon habitat assessments identified suitable water points for the species along Walker Creek, Carborough Creek and an artificial farm dam located in the central portion of the study area. Carborough Creek and Walker Creek are both ephemeral in nature but are major watercourses for the area with a stream order of four and five, respectively. Small pools of water were observed at various points along the dry sandy creek bed of Walker Creek, and the artificial dam was found to be at a moderate level of water capacity. These field observations occurred at the commencement of the dry season and whilst the water sources cannot be identified as permanent (i.e. spring-fed source), they may provide a reliable source of water for much of the year.

Habitats on the appropriate sandy substrates for foraging and breeding (DoE 2016d) that were ground-truthed within a 1 km range of these water sources, included the fringing riparian forest, floodplain Eucalypt forest and the dry Eucalypt forest. For the floodplain Eucalypt forest and dry Eucalypt forest habitat, only the southern portions of the primary impact area and a small portion of the southern dam footprint were found to comprise the bare ground conditions that are preferential for the species (i.e. in the order of 30%) (**Figure 6**). During the field survey, two Squatter Pigeon individuals were observed within the central area of the dry Eucalypt forest habitat (**Figure 6**). The extensive weed incursion within the fringing riparian forest has significantly degraded the habitat resources for the Squatter Pigeon, with the dense groundcover inhibiting foraging opportunities and providing poor conditions for breeding.

Overall, portions of the floodplain Eucalypt forest and dry Eucalypt forest habitat within 1 km of identified water sources are considered areas of Squatter Pigeon habitat within the study area (**Figure 6**).

*Koala*

Koala has been observed numerous times in areas in the vicinity of the study area and three Koalas were recorded within the floodplain and fringing riparian forest habitats in the study area during the February 2018 survey (**Figure 6**).

Koala has been previously recorded within the operational mine lease (EcoServe & LAMR, 2005). In 2016, two individuals were recorded in floodplain Eucalypt habitat adjacent to the study area along Walker and Carborough Creek. Species presence has also been recorded in 2015 along Humbug Creek, 10 km south-east of the study area. Two un-confirmed sightings of the species occurred in 2008 and 2013 by mine staff along the mine access road and haul road.

Targeted Koala habitat assessments identified the total extent of fringing riparian forest habitat as containing two known Koala food tree species, Queensland Blue Gum and River Red Gum (Australian Koala Foundation 2015). Only portions of the floodplain Eucalypt forest habitat and dry Eucalypt habitat were found to contain Koala food tree species. This ranged from containing two known species (Poplar Box (*Eucalypts populnea*) and Narrow-leaved Ironbark (*Eucalyptus crebra*)) to only one known food tree species dominating the canopy layer (i.e. >50% coverage).

Within these areas containing Koala food tree species, only the riparian forest habitat and floodplain Eucalypt forest habitat occurred on alluvial substrates where canopy trees could access the saturation zone along Walker Creek and Carborough Creek. In these areas, soil moisture is likely to be retained for extended periods in between creek flow events. In contrast, the dry Eucalypt forest habitat was found to contain deep sandy soils with limited water holding capacity.

Overall, the riparian forest habitat and portions of the floodplain Eucalypt forest habitat containing Koala food trees are considered areas of Koala habitat within the study area (**Figure 6**).

*Ornamental Snake*

Ornamental Snake has been previously recorded in Brigalow habitat within the mine site (EcoServe & LAMR Pty Ltd, 2007). Queensland Essential Habitat Mapping also identifies three records within a 2 – 5 km radius of the study area. Targeted Ornamental Snake habitat assessments across the Brigalow / Belah woodland habitat revealed varying values for the species. Only three of the seven patches of Brigalow / Belah habitat were found to contain the essential microhabitat features necessary to support the species. This includes a structurally complex ground layer comprising extensive amounts of woody debris, wide soil cracks, as well as deep ephemeral gilgai (**Figure 6**).

**Table 4-3: Likelihood of occurrence results for threatened and migratory fauna species**

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| **Fauna** | | | | | |
| Allan's Lerista<br>*Lerista allanae* | E | Found in association with *Eucalyptus orgadophila* (Mountain Coolabah), *E. erythrophloia* (Red Bloodwood) open woodlands and *Melaleuca bracteata* (Black Tea-tree). It is currently associated with altered landscapes that have areas with leaf litter and friable surface soils beneath trees and shrubs. These sites were characterised by dark chocolate non-cracking clay-based soils which are mapped as Regional Ecosystem 11.8.5 and 11.8.11. | Unlikely | Unlikely | The study area does not contain suitable habitat for the species and is not within its current range. Species is only known to occur within a small area south of Clermont. |
| Australia Painted Snipe<br>*Rostratula australis* | E | Species dependent on wetlands and can inhabit a variety of types including shallow terrestrial freshwater (occasionally brackish) wetlands, temporary and permanent lakes, swamps and claypans. Preferred wetland habitats are characterised by emergent vegetation (including tussocks, grasses, sedges, rushes, reeds, canegrass and/or paperbarks) where nesting will occur. Artificial habitats that are occasionally used include reservoirs, farm dams, sewage | Unlikely | Unlikely | The study area does not contain suitable habitat for the species due to the lack of wetland habitats containing fringing aquatic vegetation. |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| | | ponds, inundated grasslands, and leaking irrigation channels. | | | |
| Curlew Sandpiper *Calidris ferruginea* | CE, M | Species usually forages and roosts in 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. | Not assessed | Unlikely | Suitable coastal habitat is not present within the study area. |
| Fitzroy River Turtle *Rheodytes leukops* | V | Generally associated with instream habitats providing deep pool and riffle sequences, this species also prefers *Vallisneria* spp. (Ribbonweed) beds. Common riparian trees associated with the Fitzroy River Turtle habitat include E*ucalyptus tereticornis* (Queensland Blue Gum), *Casuarina cunninghamiana (*River She-oak), *Callistemon viminalis (*Weeping Bottlebrushes) and *Melaleuca linariifolia* (Paperbarks). | Unlikely | Unlikely | Walker Creek within the study area does not support the instream habitat requirements for the species. |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| Ghost Bat<br>*Macroderma gigas* | V | Ghost bats occur in a wide range of habitats from rainforest, monsoon and vine scrub, to open woodlands in arid areas. These habitats are used for foraging, while roost habitat is more specific. Favoured roosting sites of the ghost bat are undisturbed caves or mineshafts which have several openings. | Not assessed | Unlikely | The species occurs in two disjunction distributions and 4 known disjunct subpopulations throughout Queensland. The study area overlaps one of the two disjunct distributions which occurs from coastal northeast Queensland from near the tip of Cape York Peninsula to approximately Gladstone.<br><br>Microbat surveys were conducted during previous ecological surveys, however, the species (or its genus) was not detected. The study area also does not support potential rooting or foraging habitat. |
| Greater Glider<br>*Petauroides volans* | V | Largely restricted to eucalypt forest and woodlands, with a preference of old growth with abundant large tree hollows (den habitat). | Known | Known | Identified within the study area by Footprints Environmental (2013) prior to species' listing.<br><br>Vegetation within the study area is contiguous with a large forested tract that extends further west of the study area. Riparian vegetation along Walker Creek within the study area, likely to contain hollow-bearing trees. |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| Koala<br>*Phascolarctos cinereus* | V | Koala habitat can be broadly defined as any forest or woodland containing species that are known koala food trees, or shrubland with emergent food trees. Within inland environments (<800mm rainfall), this is limited to open forests and woodland where Koala food trees have a reliable access to soil moisture. Habitat in particular includes Box Gum or Red Gum woodlands on heavier soils in remnant or regrowth vegetation patches particularly riparian zones (DoE, 2014a) | Transient species | Known | Use of Walker Creek by the species determined to be infrequent based on scratch marks (Ecoserve & LAMR, 2006)) and the lack of direct and indirect sighting during targeted searches (Footprints, 2013).<br><br>Two individuals have been recorded in 2016 directly adjacent to the study area along Walker and Carborough Creek. Suitable habitat for the species has been identified on the alluvial plains of Walker Creek within the study area.<br><br>Three individuals were sighted in 2018 field surveys. |
| Ornamental Snake<br>*Denisonia maculata* | V | The Ornamental Snake inhabits remnant and non-remnant low-lying areas with cracking clay soils, where it can be locally abundant. Prefers moist areas and adjoining elevated ground, particularly areas associated with gilgai development. Areas dominated by *Acacia harpophylla* (Brigalow), *Acacia cambagei* (gidgee), *Acacia argyrodendron* (blackwood) and *Eucalyptus coolabah* (coolabah) are the habitats where the Ornamental Snake is most likely to be | Likely | Likely | Ornamental Snake has been previously recorded 2-5 km south-east of the study area in remnant vegetation. Three areas within the Brigalow habitat provide suitable microhabitat features for the species. |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| | | found, which includes riparian woodlands and open forest on levees. | | | |
| Northern Quoll *Dasyurus hallucatus* | V | The species occupies a diversity of habitats across its range including Eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Northern Quoll are also known to occupy non rocky lowland habitats such as beach scrub communities in central Queensland. Northern Quolls appear to be most abundant in habitats within 150 km of the coast. | Unlikely | Unlikely | The study area does not contain suitable rocky habitats for the species. |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| Red Goshawk *Erythrotriorchis radiatus* | V | Occurs over wooded and forested lands, associated with different vegetation mosaics between south-east Queensland, northern Queensland and Cape York Peninsula. Prefers forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins. Nesting habitat has been defined as a stand of tall trees within 1km of permanent water. The species is mainly associated with regional ecosystems at risk with rugged terrain in southern and northern Queensland. | Unlikely | Unlikely | The study area does not contain suitable habitat for the species, specifically extensive vegetated tracts of mosaic communities, and the presence of permanent water i.e. large river systems. |
| South-eastern Long-eared Bat *Nyctophilus corbeni* | V | This species can occur in a range of inland woodland vegetation types, including box, ironbark, and cypress pine woodlands. Brigalow woodland and River Red Gum forests lining watercourses and lakes also provide habitat for the species Throughout inland Queensland, the species habitat is dominated by various eucalypt and bloodwood species and is most abundant in | Possible / Likely | Unlikely | Previous ecological studies determined the species to be 'likely' due to the presence of suitable refuge, foraging and breeding habitat within the study area. Suitable habitat present consists of poplar box woodlands on alluvial plains, Brigalow woodlands and riparian zones (Cardno, 2013 & Footprints, 2013).<br><br>Targeted surveys were conducted for the species using harps and Anabat devices. *Nyctophilus* spp. was recorded during a |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| | | vegetation with a distinct canopy and a dense cluttered shrub. Captures have been made in open dry woodland and forest, which may include *Corymbia citriodora, C. bloxsomei, Eucalyptus crebra, E. melanophloia, E. populnea, E. major, E. pilligaensis, E. Chloroclada, E. fibrosa, Angophora leiocarpa, Allocasuarina luehmannii, Dodonaea viscosa, Callitris glaucophylla, Acacia harpophylla, Ac. leiocalyx, Ac. conferta, Casuarina cristata and Geijera parviflora*. | | | 2013 survey however, classification to species was not determined (Footprints, 2013).<br><br>Further field validation was required to assess suitable habitat and quality within the study area. Eucalypt woodland and River Red Gum riparian forest (RE 11.3.25) is present within the study area which is stated habitat for the species. Also occurring are habitats dominated by several species associated with the South-eastern Long-eared Bat.<br><br>Although this habitat is present, it is considered marginal due to the lack of a dense cluttered shrub layer, which the preferential habitat structure for the species.<br><br>Whilst marginal habitat is present, the study area occurs outside of the likely distribution for the species, which is predominantly restricted to the Brigalow Belt South Bioregion and the Mulga Lands Bioregion. The most northern record for the species is within the Expedition National Park located approximately 390 km south of the study area.<br><br>Collectively, these results have led to the reassessment of the species' occurrence from likely (previous) to unlikely (current). |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| Squatter Pigeon (southern)<br>*Geophaps scripta scripta* | V | Open-forests to sparse, open-woodlands and scrub that are mostly dominated in the overstorey by *Eucalyptus*, *Corymbia*, *Acacia* or *Callitris* species; remnant, regrowth or partly modified vegetation communities; within 3 km of water bodies or courses. | Likely | Known | Previous ecological studies have recorded the presence of the species within the surrounding area. Current field surveys recorded the species within the study area. Suitable habitat identified within portions of the fringing Eucalypt and dry Eucalypt forest. |
| Star Finch<br>*Neochmia ruficauda ruficauda* | E | Occurs in grasslands and grassy woodlands, near permanent water, and often in or near cleared suburban areas. Also reported along river banks dominated by native grasses and sedges. | Unlikely | Unlikely | The study area does not contain suitable habitat for the species due to the lack of grassy habitats adjacent to permanent water. No evidence of the species or its habitats were found during targeted survey in 2018. |
| Yakka Skink<br>*Egernia rugosa* | V | Known woodland habitats include *Eucalyptus populnea (*Poplar Box), *Acacia aneura* (Mulga), *Callitris glaucophylla* (White Cypress Pine), and disturbed, treated and cleared areas where suitable microhabitat features remain. Also been recorded, though less frequently, in *Acacia harpophylla* (Brigalow), *Acacia catenulata (*Bendee), *Casuarina cristata (*Belah), *Acacia cambagei (*Gidgee), *Acacia shirleyi (*Lancewood), and *Allocasuarina luehmannii* (Buloke) woodlands. | Possible | Unlikely | Previous ecological studies determined the species to be 'possible' due to the presence of suitable refuge, foraging and breeding habitat within the study area. Extensive ground searches and nocturnal surveys failed to detect the species or any signs of potential occurrence (Footprints, 2013). Current closest records of the species are located approximately 187 km south of the study area. |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| White-throated / Southern Snapping Turtle<br>*Elseya albagula* | CE | Found only in Queensland in the Fitzroy, Mary and Burnett Rivers and associated smaller drainages in south eastern Queensland. The white-throated snapping turtle is recognised as a habitat specialist. Within the river system the white-throated snapping turtle prefers clear, flowing, well-oxygenated waters. | Not assessed | Unlikely | The study area is outside of the known distribution for the species and contains no suitable habitat. |
| **Migratory Species** | | | | | |
| Black-faced Monarch<br>*Monarcha melanopsis* | M | The species mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest. | Not assessed | Unlikely | The required habitat (rainforest ecosystems) for the species does not occur within the study area. |
| Common Sandpiper<br>*Actitis hypoleucos* | M | The species utilises saltwater and freshwater ecosystems for foraging and roosting. These include coastal and inland wetlands, and mangroves. | Not assessed | Unlikely | Sufficient wetland habitat not present within the study area |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| Fork-tailed Swift<br>*Apus pacificus* | M | The Fork-tailed Swift is predominantly aerial and occurs over inland areas and occasionally above the foothills in coastal areas with dry and open habitat. They can also occur over low scrub, heathland, saltmarsh and riparian woodlands and are associated with low pressure systems that favour the occurrence of insect prey. | Not assessed | Unlikely | The study area lacks suitable habitat for the species. The closest known recorded for the species was captured in 2012 over 50km to the west (ALA 2016). |
| Latham's Snipe<br>*Gallinago hardwickii* | M | Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). | Not assessed | Unlikely | A small ephemeral wetland was identified within the west of the Project Area and described as RE 11.3.27. Although this habitat feature is present, the species is unlikely to occur due to the lack of foraging habitat (mud) coupled with some form of cover (low, dense vegetation) being present within the wetland. |
| Oriental Cuckoo<br>*Cuculus optatus* | M | Monsoon forest, rainforest edges, leafy trees in paddocks, river flats, roadsides, mangroves, islands. | Not assessed | Unlikely | The study area is dominated by dry Eucalypt woodlands and forests with some riparian habitat. The habitat occurring with the study area is not suitable for this species. |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| Osprey<br>*Pandion cristatus* | M | Littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. Require extensive areas of open fresh, brackish or saline water for foraging. 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. | Not assessed | Unlikely | The study area does not possess extensive areas of open fresh, brackish or saline water for foraging in which the species requires. |
| Pectoral Sandpiper<br>*Calidris melanotos* | M | The species inhabits shallow fresh to saline wetlands and is usually found in coastal or near coastal habitat but occasionally found further inland. | Not assessed | Unlikely | Sufficient wetland habitat not present within the study area. |
| Satin Flycatcher<br>*Myiagra cyanoleuca* | M | Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests than *Myiagra rebecula* (Leaden Flycatcher), often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest. Mainly recorded in eucalypt forests, especially wet sclerophyll forest, often dominated by eucalypts such as *Eucalyptus fastigata (*Brown | Not assessed | Unlikely | No wet sclerophyll forest dominated by preferred species were recorded within the study area. |

| Species | EPBC Act Status[1] | Habitat* | Likelihood of Occurrence Assessment[2] | | Justification |
|---|---|---|---|---|---|
| | | | Previous assessment | Current assessment | |
| | | Barrel), *E. dalrympleana* (Mountain Gum), *Eucalyptus cypellocarpa* (Mountain Grey Gum), *Eucalyptus radiata* (Narrow-leaved Peppermint), *Eucalyptus viminalis* (Manna Gum), or occasionally *E. regnans* (Mountain Ash). They sometimes also occur in dry sclerophyll forests and woodlands, usually dominated by eucalypts such as *E. blakelyi* (Blakely's Red Gum), *E. sideroxylon* (Mugga Ironbark), *Eucalyptus melliodora* (Yellow Box), *Eucalyptus albens* (White Box), Manna Gum or stringybarks, including *E. macrorhyncha* (Red Stringybark), and *Eucalyptus caliginosa*, (Broad-leaved Stringybark), usually with open understorey. | | | |
| Sharp-tailed Sandpiper<br>*Calidris acuminata* | M | The species prefers muddy edges of shallow fresh or brackish wetlands, with suitable vegetation cover (sedges, grass or saltmarsh). | Not assessed | Unlikely | Sufficient wetland habitat not present within the study area. |
| Yellow Wagtail<br>*Motacilla flava* | M | Short grass and bare ground, swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, town lawns. | Not assessed | Unlikely | No suitable habitat for the species was recorded within the study area. |

[1] Current status under the EPBC Act: CE = Critically; V = Vulnerable; M = Migratory

[2] Known: Records from the study area.

Likely: Preferred habitat observed or mapped in the study area and known to occur in the region surrounding the study area and distribution overlaps with the study area.

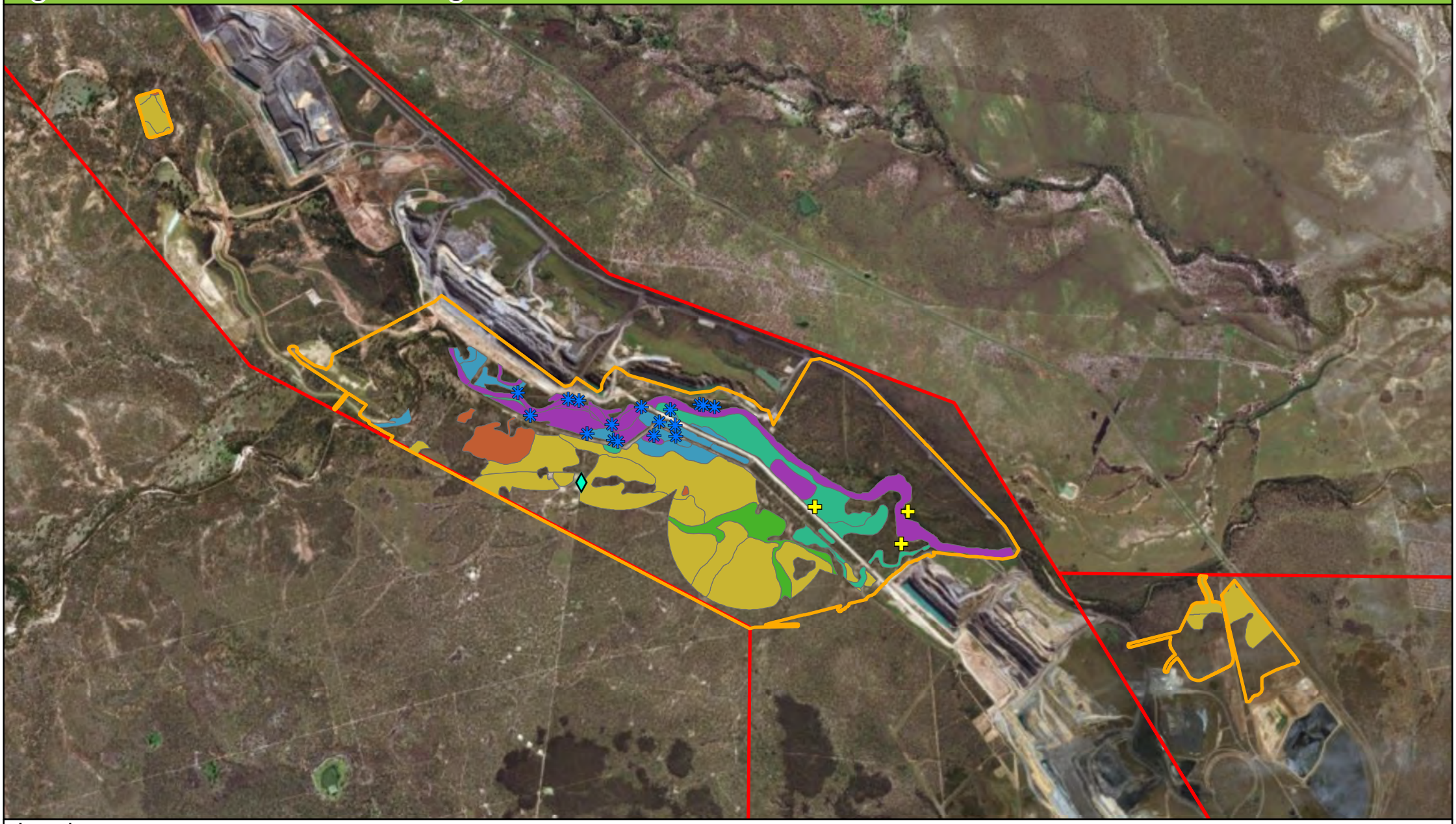
Potential: Marginal habitat observed or mapped in the study area and known to occur in the region surrounding the alignment corridor and distribution overlaps with the study area.

Unlikely occurring: Not known from surrounding region or distribution does not overlap with the study area but at least marginal habitat present.

Does not occur. Not known from the surrounding region and distribution does not overlap with the study area (usually associated with errors in databases searched) or no habitat present on the study area.

* Derived from Species Profile and Threats Database (http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl) or A-Z of animals (https://www.ehp.qld.gov.au/wildlife/animals-az/index.html)

# Figure 6: Threatened fauna records & ground-truthed habitat



**Legend**

- Mining Lease
- Study area

**Threatened species records**

- Greater Glider
- Koala
- Squatter Pigeon

**Ground-truthed Threatened Fauna Habitat**

- Greater Glider
- Koala
- Koala, Greater Glider
- Ornamental Snake
- Squatter Pigeon
- Squatter Pigeon, Koala

0 500 1,000 2,000

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

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## 4.6 Groundwater Dependent Ecosystems

The groundwater system across the SWC Mine has been described as comprising of two distinct aquifers – the unconfined or 'water table' aquifer and the confined coal seam aquifer (Golders, 2018). The water table aquifer consists of an alluvial and regolith hydrostratigraphic units that are in hydraulic connection. The regolith unit covers the majority of the study area whilst the alluvial unit is limited to the creek channels associated with Walker and Carborough Creeks. The alluvium can be locally saturated where the water table is shallow enough to intersect the unit. The water table aquifer is recharged via direct precipitation (surface runoff percolating through the ground surface) and by ephemeral stream recharge during flow events (Golders, 2018). The confined coal seam aquifer occurs deep below the water table aquifer and is separated by unweathered bedrock, which acts as an aquitard (Golders, 2018).

Desktop GDE mapping indicates the potential presence of two types of GDEs that may be utilising the groundwater resources at SWC Mine. These area:

- Aquatic (Type 2 GDEs) - ecosystems dependent on the surface expression of groundwater such as wetlands, lakes, seeps, springs, and river baseflow systems. In these cases, groundwater discharge provides water to support aquatic biodiversity
- Terrestrial (Type 3 GDEs) - ecosystems dependent on subsurface presence of groundwater such as terrestrial vegetation which depends on groundwater on a seasonal, episodic or permanent basis. These types of ecosystems can exist wherever the water table capillary fringe is within the root zone of the plants, either permanently or episodically.

The current described hydrogeologic model for the SWC Mine does not identify any areas within or surrounding the study area where there is a surface expression of groundwater (Golders, 2013). As such aquatic GDEs (Type 2) are not considered to occur within or surrounding the study area.

However, based on available monitoring bore data across the SWC Mine (Golders, 2018), there are habitats where vegetation could potentially access groundwater (i.e. < 10 m depth to water) (Canadell *et al*., 1996) and be considered a terrestrial GDE (Type 3). This is limited to the identified fringing riparian forest and portions of the floodplain Eucalypt forest habitat within the western portion of the study area along Walker Creek (**Figure 7**). In the broader area across the SWC Mine where shallow groundwater has also been identified, the habitats present are also limited to these two types. This includes areas within the upper branches of Walker Creek and along Carborough Creek.

For these habitat types, the groundwater that may potentially be accessed would be contained within the water table aquifer. This aquifer system does have limitations as a reliable and consistent groundwater source for vegetation as it is seasonally influenced. During dry periods when vegetation would be more reliant on this source of water, recharge rates and the influx of fresh water decreases, which impacts on water quality and water levels within the aquifer (Golders, 2018).

Nonetheless, these limitations would not necessarily discount the potential use of groundwater by these habitat types. Particularly for the habitat types that occur within the upper reaches of Walker Creek and along Carborough Creek where depth to water has been recorded at less than 5 m (Golders, 2018). Species composition within these habitat types also consist of native canopy species that have been recorded to access groundwater between depths of 6 to 10 m (i.e. *Eucalyptus calmedulensis* and *Corymbia clarksoniana*) (Orellana et al., 2011).

However, not all areas of these two habitat types occur in areas of shallow groundwater. The fringing riparian forest and floodplain Eucalypt forest habitat also extends along and adjacent to Walker Creek within the study area and further along Bee Creek, where depth to water within the water table aquifer are > 10m.

Therefore the likelihood of the study area supporting Type 3 GDEs is considered to be high in areas where shallow groundwater is present. This includes areas of fringing riparian forest and floodplain Eucalypt forest along the upper reaches of Walker Creek and Carborough Creek. The likelihood that these habitat types are Type 3 GDEs is lower along the downstream portions of Walker Creek, as well as outside of the study area along Bee Creek. This is due to the increase in depth to water within the water table aquifer.

# Figure 7: Terrestrial GDEs (Type 3) likely to occur within the study area

**Legend**

- Mining Lease
- Study area

**Flora values**

- Brigalow TEC
- Black Ironbox

**GDE values**

- Potential Terrestrial GDE (Type 3)

0 500 1,000 2,000

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

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# 5 Matter of National Environmental Significance

The MNES identified as occurring or likely to occur within the MRA Stage 2C study area are:

- One listed TEC (Brigalow dominant or co-dominant)
- Black Ironbox – threatened flora species and a GDE component of a water resource
- Habitat for four threatened fauna species (Greater Glider, Ornamental Snake, Koala and Squatter Pigeon)

**Table 5-1** provides MNES values and extent (including species habitat), identified within the MRA Stage 2C study area. **Figure 8** illustrates the location of each MNES value.

**Table 5-1: Summary of Field Verified MNES values**

| MNES Value | Study area (ha) | Disturbance footprint (ha)[1] |
|---|---|---|
| **Threatened Ecological Communities** | | |
| Brigalow (dominant or co-dominant) TEC | 32.7 | 32.7 |
| **Threatened Species' Habitat** | | |
| Black Ironbox | 27.2 | 16.8 |
| Koala | 259.4 | 212.2 |
| Ornamental Snake | 33.7 | 33.7 |
| Squatter Pigeon | 401.6 | 295.3 |
| Greater Glider | 186.2 | 149.3 |

[1] = Excluding approved Stage 2A area (EPBC 2014/7272)

The following sections provide a description of each field verified MNES value including the determination of key characteristics such as important populations, ecologically significant proportions and habitat critical to the survival of the species. Interpretation of these key characteristics has been done in accordance with the definitions provided in Commonwealth Significant Impact Guidelines (EPBC Act Policy Statement 1.1).

# Figure 8: MNES values

**Legend**

- Mining Lease
- Study area

**Flora values**

- Brigalow TEC
- Black Ironbox

**Fauna values**

- Greater Glider
- Koala
- Koala, Greater Glider
- Ornamental Snake
- Squatter Pigeon
- Squatter Pigeon, Koala

0 500 1,000 2,000

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

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## 5.1 Threatened Ecological Communities

### 5.1.1 Brigalow (dominant or co-dominant)

Four patches of Brigalow (dominant or co-dominant) TEC were identified within the study area, comprising of a total area of approximately 32.7 ha (**Figure 8**). These patches met all key diagnostic criteria and condition thresholds for the TEC (**Appendix D**).

Three of the Brigalow TEC patches within the study area are only small occurrences encompassing a total area of less than 1.5 ha. The majority of Brigalow TEC occurs in one large patch located in the western portion of the study area.

## 5.2 Black Ironbox

Approximately 27.2 ha containing 525 individuals of Black Ironbox was ground-truthed within the study area (**Figure 8**). An assessment of the population and value of habitat within the project disturbance footprint to the survival of the species is provided in the following sections.

As well as being a listed threated flora species, Black Ironbox may also be considered a groundwater dependent ecosystem (GDE). This is relevant to this assessment, as GDEs are considered MNES if they form an environmental water resource user that may be impacted by coal seam gas or a large coal mine development (i.e. the water trigger applies). The extent to which Black Ironbox within the study area should be considered a GDE is also discussed below.

*Important population*

Black Ironbox occurs in two disjunct distributions, Townsville to Nebo and around Rockhampton, which provide an extent of occurrence (EOO) in the order of 124,000 km$^2$ (DoE 2016e). Currently, there are no defined important populations for this species within its current range.

The Central Queensland population of Black Ironbox occurs within the Townsville to Nebo distribution and is separated into two catchments, the Bowen / Broken and Boogie River catchment and the Isaac / Fitzroy catchment. The study area occurs within the Isaac / Fitzroy catchment where the core and largest populations of Black Ironbox have been identified along Bee Creek, Funnel Creek and Dennison Creek (Queensland Herbarium, 2012). The density of mature Black Ironbox individuals along Bee Creek has been recorded at 165 individuals / km (Cardno, 2012), which falls within the upper quartile range of average measured density for the species (Queensland Herbarium, 2012). Walker Creek is a tributary of Bee Creek.

In consideration of the important population attributes defined in the Commonwealth Significant Impact Guidelines (EPBC Act Policy Statement 1.1), the study area is not considered to support an important population of Black Ironbox (**Table 5-2**). The density of mature Black Ironbox individuals along Walker Creek is approximately 76 individuals / km, which is similar to the average measured density for the species (Queensland Herbarium, 2012) and significantly lower than Bee Creek at 165 individuals / km. The large and denser population along Bee Creek provides a greater source a reproductive output (pollen) and plays a critical role in maintaining genetic diversity. At a catchment level scale, the Walker Creek Black Ironbox population is a localised occurrence of the species on a more minor tributary system, with the Bee Creek population being the main source population for the drainage system.

A summary of the assessment against the Commonwealth Significant Impact Guidelines (EPBC Act Policy Statement 1.1) important population criteria is provided in **Table 5-2.** The assessment is based on data, expert opinion and precedence.

**Table 5-2: Important population assessment for Black Ironbox**

| Important Population Criteria | Assessment | Justification |
|---|---|---|
| Key source population either for breeding or dispersal | No | • Density within the study area is 7.6 individuals / 100m.<br>• As a precedence the Sonoma Mine project recorded an important population at a density of 14.2 individuals / 100m along Coral Creek, double that of the Walker Creek occurrence.<br>• Bee Creek (downstream from impact site) density equates to 16.5 individuals / 100m.<br>• Lower density along Walker Creek indicates that habitat conditions are of a lower quality for the species when compared to Bee Creek and Coral Creek. Areas of higher quality habitat supporting a greater density of individuals are considered to be of greater source value for the wider population.<br>• For Eucalypt species the reproductive output (pollen pool) of a population is frequently dominated by a small percentage of mature trees flowering synchronously. Given that Bee Creek has a high density of individuals compared to Walker Creek, reproductive output is likely to be greater due to a higher chance of more mature trees flowering. |
| Populations that are necessary for maintaining genetic diversity | No | • Gene flow between populations for Eucalypt species is limited. This is most likely attributed to differences in flowering phenology between population, pollination mechanism (localised dispersal of pollen by insects and birds) and localised distribution of seed.<br>• Dispersal of seed and thus genetic material to other populations can be enhanced for riparian species; however this is still limited in Central Queensland due to the ephemeral nature of creek systems.<br>• For Eucalypt species, most of the genetic diversity occurs within populations. This is more pronounced in disjunct populations like the Black Ironbox.<br>• Whilst Eucalypts are commonly self-compatible (hermaphroditic flowers), the breeding system is one of mixed mating with preferential outcrossing. As such genetic diversity within populations can be impacted by inbreeding.<br>• Given that Bee Creek has a high density of individuals compared to Walker Creek, the chances of inbreeding are reduced. As such Walker Creek is less likely to be a population necessary for maintaining genetic diversity for the species in the local area. |
| Populations that are near the limit of the species range | No | • Expert distribution estimates for the species (Atlas of Living Australia) locate the study area within the species range, rather than on the limit.<br>• Study area is not the most western record for the Central Queensland population. The most western record for the |

| Important Population Criteria | Assessment | Justification |
|---|---|---|
| | | population occurs approximately 77km north-west from the study area and is 16km further west along Exe Creek.<br>• The species distribution extends much further south (Rockhampton region) and north (Ayr). The extent of occurrence is about 90,000 km$^2$ (Queensland Herbarium, 2008). |

*Habitat critical to the survival of the species*

Black Ironbox is a riparian dependent species, mainly distributed along the banks of wide (>10 m) drainage lines, usually of middle-order streams, with river sand, rock cobble or gravel substrates. Stream environment is ephemeral but subject to periodic high-energy flood flows. Sun-exposed sandy channels with deep river sands, or narrow drainage line tended to be free of this species and is considered unsuitable habitat (Queensland Herbarium, 2012). Habitat for Black Ironbox within the study area is restricted to the stream banks of Walker Creek.

Riparian condition surveys within the Isaac / Fitzroy catchment determined Walker Creek and Bee Creek to be good condition (Queensland Herbarium, 2012). Habitat for the species is not limited to the area within the study area and opportunities exist for the species to disperse and inhabit areas elsewhere in the catchment. As such, whilst habitat is suitable and supports the species within the project disturbance footprint, it is not critical in maintaining the survival of the species in the area.

*Black Ironbox as a GDE*

Desktop GDE mapping indicates the potential presence of two types of GDEs that may be utilising the groundwater resources at SWC Mine along Walker Creek where Black Ironbox was identified. These area:

- Aquatic (Type 2 GDEs) - ecosystems dependent on the surface expression of groundwater such as wetlands, lakes, seeps, springs, and river baseflow systems. In these cases, groundwater discharge provides water to support aquatic biodiversity
- Terrestrial (Type 3 GDEs) - ecosystems dependent on subsurface presence of groundwater such as terrestrial vegetation which depends on groundwater on a seasonal, episodic or permanent basis. These types of ecosystems can exist wherever the water table capillary fringe is within the root zone of the plants, either permanently or episodically.

As discussed in **Section 4.6,** the fringing riparian forest habitat and the floodplain Eucalypt forest habitat within areas of shallow groundwater (<10m), are likely to be terrestrial (Type 3) GDEs. However, groundwater depth is not consistent across the study area. Shallow groundwater is limited to the areas of this habitat along the upper reaches of Carborough Creek and Walker Creek within the study area. However, further downstream depth to groundwater increases. The likelihood of these habitats being a terrestrial (Type 3) GDE further downstream in areas where groundwater is deeper (>10m), is considered to be low.

The occurrence of Black Ironbox across the SWC Mine occurs within the fringing riparian forest habitat where depth to water within the water table aquifer has been recorded to range from 10 – 15 m from adjacent monitoring bores (Golders, 2018). It does not occur along Carborough Creek or upper portions of Walker Creek west of the study area where groundwater is very shallow (<5m). The density of Black

Ironbox along Walker within the study area and then further downstream along Bee Creek also varies, but generally increases as the creeks progress downstream. Within the project footprint of MRA2C, the density of Black Ironbox along Walker Creek was found to be approximately 7.6 individuals / 100m$^2$. This progresses to 8.27 individual / 100m$^2$ further downstream along Walker Creek within the mining lease. Along Bee Creek the density of Black Ironbox is substantially greater at 16.5 individuals / 100m$^2$.

While the species is within areas of habitat that may have access to shallow groundwater (i.e. 10 m), it also occurs outside of these areas and increases in density as groundwater becomes deeper and is therefore less accessible. It also does not occur in areas where groundwater is highly accessible. The species is very much restricted to the riparian zone of watercourses, so there is a level of water dependency. However, the variation in occurrence of the species suggests that this water dependency may be from other sources such as surface flow rather than groundwater. The variation of occurrence also suggest that other factors may contribute to the persistence of the species in the area other than water dependency such as stream characteristics and recruitment strategy (Queensland Herbarium, personal communication, 8 August 2017).

Studies have found that Black Ironbox seldom occurs on very narrow (5-10 m wide) drainage systems and is mainly distributed along the banks of middle-order streams, usually with a meander pattern (Pollock, 2012). Most of the streams in which Black Ironbox has been recorded are ephemeral. Occurrences are generally on alluvial soil substrates of river sand, rock cobble or gravel, which are typically well-drained and remain moist for much of the year. Other factors noted to influence the occurrence of Black Ironbox is water flow velocity, with most watercourses systems where Black Ironbox is situated found to be subject to periodic high energy flood flows (Pollock, 2012). The reason attributed to this is that that the regeneration of the species appears to be dependent on bare seed-beds prepared by previously flood-scoured cobble and river sand banks (Pollock, 2012). The high-water flows preceding the seeding of the species reduces understorey competition from other herbs, grasses and forbs and allows seeds to successfully germinate. All such factors are present along Walker Creek within the study area.

The rooting depth or depth to water table range has not been studied for Black Ironbox so the ability of the species to tap into the groundwater within the study area and further downstream cannot be negated. However, the level of dependency that the species has on groundwater sources at SWC Mine is not considered to be high. The interaction with groundwater is likely to be intermittent, seasonally and situationally dependent at best. This concept is supported by other examples of the species persistence without groundwater sources, including along watercourse in Collinsville, Queensland where the underlying metamorphic geology prevents access to groundwater and in plantings in non-riparian environments in Biloela, Queensland (Queensland Herbarium, personal communication, 8 August 2017).

## 5.3 Threatened fauna species

### 5.3.1 Ornamental Snake (*Denisonia maculata*)

Approximately 33.7 ha of Ornamental Snake habitat has been identified in the study area (**Figure 8**). This is based on habitat assessments identifying known ecological requirements for the species (refer to **Section 4.5**). Whilst previous ecological studies did not record the presence of the species within the study area, the species has been previously recorded across the mine site. This includes three records 2 – 5 km south-east of the study area in remnant Brigalow habitat.

Habitat within the study area considered to support Ornamental Snake includes gilgai relief areas on cracking clays. Targeted habitat assessments identified three areas of this habitat within the study area. The habitat was found to contain a structurally complex ground layer comprising extensive amounts of

woody debris, wide soil cracks, as well as deep ephemeral gilgai. Given the abundance and high variety of essential microhabitat features, coupled with the predominantly low presence of threats, it is likely that the species would be utilising the study area for breeding, feeding and sheltering. As such the study area is considered to contain important habitat for the species.

As per the Draft Referral Guidelines for the Nationally listed Brigalow Belt Reptiles (DoE, 2011), important habitat is utilised as a surrogate for important populations due to the cryptic nature of reptile species such as Ornamental Snake. Subsequently, the study area would be considered as an area supporting an important population of Ornamental Snake.

Additional Brigalow / Belah habitat was ground-truthed within the study area; however these areas were not determined to be Ornamental Snake habitat due to the lack of essential microhabitat features including gilgai and soil cracks.

### 5.3.2 Koala (*Phascolarctos cinereus*)

*Habitat critical to the survival of the species*

As per the EPBC Act referral guidelines for the vulnerable Koala, Koala habitat value is categorised by five primary habitat attributes – vegetation composition, occurrence, recovery value, key existing threats and connectivity. By applying these five attributes as per the referral guideline's Koala habitat assessment tool, the study area is deemed to contain habitat critical to the survival of the Koala (habitat score of 9). Approximately 259.4 ha of Koala habitat occurs within the study area (**Figure 8**).

A determination on the critical role of this habitat is provided below covering the five primary Koala habitat attributes and includes the latest regional data, previous ecological assessment results for the study area and the recent results of the targeted habitat assessments and fauna survey.

Vegetation composition, structure and condition

As per the EPBC Act referral guidelines for the vulnerable Koala (DoE 2014a), vegetation with a reliable access to soil moisture is a key habitat requirement for inland environments. Long periods of drought are a natural climatic condition of inland environments, which can cause moisture stress for large canopy trees resulting in the release of chemicals (terpenes and phenols) that can deter Koala consumption. An alternate access to a reliable source of soil moisture other than surface rainfall runoff is critical during these dry conditions.

Within the study area, the fringing riparian forest habitat and floodplain Eucalypt forest habitat is likely to have access to some degree to the saturation zone associated with Walker and Carborough Creek. Whilst this is not considered a continual alternate source to surface runoff, seasonal replenishment would provide for an extended period of soil moisture.

Based on targeted habitat assessments across the study area, Koala food trees listed for the Isaac Regional Council Area (AKF, 2015) were confirmed within the floodplain of Walker and Carborough Creek. The entirety of the fringing riparian forest habitat was found to contain two known Koala food trees; however only portions (approximately 45%) of the floodplain Eucalypt forest habitat was found to contain Koala food trees dominating the canopy layer (>50% coverage) (refer to **Section 4.4**). Koala food trees identified within these habitat types include:

- Poplar Box
- Narrow-leaved Ironbox
- Queensland Blue Gum
- River Red Gum

Suitable vegetation composition, structure and condition to support Koalas was therefore only identified within two habitat areas within the study area – the fringing riparian forest and portions of the floodplain Eucalypt forest habitat.

Occurrence

Surveys conducted in 2018 identified three Koalas within the study area, all restricted to the riparian and fringing floodplain Eucalypt forests. Additionally, survey data for the SWC Mine spanning over 11 years from 2005 – 2016, has also two confirmed sightings within proximity to the study area.

Recovery value

As per the EPBC Act referral guidelines for the vulnerable Koala, the interim recovery objectives for inland environments is protecting and conserving refuge habitat. Given the Koala was recorded within riparian habitats during the 2018 field assessment, it is considered that the study area and in particular the riparian and fringing floodplain Eucalypt forests, would contribute to the recovery of the Koala.

Key existing threats

The study area has historically been utilised for grazing purposes. Key threats to the species such as dog attacks and vehicle strikes would have been low. Operational mining activities do not currently extend into the study area. Vehicle traffic associated with mining activities are infrequent and occur as part of routine maintenance and inspection checks across the lease. Clearing or construction of infrastructure within the study area has not occurred to the extent that it would create a barrier to Koala movement.

Overall, key existing threats to Koala within the study area are considered to be low.

Connectivity

The study area forms the eastern edge of a large vegetation tract that extends west of the South Walker mining lease. Connectivity to the west and south of the study area is therefore high. The large vegetation tract provides a landscape linkage between the Carborough Ranges and Dipperu National Park.

The operational mining area fragments the study area from areas to the north and east, creating a significant barrier to fauna movement. However, Walker Creek does provide a corridor that links to other eastern areas of habitat along Bee Creek.

Determination of habitat critical to the survival of the species

All habitats within the study area form the eastern extent of a larger vegetation tract, contributing to a landscape in which fauna species can readily disperse. Due to the study area's dominant grazing land use key existing threats to Koalas such as dog attacks and vehicle strikes are uniformly low. However, the 2018 survey confirmed the occurrence of three Koalas only in riparian and fringing floodplain Eucalypt forests in the study area. These areas are also the only habitat types within the study area that provide suitable vegetation composition, structure and condition for the species. These habitats contain the foraging resources capable of supporting species utilisation of the area.

Based on the Koala referral guidelines, the riparian and fringing floodplain Eucalypt forest habitat within the study area is considered to be habitat critical to the survival of the species due to three confirmed sightings in 2018, good connectivity to the west, high vegetation structure and composition value, high recovery value of the habitat and low existing threats.

Important population

At present, there are no species-specific policy guidelines on what constitutes an important population for the Koala. As such, an assessment of an 'important population' was made based on guidance within the *Matters of National Environmental Significance Significant impact guidelines 1.1* (DoE 2013).

The species is known to occur within the study area and surrounds and has been identified as using both riparian and floodplain eucalypt woodland habitat areas. Based on available evidence and regional species records to date, concentration of sightings occur around specific habitat nodes within the Conor Ranges, Dipperu National Park and the Funnel Creek riparian habitat, as well as Blair Athol State Forest Park (ALA, 2016). The Carborough Ranges to the west of the study area are also likely to provide a large habitat area for Koalas. Given the high connectivity value that Walker Creek provides to these areas, as well as numerous recent records, the study area is likely to:

- Contain a key source population for breeding or dispersal; and
- Contain a population large enough that is necessary for maintaining genetic diversity.

The study area does not contain a population that is near the limit of its range, as Koala are found throughout eastern Queensland and southern states.

### 5.3.3 Squatter Pigeon (*Geophaps scripta scripta*)

Approximately 401.6 ha of Squatter Pigeon habitat was identified within the study area (**Figure 8**). This is based on positive identification of the species within the study area and targeted habitat assessments identifying known ecological requirements for the species (refer to **Section 4.5**). In addition to the recent survey record, previous ecological studies recorded the presence of the species adjacent to the study area. Habitat considered to support Squatter Pigeon within the study area includes Eucalypt dominated forest habitat with the following characteristics:

- Within 1km of a permanent water source (artificial and non-artificial)
- Consists of a diverse groundcover with bare ground (approximately 30%) available for foraging
- Occurs on a well-draining sandy substrate (Land zone 5)

An assessment of the population status of individuals utilising the study area, as well as the value of habitat to the survival of the species is provided in the following sections.

*Important population*

Squatter Pigeon is a far ranging species with the extent of occurrence (EOO) in the order of 1,684,230 km$^2$ across north Queensland to central New South Wales (ELA, 2015). The southern EOO for the species has been determined as contracting northwards and as a result all relatively small, isolated and sparsely distributed sub-populations occurring south of the Carnarvon Ranges are considered important (DoE 2016d). The study area occurs in the northern EOO for the species and is well north of the Carnarvon Ranges.

In addition to this, the study area is not considered to support an important population of Squatter Pigeon as it does not comprise the attributes defined in the Commonwealth Significant Impact Guidelines (EPBC Act Policy Statement 1.1) (**Table 5-3**). The key component of this determination is that suitable habitat within the study area is small in extent and would not be considered source habitat supporting a source population. At a regional scale (1:500,000), the study area forms a potential sink area where individuals disperse to from larger areas of higher quality habitat. Source areas surrounding the study area include the lateritic jump ups and old alluvial plains of the Isaac River and Funnel Creek as well as the ridge lines of Crediton State Forest and Carborough Ranges adjacent to Eungella Dam. This is supported by the numerous species records within these areas. As a sink habitat, the study area would not play a critical role in maintaining genetic diversity of the species. This would be a primary role of a source population.

A summary of the assessment against the Commonwealth Significant Impact Guidelines (EPBC Act Policy Statement 1.1) important population criteria is provided in **Table 5-3.** The assessment is based on data and expert opinion.

**Table 5-3: Important population assessment for Squatter Pigeon**

| Important Population Criteria | Assessment | Justification |
|---|---|---|
| Key source population either for breeding or dispersal | No | • Large areas of higher quality habitat can support a greater number of individuals, which would be considered source populations.<br>• Areas of high quality habitat within the region include the lateritic jump ups and old alluvial plains of the Isaac River and Funnel Creek, and the ridges within Carborough ranges and Crediton State Forest located to the west, east and north of the study area, respectively<br>• The study area contains areas of suitable habitat; however in a regional and overall species distribution context this habitat is of a smaller extent and would be considered a sink area - habitat where individuals disperse to from a source area |
| Populations that are necessary for maintaining genetic diversity | No | • Squatter Pigeon is a mobile species with a widespread EOO (1,684,230 km$^2$) and a substantial AOO (2,888 km$^2$). It's not a sedentary species that occurs in isolated and disjunct populations.<br>• Due to the nature of the species, genetic flow is not constrained for the greater population and the risk of inbreeding is low.<br>• There are no distinct populations that are necessary for maintaining genetic diversity; however source populations are considered important for maintaining EOO and AOO, which in turn effects the genetic flow characteristics of the species. The study area is not considered to contain a source population. |
| Populations that are near the limit of the species range | No | • Study area located within the central portion of the species known range<br>• Other records further west of the study area |

*Habitat critical to the survival of the species*

The Squatter Pigeon occupies a wide array of habitat types, however, requires specific habitat values to support breeding and foraging opportunities. This includes open forest and woodland communities on sandy or gravelly substrates with low vegetated ground cover and within 1 km of permanent water sources to fulfil the species daily requirements (DoE 2016d). The habitat identified within the study area consists of the Tertiary loamy and sandy plains of the older alluvial terraces of Walker Creek and Carborough Creek that were found to consist of a sparse groundcover and sufficient areas of bare ground. This also includes similar habitat ground-truthed within 1 km of a large farm dam.

Whilst suitable habitat does occur within the study area, it is not considered to play a critical role in maintaining the survival of the species in the area. In addition to the source habitat areas located in the surrounding landscape, there is a large extent that could provide similar sink habitat for the species. Numerous water sources are also provided by mine site dams where the species has been previously recorded. Thus other areas of habitat are available in the region and the persistence of the species is not reliant on habitat within the study area.

### 5.3.4 Greater Glider (*Petauroides volans*)

Approximately 186.2 ha of Greater Glider habitat was identified within the study area (refer to **Section 4.5**) (**Figure 8**). Nocturnal surveys carried out along Walker Creek in 2018 confirmed the presence of 22 individuals. Previous ecological studies have also recorded the presence of the species within the study area and five species records occur directly upstream of the study area along Walker Creek. Habitat considered to support Greater Glider within the study area includes Eucalypt dominated forest habitat with an abundance of hollow-bearing trees. This was associated with the fringing riparian habitat along Walker Creek.

An assessment of the population status of individuals utilising the study area, as well as the value of habitat to the survival of the species is provided in the following sections.

*Important population*

Currently, there are no defined important populations for this species within its current range. Greater Glider is a far ranging species with the extent of occurrence (EOO) in the order of 1,586 870 $km^2$ across north Queensland to Victoria (ELA, 2015). Current population density estimates across its distribution range between 0.01 to 5 individuals per hectare (TSSC 2016).

In consideration of the important population attributes defined in the Commonwealth Significant Impact Guidelines (EPBC Act Policy Statement 1.1), the study area is considered to support an important population of Greater Glider (**Table 5-4**). The key component of this determination is the identification of 22 individuals across five nights of survey within 153.2 ha of suitable habitat (equating to a density of 0.14 per ha). Additionally, the study area contains a high abundance of important habitat resources such as hollow-bearing trees both within and adjacent to Walker Creek. Additionally, pre-clearance surveys across approximately 70 ha of suitable Greater Glider habitat directly north of the study area along Walker Creek also identified five individuals.

Greater Glider have low dispersal ability and are sensitive to fragmentation. Large vegetation tracts containing old growth vegetation with a high density of hollow-bearing trees would be required to support a population large enough to be considered a source population. The study area contains a high density of hollow bearing trees and is highly connected to large tracts of vegetation such as the Carborough Ranges in the west and Dipperu National Park in the south. Records of Greater Glider exists within the Carborough Ranges and due to the high connectivity, the Greater Glider population within the study area would be contiguous with the western population. This population is likely to be a source population, where individuals would most likely be dispersing from to sink populations in the south, which contains fewer records (ALA 2018). As a source population, the study area would play a role in maintaining genetic diversity of the species.

A summary of the assessment against the Commonwealth Significant Impact Guidelines (EPBC Act Policy Statement 1.1) important population criteria is provided in **Table 5-4**.

**Table 5-4: Important population assessment for Greater Glider**

| Important Population Criteria | Assessment | Justification |
|---|---|---|
| Key source population either for breeding or dispersal | Yes | Modelling indicates that native forest patches of at least 160 km$^2$ are required to maintain a viable population of Greater Glider. Whilst home ranges are small the species requires up to four den sites / 2 ha of suitable habitat (DoE, 2015).<br>Large forest patches within the region that have the potential to contain suitable habitat and a high density of den sites include the Carborough ranges and Connor Ranges.<br>The study area is considered to form part of a large tract of suitable habitat (> 160 km$^2$) that contains a high density of hollow bearing trees (> 4 sites per 2 ha). Habitat areas connect west to the Carborough Ranges and south to Dipperu National Park. Records in the wider area are considered to form part of the same population that exists within the study area, and is likely a source population for habitat areas in the south and south-east. |
| Populations that are necessary for maintaining genetic diversity | Yes | Large habitat tracts supporting a source populations are considered important for maintaining genetic diversity. The study area is considered to contain a source population. |
| Populations that are near the limit of the species range | No | The population within the study area is not near the limit of its range as the study area is located within the central portion of the species known range, with exiting records to the west. |

*Habitat critical to the survival of the species*

The survival of Greater Glider within an area is heavily dependent on the presence of contiguous vegetation containing hollow bearing trees. Areas that have been cleared of such habitat resources have shown rapid and significant population declines (DoE, 2015). Even areas where vegetation has regrown such as forestry reserves, Greater Glider populations have not been able to recover due to the lack of nesting hollows (DoE, 2015).

A similar strong correlation exists between tree hollows and species abundance. With the species small home ranges, areas containing a high density of hollow bearing trees have the capacity to support a high abundance of the species (DoE 2015). The species preference is for 2 – 4 den sites / 2 ha of suitable habitat (DoE, 2015). To support a viable population of Greater Glider, an extensive area containing hollow bearing trees is required. Habitat modelling has indicated areas in the order of 160 km$^2$ (DoE, 2015).

Based on these habitat requirements, habitat critical to the survival of the species is considered to consist of large vegetation patches containing a high density of hollow bearing trees. The study area is highly connected to vegetation the west and south creating large tracts of suitable habitat. Riparian and eucalypt floodplain vegetation also contain a high density of hollow bearing trees. As such, the study area is considered to contain habitat critical to the survival of the Greater Glider.

# 6 Impact Assessment

In determining the significance of impact associated with the MRA Stage 2C, the relevant criteria listed in the Matters of National Environmental Significance – Significant Impact Guidelines 1.1 (DoE) dated 2013 were applied.

## 6.1 Threatened Ecological Communities

### 6.1.1 Brigalow (dominant or co-dominant)

**Table 6-1** outlines the significant impact assessment for the Brigalow TEC, listed as endangered under the EPBC Act. A maximum of approximately 32.7 ha of Brigalow TEC will be impacted by the Project, which will adversely affect habitat critical to the survival of the ecological community (**Figure 9**). Project impacts are likely to be significant on this MNES value.

**Table 6-1: Significant Impact Criteria – Brigalow TEC**

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| Reduce the extent of an ecological community | No | The extent of occurrence for Brigalow TEC across the region will remain unchanged following the development of the project. |
| Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines | No | Clearing for the project will not fragment any patches of Brigalow TEC. Connectivity between remaining Brigalow TEC patches will remain following the development of the project. |
| Adversely affect habitat critical to the survival of an ecological community | Yes | Approximately 32.7 ha of Brigalow TEC habitat will be lost as a result of the project. |
| Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns. | Yes | The progression of the Mulgrave pit and construction of associated infrastructure will ultimately remove 32.7 ha of Brigalow TEC and associated habitat. |
| Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting | No | The progression of the Mulgrave pit and construction of associated infrastructure will ultimately remove 32.7 ha of Brigalow TEC rather than cause a substantial change in species composition. |
| Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: | No | The progression of the Mulgrave pit and construction of associated infrastructure will ultimately remove 32.7 ha of Brigalow TEC rather than cause a substantial reduction in the quality or integrity. |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| – assisting invasive species, that are harmful to the listed ecological community, to become established, or<br>– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community | | |
| Interfere with the recovery of an ecological community | No | The project will result in 32.7 ha of Brigalow TEC being impacted. This equates to only 0.2% of the mapped Brigalow TEC extent (based on RE associations) occurring within the Northern Bowen Basin (subregion). |

# Figure 9: MNES values - impact area

**Legend**

- Mining Lease
- Study area
- Impact area

**Flora values**

- Brigalow TEC
- Black Ironbox

**Fauna values**

- Greater Glider
- Koala
- Koala, Greater Glider
- Ornamental Snake
- Squatter Pigeon
- Squatter Pigeon, Koala

0 500 1,000 2,000

Metres

Datum/Projection:
GDA 1994 MGA Zone 55

N

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Prepared by: RW Date: 03/05/2018

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## 6.2 Black Ironbox

*Threatened species impact assessment*

**Table 6-2** outlines the significant impact assessment for Black Ironbox, as per its listing as a vulnerable flora species under the EPBC Act. Approximately 405 individuals across 16.8 ha of suitable riparian habitat will be impacted by the project (**Figure 9**). This habitat has been assessed as not critical for the survival of the species and the occurrence of Black Ironbox within the study area is not considered to be part of an important population (refer to **Section 5.2**). Project impacts are not considered to be significant on Black Ironbox.

In addition to the remaining undisturbed habitat within the study area, it is proposed to use Black Ironbox in the revegetation of the constructed diversion channel to assist in mitigating impacts associated with the removal of mature individuals within the project disturbance footprint. This is discussed further in **Section 7.0**.

**Table 6-2: Significant Impact Criteria (vulnerable species) – Black Ironbox**

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| Lead to a long-term decrease in the size of an important population of a species | No | The occurrence of Black Ironbox is not considered to be part of an important population. Larger more densely populated occurrences occur in the region and immediate surrounding areas (e.g. Bee Creek).<br>Revegetation of the creek diversion utilising the species would mitigate the long-term decrease of Black Ironbox within the impact area. |
| Reduce the area of occupancy of an important population | No | The occurrence of Black Ironbox is not considered to be part of an important population. Larger more densely populated occurrences occur in the region and immediate surrounding areas (e.g. Bee Creek). Impacts are expected on approximately 405 individuals across 16.8 ha. Nearby important populations downstream on Bee Creek will not be impacted by this Project.<br>Revegetation of the creek diversion utilising the species would mitigate the reduction of area of occupancy of Black Ironbox within the impact area. |
| Fragment an existing important population into two or more populations | No | Project clearing will not fragment habitat supporting an important population. |
| Adversely affect habitat critical to the survival of the species | No | Habitat within the study area is not considered critical to the survival of the species due good quality habitat still occurring downstream of the study area. Loss equates to only 0.04 % of potential Black Ironbox habitat modelled within the region. |
| Disrupt the breeding cycle of an important population | No | The occurrence of Black Ironbox is not considered to be part of an important population. Larger more densely populated occurrences occur in the region and immediate surrounding areas (e.g. Bee Creek). |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| | | This population would have a greater reproductive output (pollen) in comparison to population within the study area. |
| Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | No | Habitat within the study area is not considered critical to the survival of the species due good quality habitat occurring downstream of the study area and in numerous other large watercourse systems in the nearby region.<br>The loss equates to only 0.04% of potential Black Ironbox habitat modelled within the region. It is unlikely that this will result in a decline of the species.<br>Rubber Vine is a threat to the species and has the potential to cause extensive degradation. No Rubber Vine infestations were located along Walker Creek. Current mining operations have not introduced this species and it is unlikely that this will occur as a result of the expansion project. Exotic grasses were prevalent along Walker Creek and likely a result of previous grazing land use rather than current mining activities. Management of diversion rehabilitation will include weed and exotic grass control which are identified as threatening processes. |
| Introduce disease that may cause the species to decline | No | No diseases listed as a threat to the species |
| Interfere substantially with the recovery of the species | No | Based on the percentage of potential modelled habitat impacted, the project is not considered to substantially interfere with the recovery of the species.<br>Rehabilitation of creek diversion will include Black Ironbox to mitigate impacts. |

*GDE impact assessment*

Groundwater impacts have been assessed based on the level of risk that predicted drawdown will affect Black Ironbox within SWC Mine. The level of risk has been determined on:

- Likelihood of drawdown impacts;
- Likelihood of Black Ironbox utilising groundwater (i.e. inferred degree of dependency);
- Consequences of drawdown on Black Ironbox (considering associated ecological value and severity of threat);

Drawdown within the water table aquifer has been predicted within a 0.2 – 2 km radius around the life of mine extent at SWC Mine. Approximately 2 km of fringing riparian forest containing Black Ironbox occurs within the effected drawdown area. Black Ironbox outside of the predicted draw down area along the lower reaches of Walker Creek and Bee Creek are unlikely to be impacted by changes in groundwater levels.

The level of dependency that the species has on groundwater sources at SWC Mine is not considered to be high. The interaction with groundwater is likely to be intermittent, seasonally and situationally dependent at best. Due to the lower level of reliance on groundwater, the severity of threat is considered to be low.

In addition to drawdown, other groundwater impacts can occur as a result of mining operations such as aquifer fragmentation. Water table aquifer within the alluvium at SWC Mine is already fragmented so impacts associated with interrupted connectivity is not anticipated. Overall, indirect impacts to Black Ironbox as a result of groundwater drawdown are not anticipated to be significant. Based on the low risk of indirect impacts, approximately 120 individuals across approximately 10.4 ha of riparian habitat will remain undisturbed within the study area.

As it is highly likely that Black Ironbox requires water from the riparian saturation zone, the maintenance of the current hydrological flows along Walker Creek is of importance. The constructed diversion channel will divert the current catchment area associated with Walker Creek. Connectivity of subsurface flows (hyporheic) will remain through deliberate design and over excavation of the diversion channel to provide a hyporheic zone. As such, water flow and volume to downstream areas will be equivalent to current conditions, which will further reduce the likelihood of indirect impacts to downstream populations.

## 6.3 Threatened Fauna Species

### 6.3.1 Ornamental Snake (*Denisonia maculata*)

**Table 6-3** outlines the significant impact assessment for Ornamental Snake, listed as vulnerable under the EPBC Act. A maximum of approximately 33.7 ha of Ornamental Snake habitat supporting an important population will be impacted by the project (**Figure 9**). Project impacts are therefore likely to be significant for this MNES value.

**Table 6-3: Significant Impact Criteria – Ornamental Snake**

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| Lead to a long-term decrease in the size of an important population of a species | Yes | Habitat within the study area is considered to support an important population due to the presence of important habitat (gilgai habitat in good condition). The determination of important habitat is supported by species records 2 – 5 km south-east of the study area. The project will impact on 33.7 ha of Ornamental Snake habitat. No undisturbed Ornamental Snake habitat will remain within the study area following the development of the project, resulting in the reduction of the local important population. |
| Reduce the area of occupancy of an important population | Yes | Habitat within the study area is considered to support an important population due to the presence of high quality habitat. The project will impact on 33.7 ha of Ornamental Snake habitat. No undisturbed Ornamental Snake habitat will remain within the study area following the development of the project, |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| | | resulting in the reduction of area of occupancy for the local important population. |
| Fragment an existing important population into two or more populations | No | Project clearing will not fragment Ornamental Snake habitat supporting an important population. |
| Adversely affect habitat critical to the survival of the species | Yes | The project will impact on 33.7 ha of Ornamental Snake habitat. No undisturbed Ornamental Snake habitat will remain within the study area following the development of the project. |
| Disrupt the breeding cycle of an important population | No | The project will not specifically disrupt the breeding cycle of an important population. |
| Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | No | The species is also known to persist in disturbed environments as long as key microhabitat features are present (gilgai, soil cracks) |
| Introduce disease that may cause the species to decline | No | There are no known diseases that threatened the species |
| Interfere substantially with the recovery of the species | No | The project does not interfere with the recovery actions outlined in the Draft Recovery Plan for Queensland Brigalow Belt Reptiles. |

### 6.3.2 Koala (*Phascolarctos cinereus*)

**Table 6-4** describes the significant impact criteria for the Koala, listed as vulnerable under the EPBC Act. A maximum of 212.2 ha of Koala habitat will be impacted by the project (**Figure 9**). This habitat has been assessed as critical for the survival of the species and is considered to support an important population (refer to **Section 5.3.2**).

The diversion channel has been designed to maintain the hydrology of Walker Creek and indirect impacts on habitat further downstream along Walker Creek are unlikely. The inclusion of Koala food trees in the revegetation of the constructed diversion channel is proposed to assist in mitigating impacts on habitat within study area. This is discussed further in **Section 7.0**.

Project impacts are likely to adversely affect habitat critical to the survival of the species.

**Table 6-4: Significant Impact Criteria – Koala**

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| Lead to a long-term decrease in the size of an important population of a species | No | The study area is considered to support an important population of Koalas. Three individuals were confirmed within the study area during the 2018 survey. Based on current information and concentrations of species records, important populations are likely to occur in the Conor Ranges, Carborough Ranges, Dipperu National Park and the Funnel Creek riparian habitat, as well as Blair Athol State Forest Park. The study area is highly |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| | | connected to these areas enabling a contiguous population<br>The project is unlikely to lead to a long-term decrease in the size of the population. The connectivity with surrounding habitat will remain following the creek diversion project, allowing for breeding males to still disperse across the area. Whilst some connectivity along the riparian corridor will be lost until rehabilitation of the creek diversion is established, the species will be able to utilise adjacent eucalypt woodland habitats to disperse.<br>The existing hydrology of Walker Creek will also be maintained within the diversion channel, which will retain habitat values within the study area. Rehabilitation of the creek diversion will include Koala food trees to mitigate impacts. |
| Reduce the area of occupancy of an important population | No | The study area is considered to support an important population of Koalas. Three individuals were confirmed within the study area during the 2018 survey. Based on current information and concentrations of species records, important populations are likely to occur in the Conor Ranges, Carborough Ranges, Dipperu National Park and the Funnel Creek riparian habitat, as well as Blair Athol State Forest Park. The study area is highly connected to these areas enabling a contiguous population.<br>The project is unlikely to lead to a reduction in area occupancy of the population. The connectivity with surrounding habitat will remain following the creek diversion project, allowing for breeding males to still disperse across the area. Whilst some connectivity along the riparian corridor will be lost until rehabilitation of the creek diversion is established, the species will be able to utilise adjacent eucalypt woodland habitats to disperse.<br>The existing hydrology of Walker Creek will also be maintained within the diversion channel, which will retain habitat values within the study area. Rehabilitation of the creek diversion will include Koala food trees to mitigate impacts. |
| Fragment an existing important population into two or more populations | No | The project is unlikely to fragment an existing population into two or more populations. The study area is well connected to large tracts of surrounding habitat within the Conor Ranges, Carborough Ranges, Dipperu National Park and the Funnel |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| | | Creek riparian habitat, as well as Blair Athol State Forest Park.<br>The connectivity with surrounding habitat will remain following the construction of the project. Whilst some connectivity along the riparian corridor will be lost until rehabilitation of the creek diversion is established, the species will be able to utilise adjacent eucalypt woodland habitats to disperse. |
| Adversely affect habitat critical to the survival of the species | Yes | Habitat within the study area is considered critical to the survival of the species. This is in accordance with the Koala referral guidelines (habitat score of 9).<br>Two key considerations are outlined in referral guidelines as to whether a proposed action will have or is likely to have a significant impact on the koala. These include:<br>• Adversely affecting habitat critical to the survival of the species (specifically, > 20 ha with a habitat score of >8), and/or<br>• Interfering substantially with the recovery of the species through the introduction or exacerbation of key threats in areas of habitat critical to the survival of the species<br>A total of 212.2 ha of habitat (habitat score of 9) will be impacted by the project, as such the project is likely to have a significant impact on the Koala. |
| Disrupt the breeding cycle of an important population | No | Based on current information and concentrations of species records, important populations are likely to occur in the Conor Ranges, Carborough Ranges, Dipperu National Park and the Funnel Creek riparian habitat, as well as Blair Athol State Forest Park. The study area is highly connected to these areas enabling a contiguous population.<br>The project is unlikely to disrupt the breeding cycle of the population. The connectivity with surrounding habitat will remain following the creek diversion project, allowing for breeding males to still disperse across the area. Whilst some connectivity along the riparian corridor will be lost until rehabilitation of the creek diversion is established, the species will be able to utilise adjacent eucalypt woodland habitats to disperse. |
| Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | No | The project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of the habitat. A total of 212.2 ha of Koala habitat will be impacted by the project. The area provides suitable |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| | | foraging resources for the species. However, the connectivity with surrounding habitat will remain following the creek diversion project, allowing for breeding males to still disperse across the area. Whilst some connectivity along the riparian corridor will be lost until rehabilitation of the creek diversion is established, the species will be able to utilise adjacent eucalypt woodland habitats to disperse. |
| Introduce disease that may cause the species to decline | No | It is unlikely that the project will facilitate the introduction or spread of diseases specific to the species such as Chlamydia, or diseases that can significantly degrade critical habitat such as root rot (*Phytophthora cinnamomi*).<br>Whilst dieback was noted to occur in the study area, this was highly localised and not to the extent that occurs as a result of root rot. No other signs of root rot such as yellow and wilting of the leaves was observed across the vegetation communities within the study area. |
| Interfere substantially with the recovery of the species | No | The project will not increase Koala fatalities due to dog attacks, vehicle strike or introduced pathogens. Mining activities are limited to operational land and will not encroach into remaining habitat areas.<br>The retention of vegetation within undisturbed portions of the study area will retain connectivity across the landscape, allowing Koalas to continue to disperse to surrounding areas of suitable habitat. Maintaining existing hydrology of Walker Creek within the diversion channel will also retain refuge habitat values within the study area.<br>Rehabilitation of the creek diversion will include Koala food trees to mitigate impacts. |

### 6.3.3 Squatter Pigeon (*Geophaps scripta scripta*)

**Table 6-5** outlines the significant impact assessment for Squatter Pigeon, listed as vulnerable under the EPBC Act. A maximum of approximately 295.3 ha of Squatter Pigeon habitat will be potentially impacted by the project (**Figure 9**). This habitat has been assessed as not critical for the survival of the species and is not considered to support an important population (refer to **Section 5.3.3**). Project impacts are not considered to be significant on Squatter Pigeon.

**Table 6-5: Significant Impact Criteria – Squatter Pigeon**

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| Lead to a long-term decrease in the size of an important population of a species | No | Not considered an important population as current occurrence not considered to be part of a source population and playing a critical role in maintaining genetic diversity. |
| Reduce the area of occupancy of an important population | No | Not considered an important population as current occurrence not considered to be part of a source population and playing a critical role in maintaining genetic diversity. |
| Fragment an existing important population into two or more populations | No | Project clearing will not fragment Squatter Pigeon habitat supporting an important population. |
| Adversely affect habitat critical to the survival of the species | No | Habitat within the study area is not considered critical to the survival of the species due to the abundance of habitat (including breeding) that occurs in the region.<br>Potential breeding habitat for the species will be cleared as a result of the project. The diversion will result in the relocation of a suitable water source for the species further south. Current extent of breeding habitat ground-truthed within the study area is 401.6 ha, of which 295.3 ha will be impacted. Following the construction of the project, including the diversion, critical water resources may be available to the surrounding suitable foraging habitat for the species. |
| Disrupt the breeding cycle of an important population | No | Not considered an important population as current occurrence not considered to be part of a source population and playing a critical role in maintaining genetic diversity. |
| Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | No | The project will result in the potential loss of 295.3 ha of Squatter Pigeon habitat. This equates to only 0.3% of potential Squatter Pigeon habitat modelled within the region (1:500,000). It is unlikely that this will result in a decline of the species.<br>Other threats to the species including overgrazing, weed incursion of Buffel Grass and predation by pest species are already noted and are likely the result of the current grazing land use. |
| Introduce disease that may cause the species to decline | No | No diseases are listed as a threat to the species. |
| Interfere substantially with the recovery of the species | No | Based on the percentage of potential modelled habitat impacted, the project is not considered to substantially interfere with the recovery of the species. |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| | | Rehabilitation of creek diversion to ensure the catchment size and volume of water flow through the diversion is similar to that of Walker Creek will assist in mitigating impacts on breeding habitat. |

### 6.3.1 Greater Glider (*Petauroides volans*)

**Table 6-6** outlines the significant impact assessment for Greater Glider, listed as vulnerable under the EPBC Act. Approximately 149.3 ha of Greater Glider habitat will be potentially impacted by the project (**Figure 9**). This habitat is considered to support an important population and to be habitat critical to the survival of the species.

The persistence of the species in a fragmented and disturbed landscape like that of the Northern Brigalow Belt is heavily dependent on forest connectivity, sizeable habitat tracts and the presence of hollow-bearing trees. Hollow-bearing trees are a particularly critical component as they are a limited resource due to the association with old growth forest.

The project will result in the removal of habitat containing a high density of breeding resources. Riparian corridors along Walker Creek provide high quality connectivity for the Greater Glider to Carborough Range in the west, Conor Range and Dipperu National Park in the east. Diversion of the creek will reduce the riparian connectivity and the ability of the species to disperse between sink and source populations. The project is therefore likely to have a significant impact on the Greater Glider.

**Table 6-6: Significant Impact Criteria – Greater Glider**

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| Lead to a long-term decrease in the size of an important population of a species | Yes –within the study area | The study area is considered to contain an important population of Greater Glider. 22 individuals were identified across five nights of survey within 153.2 ha of suitable habitat. 149.3 ha of habitat will be removed for the project, including trees with high densities of hollows, which are a key resource for the species. It is considered likely that this impact will reduce the size of the population with in the study area. |
| Reduce the area of occupancy of an important population | Yes | The study area is considered to contain an important population of Greater Glider and 149.3 ha of habitat will be removed for the project. This will reduce the area of occupancy of the species. |
| Fragment an existing important population into two or more populations | Yes | The study area is considered to contain an important population of Greater Glider. 22 individuals were identified across five nights of survey within 153.2 ha of suitable habitat. This population is likely to form part of a larger source population to the west in the Carborough Ranges. Riparian habitat with old growth forest provide connectivity corridors between suitable habitat areas and Walker Creek is likely to provide |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| | | connection to larger habitat areas in the east, such as Dipperu National Park.<br>Removal of old growth forest within the riparian corridor of Walker Creek may reduce Greater Glider movement between habitat areas and fragment populations east and west of the study area. Greater Glider is known to be sensitive to even small levels of fragmentation and this is therefore considered to be significant. |
| Adversely affect habitat critical to the survival of the species | Yes | The study are is considered to contain habitat critical to the survival of the Greater Glider. 149.3 ha of habitat will be removed for the project and this is considered to be significant. |
| Disrupt the breeding cycle of an important population | Yes | The study area contains a high density of tree hollows which is a key breeding resource for Greater Gliders. It is likely the removal of this resource would have some disruptive effected on the important population of Greater Glider in the study area. |
| Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline | Yes – within the local area | The study are is considered to contain habitat critical to the survival of the Greater Glider. High density suitable hollows were identified within Walker Creek that are known to be utilised by the species. Riparian habitat with old growth forest provide connectivity corridors between suitable habitat areas and Walker Creek is likely to provide connection to larger habitat areas east and west of the study area. Greater Glider are considered particularly sensitive to removal of old growth forests containing hollows and have little dispersal ability between cleared areas.<br>The project will result in the potential impact on 149.3 ha of riparian habitat containing the essential breeding resource of hollow-bearing trees. As hollow-bearing trees are a limited resource with density concentrated along Walker Creek, the removal of this riparian habitat will reduce the carrying capacity of the area. This is likely to result in localised population decline. |
| Introduce disease that may cause the species to decline | No | There are no known diseases that threaten the species. |
| Interfere substantially with the recovery of the species | Yes | The project is likely to interfere with the primary conservation action listed in the species conservation advice (TSSC 2016), specifically;<br>• Protect and retain hollow-bearing trees, suitable habitat and habitat connectivity |

| Significant Impact Criteria | Assessment | Response to Criteria |
|---|---|---|
| | | Greater Glider are considered particularly sensitive to removal of old growth forests containing hollows and have little dispersal ability between cleared areas.<br>Removal of old growth forest within the riparian corridor of Walker Creek may reduce movement between east and west habitat areas and diminish the availability of suitable hollow-bearing trees. These actions may interfere with the recovery of the species in the area. |

# 7 Mitigation and Management

## 7.1 Avoidance and minimisation

The diversion channel alignment has been chosen to predominantly traverse an existing drainage line, which will reduce the extent of excavation and clearing required. In doing so the pit will be limited to the available area north of the diversion. Whilst clearing impacts will occur to develop the pit and establish the diversion and associated water management infrastructure, further disturbance to surrounding MNES values within the study area will be minimised.

## 7.2 Mitigation and management

The proposed diversion channel presents an opportunity to rehabilitate in consideration of MNES values impacted by the MRA Stage 2C project. The diversion channel has been specifically designed to provide features that are characteristic of incised alluvial streams within the Bowen Basin with the purpose of creating a riparian environment close to natural conditions. The design includes a lower bench that is inundated by flows around the 2 year ARI events, and a higher bench that is inundated by flows around the 50 year ARI events in the downstream sections of the diversion (**Figure 10**). The benches will act as an inset floodplain, providing a suitable environment to facilitate ongoing riparian zone regeneration and long term vegetation cover and stability of the channel.

A hyporheic zone will develop over time as the sand bed level accumulates, which will provide a similar saturation zone present along the existing Walker Creek. The saturation zone will provide a source of soil moisture for surrounding vegetation (including planted Koala food trees and Black Ironbox) as well as retaining sub-surface flow connectivity to downstream environments.

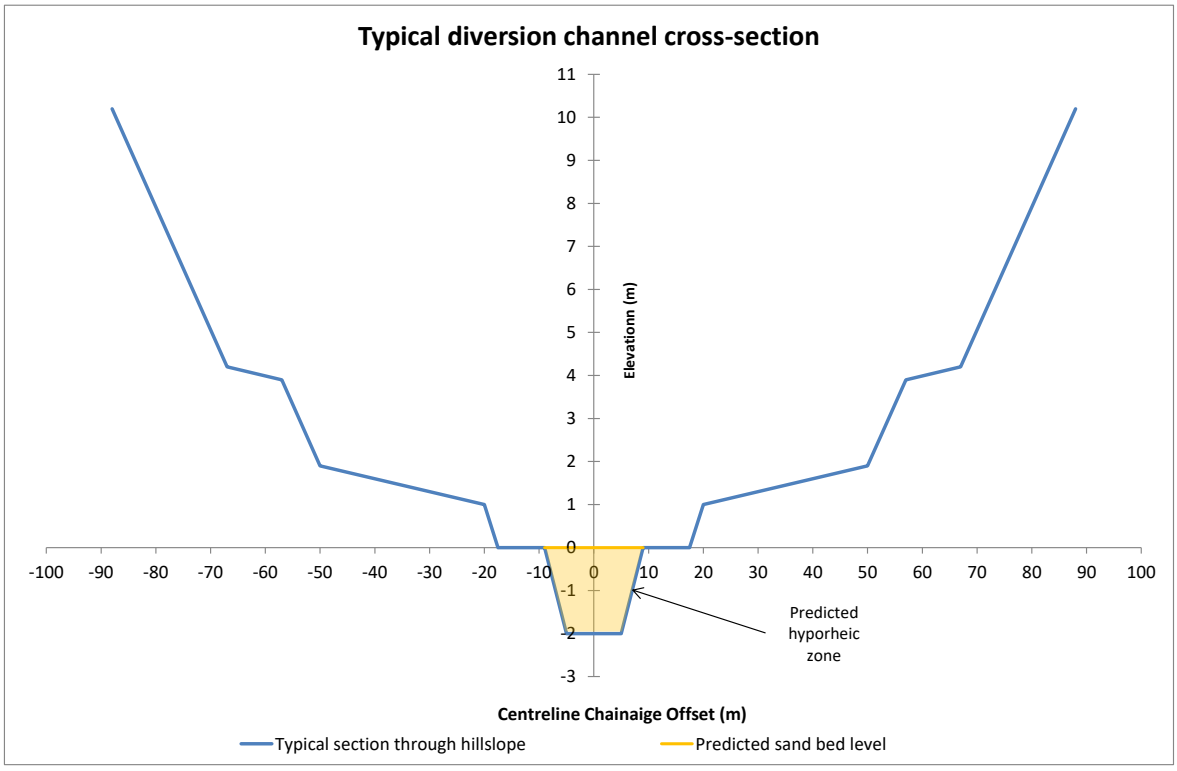


**Figure 10: Generalised cross section of proposed diversion channel**

A revegetation plan has been prepared for the constructed channel that specifies the use of Koala food tree species as well as the threatened Black Ironbox in the planting mix along the channel (Alluvium, 2016). The area available for revegetation along the diversion channel in consideration of lost Koala habitat is estimated to be 157.5 ha and 46.3 ha for Black Ironbox.

The preparation of a revegetation plan specific for the diversion channel ensures appropriate planning, site preparation and maintenance, which in turn increases the rate of rehabilitation success. A number of risks to revegetation failure have been specifically identified for the diversion channel, which have been addressed through the proposed implementation of the following key strategies:

- Permian bedrock to be deeply ripped and left with a surface layer of rock rubble to provide armouring for topsoil, and allow for suitable rooting depth and water retention in sub-soils
- Addition of topsoil to provide an appropriate growth medium for seeding and compensate for deficiencies associated with current weathered soils
- Further testing to determine geo-chemical properties of Permian bedrock as well as nutrient content and structure of weathered soils
- Addition of soil ameliorants to supplement tested deficiencies
- On-site seed sourcing to ensure local provenance and adaptability to local conditions
- Follow up monitoring and maintenance, including additional planting of Black Ironbox if initial seeding fails

The establishment of the diversion channel for MRA Stage 2A has provided insight into the conditions of the area, which has been considered in the design and planning of the diversion channel for Stage 2C. Black Ironbox was not utilised in Stage 2A plantings due to expected hydrological differences between MRA2A and MRA2C (i.e. inclusion of Carborough Creek); however consultation with the former Biloela district group of Landcare Australia has revealed that the species has been successfully utilised in revegetation projects and plantings across the Central Queensland Township. Whilst the distribution of Black Ironbox does not extend as far south as Biloela, seed was sourced from a certified merchant, successfully propagated into tube stock, planted and has since matured to large fertile trees across the Township area (Donna Davis, personal communication, 30 June 2016). The establishment of Black Ironbox along the diversion channel for MRA Stage 2C is therefore considered a viable mitigation strategy.

The construction of the diversion channel will commence in the first stage of project construction and will be completed and revegetated as far as practicable before substantial progression of the mining put occurs. As such mitigation efforts will have occurred prior to the disturbance of MNES values.

Further, the construction and progression of the Mulgrave pit removing the Koala habitat will occur over a period of 30+ years allowing a considerable amount of time for habitat to be regenerated in the diversion, its riparian zone and any land based offset location.

Other management measures to be incorporated pre- and post-construction to assist in mitigating impacts on MNES include:

- Weed management including controlling infestations of Restricted Matters (as classified under the *Biosecurity Act 2014*) or Weed of National Significance (WoNS), (i.e. *Parthenium hysterophorus* or *Harrisia* spp.) as well as regular wash downs for vehicle and equipment, particularly for those that have been operating in an area of known weed infestation
- Fauna management during construction such as key habitat identification (nesting trees) and spotter-catchers to remove fauna and relocate to surrounding areas prior to clearing
- Sensitive vegetation clearing techniques i.e. targeted, staged and sequential clearing as well as demarcated ‘no go’ zones for areas of conservation value

- Standard fire, waste water management, pest, sediment, dust and noise control implemented as part of the mine's Environmental Management Plan
- Topsoil salvage, stockpiling and rehabilitation of disturbed mine areas to be undertaken in accordance with the mine's Plan of Operation, topsoil management and rehabilitation plans.

# 8 Offsets Strategy

The MRA Stage 2C project is likely to have a significant impacts on the following MNES values:

- 32.7 ha of Brigalow TEC
- 33.7 ha of Ornamental Snake habitat
- 212.2 ha of Koala habitat
- 149.3 ha of Greater Glider habitat

Proposed mitigation and management measures will limit the severity and magnitude of significant impacts to the listed above for all MNES values. However, significant residual impacts are unavoidable.

In accordance with the EPBC Act, significant residual impacts to MNES values are required to be offset as per the requirements of the EPBC Act Offset Policy. This requires the delivery of a land based offset that is suitable to offset a minimum of 90% of the significant residual impact (in combination with other offset delivery options).

BMC is currently undergoing land brokerage activities with third party owned properties to secure suitable land for Mulgrave Stage 2C offset requirements. The properties will legally secure the potential offset areas. Further assessment will be undertaken on the suitability of the potential properties in offsetting project specific impacts utilising the Commonwealth Offset Assessment Guidelines (OAG).

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# Appendix A Targeted Habitat Assessment Data

**Koala**

| Site | Habitat aspect | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Vegetation | Abundance of food trees | Soil type | Presence / absence of water source | Water source type | Slope / aspect | Connectivity | Severity of disturbance |
| K1 | Remnant | >2 food trees | Sandy | N/A | Ephemeral | 5% south | High | Low |
| K2 | Remnant | 1 food tree >50% | Silt | N/A | Ephemeral | None | High | None |
| K3 | Remnant | 1 food tree <50% | Silt | Yes | N/A | None | Low canopy connectivity | Previously cleared |
| K4 | Remnant | 1 food tree <50% | Sandy | N/A | Ephemeral | None | High | None |
| K5 | Remnant | 1 food tree >50% | N/A | N/A | Permanent | None | Moderate canopy connectivity | Some dieback |
| K6 | Remnant | 1 food tree >50% | Silt | N/A | Ephemeral | None | High | None |
| K7 | Remnant | N/A | Silt | N/A | Ephemeral | 5% east | Moderate canopy connectivity | Previously cleared |
| K8 | Remnant | 1 food tree <50% | Sandy loam | Yes | N/A | 7% west | High | Dieback |
| K9 | Remnant | 1 food tree >50% | Sandy | Yes | N/A | 7% west | High | None |
| K10 | Remnant | 1 food tree <50% | Sandy | Yes | N/A | None | High | None |
| K11 | Remnant | 1 food tree >50% | Sandy loam | N/A | Ephemeral | None | High | None |
| K12 | Remnant | 1 food tree >50% | Sandy loam | Yes | Ephemeral | None | High | Some dieback |
| K13 | Remnant | >2 food trees | N/A | N/A | Ephemeral | 10% north | High | None |

| Site | Habitat aspect | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Vegetation | Abundance of food trees | Soil type | Presence / absence of water source | Water source type | Slope / aspect | Connectivity | Severity of disturbance |
| K14 | HVR | N/A | Sandy | Yes | N/A | 2% west | Low canopy connectivity | None |
| K15 | Remnant | 1 food tree >50% | N/A | Yes | N/A | None | Low | None |
| K16 | Remnant | >2 food trees | Silt | N/A | Ephemeral | None | Low | Severe dieback |
| K17 | Remnant | 1 food tree >50% | Sandy loam | N/A | Ephemeral | None | High | None |
| K18 | Remnant | >2 food trees | Sandy | N/A | Ephemeral | None | High | None |
| K19 | Remnant | N/A | Sandy | N/A | Ephemeral | None | Low | None |
| K20 | Remnant | 1 food tree >50% | Sandy loam | N/A | Ephemeral | None | High | None |
| K21 | Remnant | >2 food trees | Sandy | N/A | Ephemeral | 15% south | High | None |
| K22 | Remnant | N/A | Sandy | N/A | Ephemeral | None | High | None |
| K23 | HVR | 1 food tree >50% | Sandy | Yes | N/A | None | Low | None |
| K24 | Remnant | N/A | Sandy loam | Yes | N/A | None | High | None |
| K25 | Remnant | >2 food trees | Sandy loam | N/A | Ephemeral | None | High | None |
| K26 | Remnant | 1 food tree >50% | Sandy | N/A | Ephemeral | None | High | None |
| K27 | Remnant | 1 food tree >50% | Sandy | N/A | Ephemeral | None | Moderate | None |
| K28 | Remnant | 1 food tree >50% | Sandy | N/A | Ephemeral | None | High | None |
| K29 | Remnant | 1 food tree >50% | Sandy loam | N/A | Ephemeral | None | High | None |
| K30 | Remnant | 1 food tree >50% | Sandy loam | N/A | Ephemeral | None | High | None |

## Ornamental Snake

| Ornamental SnakeSite | Habitat aspect | | | | | | | | | Threats | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Gilgais | | | Soil crack | | | Water | Aquatic vegetation | FWD | | | | | | | |
| | Presence | Abundance | Type | Presence | Abundance | Type | | | | Habitat clearing | Cattle | Fire | Weeds | Weed Species | Pest | Pest Species |
| os1 | × | Nil | - | × | Nil | - | × | No | Occasional to Common | No | Moderate | No | No | - | No | - |
| os2 | ✓ | Common to Abundant | Diverse | ✓ | Common to Abundant | Deep | × | No | Abundant | No | Moderate | No | No | - | No | - |
| os3 | ✓ | Abundant | Deep | ✓ | Abundant | Deep | × | Yes | Abundant | No | No | No | Low | Harissa cactus | low | Pigs |
| os4 | ✓ | Abundant | Deep | ✓ | Common | Deep | × | No | Abundant | No | No | No | Low | Harissa cactus | low | Pigs |
| os5 | × | Nil | - | ✓ | Occasional | Diverse | × | No | Occasional | No | No | No | Low | - | No | - |
| os6 | × | Nil | - | × | Nil | - | × | No | Occasional | No | No | No | Low | Buffel Grass, Harrisia cactus | No | - |

## Squatter Pigeon

| Site | Habitat aspect | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Threats | | | | | | |
| | Landform | Pattern | Soil type | Canopy cover % | Native ground cover % | Litter cover % | Weed cover % | Distance to water (km) | Water | Water type | Bank slope | Habitat clearing | Cattle | Fire | Pests | Pest Species | Other |
| SP1 | Plain | Gently Undulating Plain | sandy silt | 50 | 20 | 70 | 5 | 0.2 | No but ephemeral | Stream/ River | gentle | No | No | No | No | - | - |
| SP10 | Hillslope | Gently Undulating Plain | sandy loam | 60 | 10 | 80 | 1 | 0.5 | Yes | Stream/ River | gentle | No | No | No | No | - | - |
| SP11 | Hillcrest | Gently Undulating Plain | sandy loam | 75 | 20 | 35 | 1 | 2 | Yes | Dam | gentle | No | low | No | No | - | - |
| SP12 | Plain | Gently Undulating Plain | sandy | 40 | 40 | 10 | 0 | 0 | No but ephemeral | Stream/ River | gentle | No | No | No | No | - | - |
| SP13 | Plain | Gently Undulating Plain | sandy | 35 | 40 | 50 | 20 | 0.1 | No but ephemeral | Gilgai | gentle | No | No | No | No | - | - |

| Site | Habitat aspect | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Threats | | | | | | |
| | Landform | Pattern | Soil type | Canopy cover % | Native ground cover % | Litter cover % | Weed cover % | Distance to water (km) | Water | Water type | Bank slope | Habitat clearing | Cattle | Fire | Pests | Pest Species | Other |
| SP14 | Plain | Gently Undulating Plain | sandy | 10 | 25 | 2 | 0 | 0.5 | No but ephemeral | Wetland | gentle | Moderate | No | No | No | - | - |
| SP15 | Swamp | Gently Undulating Plain | silt | 10 | 15 | 25 | 30 | 0 | No but ephemeral | Wetland | gentle | No | Moderate | No | No | - | - |
| SP16 | Hillslope | Gently Undulating Plain | sandy | 20 | 25 | 20 | 7 | 0.5 | No but ephemeral | Wetland | gentle | Moderate | No | No | No | - | - |
| SP17 | Stream Bank | Gently Undulating Plain | sandy | 60 | 20 | 10 | 5 | 0 | No but ephemeral | Stream/ River | gentle | No | Moderate | No | No | - | - |
| SP18 | Plain | Gently Undulating Plain | sandy loam | 25 | 45 | 55 | 30 | 0 | No but ephemeral | Stream/ River | gentle | No | No | No | No | - | - |
| SP19 | Plain | Gently Undulating Plain | sandy loam | 30 | 20 | 70 | 20 | 1 | No but ephemeral | Stream/ River | steep | No | No | No | Moderate | - | - |

| Site | Habitat aspect | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Threats | | | | | | |
| | Landform | Pattern | Soil type | Canopy cover % | Native ground cover % | Litter cover % | Weed cover % | Distance to water (km) | Water | Water type | Bank slope | Habitat clearing | Cattle | Fire | Pests | Pest Species | Other |
| SP2 | Plain | Gently Undulating Plain | sandy silt | 25 | 40 | 55 | 5 | 2 | No but ephemeral | Stream/ River | gentle | low | No | No | No | - | - |
| SP20 | Plain | Gently Undulating Plain | sandy | 5 | 40 | 60 | 60 | 0.1 | No but ephemeral | Stream/ River | steep | No | No | No | No | - | weeds |
| SP21 | Plain | Gently Undulating Plain | sandy | 0 | 40 | 60 | 70 | 2 | No but ephemeral | Stream/ River | gentle | Moderate | No | No | No | - | weeds |
| SP3 | Drainage Depression | Gently Undulating Plain | sandy | 65 | 25 | 70 | 7 | 0 | No but ephemeral | Stream/ River | gentle | No | low | No | No | - | - |
| SP4 | Hillslope | Gently Undulating Plain | sandy silt | 20 | 10 | 30 | 2 | 0.1 | No but ephemeral | Stream/ River | gentle | No | Moderate | No | No | - | - |
| SP5 | Plain | Gently Undulating Plain | sandy loam | 30 | 20 | 25 | 2 | 0.1 | Yes | Dam | gentle | No | High | No | No | - | - |

| Site | Habitat aspect | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Threats | | | | | | |
| | Landform | Pattern | Soil type | Canopy cover % | Native ground cover % | Litter cover % | Weed cover % | Distance to water (km) | Water | Water type | Bank slope | Habitat clearing | Cattle | Fire | Pests | Pest Species | Other |
| SP6 | Plain | Gently Undulating Rises | sandy | 20 | 10 | 25 | 0 | 0 | No | | | No | No | No | No | - | - |
| SP7 | Plain | Gently Undulating Plain | sandy loam | 20 | 15 | 10 | 2 | 1.5 | Yes | Dam | gentle | No | Moderate | No | No | - | - |
| SP8 | Plain | Badlands | sandy | 20 | 30 | 15 | 0 | 0 | Yes | Stream/ River | gentle | No | No | No | No | - | - |
| SP9 | Plain | Gently Undulating Plain | sandy loam | 40 | 30 | 60 | 1 | 0.1 | No but ephemeral | Stream/ River | steep | No | No | No | No | - | - |
| SP22 | Plain | Gently Undulating Plain | Sandy loam | 35 | 40 | 15 | 5 | 0.5 | No but ephemeral | Stream/ River | steep | No | No | No | No | - | - |
| SP23 | Plain | Gently Undulating Plain | Sandy loam | 25 | 60 | 10 | 30 | 0.8 | No but ephemeral | Stream/ River | steep | No | No | No | No | - | - |

| Site | Habitat aspect | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | Threats | | | | | | |
| | Landform | Pattern | Soil type | Canopy cover % | Native ground cover % | Litter cover % | Weed cover % | Distance to water (km) | Water | Water type | Bank slope | Habitat clearing | Cattle | Fire | Pests | Pest Species | Other |
| SP24 | Plain | Gently Undulating Plain | Sandy loam | 25 | 60 | 10 | 10 | 1 | No but ephemeral | Stream/ River | steep | No | No | No | No | - | - |
| SP25 | Plain | Gently Undulating Plain | sandy | 35 | 30 | 20 | 2 | 0.2 | No but ephemeral | Stream/ River | gentle | No | No | No | No | - | - |
| SP26 | Plain | Gently Undulating Plain | sandy | 40 | 40 | 30 | 2 | 0.3 | No but ephemeral | Stream/ River | gentle | No | No | No | No | - | - |
| SP27 | Plain | Gently Undulating Plain | sandy | 35 | 45 | 20 | 0 | 0.2 | No but ephemeral | Stream/ River | gentle | No | No | No | No | - | - |

## Greater Glider

| Site | Habitat aspect | | | | | |
|---|---|---|---|---|---|---|
| | Well-developed canopy layer | Tree hollows | | | Threats | |
| | | Presence | Abundance | Size | Habitat clearing | Cattle |
| GG1 | Yes | ✓ | sparse | small / med | Not present | Not present |
| GG2 | Yes | × | - | - | Not present | Not present |
| GG3 | Yes | ✓ | sparse | small / med | Not present | Not present |
| GG4 | Yes | × | - | - | Not present | Not present |
| GG5 | Yes | ✓ | sparse | small / med | Not present | Not present |

# Appendix B Desktop Results

Australian Government
Department of the Environment and Energy

# EPBC Act Protected Matters Report

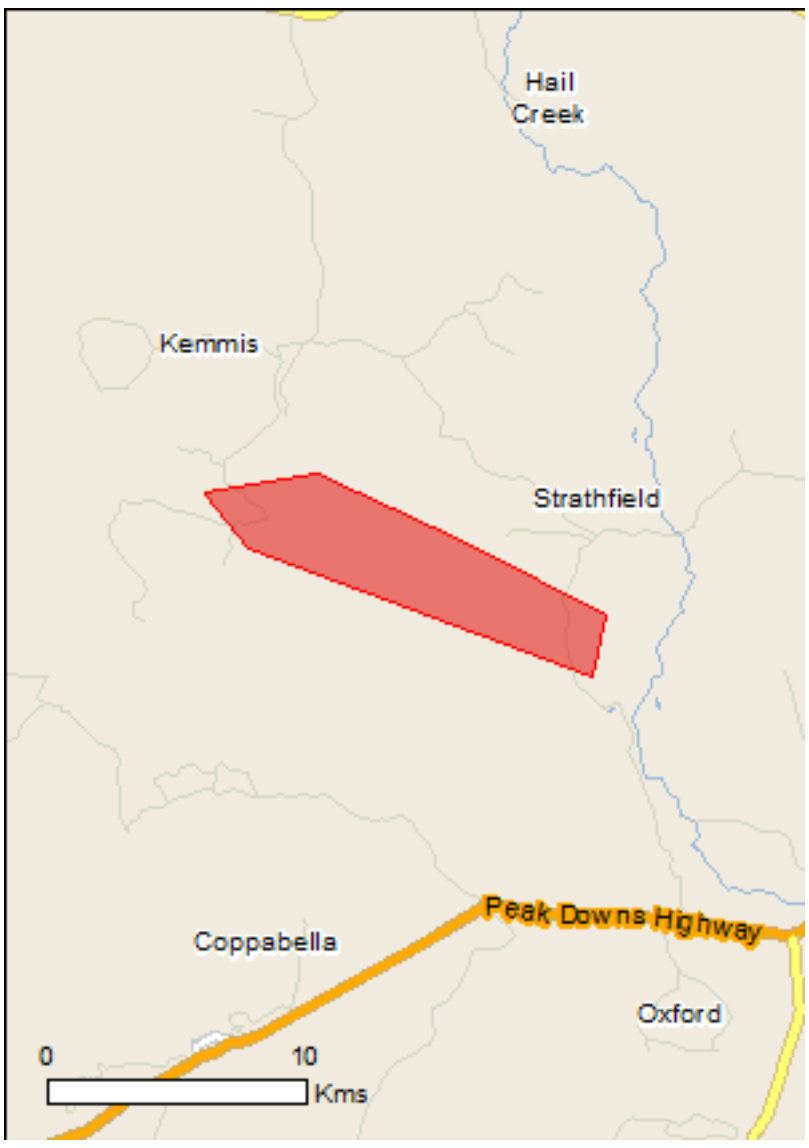
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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

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

Report created: 06/02/18 16:26:09








Coordinates
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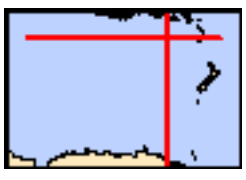

# Summary

## Matters of National Environmental Significance

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

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 3 |
| Listed Threatened Species: | 24 |
| Listed Migratory Species: | 13 |

## Other Matters Protected by the EPBC Act

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

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

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

| | |
|---|---|
| Commonwealth Land: | None |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 19 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Commonwealth Reserves Marine: | None |

## Extra Information

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

| | |
|---|---|
| State and Territory Reserves: | 1 |
| Regional Forest Agreements: | None |
| Invasive Species: | 19 |
| Nationally Important Wetlands: | None |
| Key Ecological Features (Marine) | None |

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ Resource Information ]

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.

| Name | Status | Type of Presence |
|---|---|---|
| Brigalow (Acacia harpophylla dominant and co-dominant) | Endangered | Community known to occur within area |
| Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin | Endangered | Community likely to occur within area |
| Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions | Endangered | Community likely to occur within area |

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Erythrotriorchis radiatus<br>Red Goshawk [942] | Vulnerable | Species or species habitat likely to occur within area |
| Geophaps scripta scripta<br>Squatter Pigeon (southern) [64440] | Vulnerable | Species or species habitat known to occur within area |
| Neochmia ruficauda ruficauda<br>Star Finch (eastern), Star Finch (southern) [26027] | Endangered | Species or species habitat likely to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Poephila cincta cincta<br>Southern Black-throated Finch [64447] | Endangered | Species or species habitat likely to occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat may occur within area |
| **Mammals** | | |
| Dasyurus hallucatus<br>Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331] | Endangered | Species or species habitat likely to occur within area |
| Macroderma gigas<br>Ghost Bat [174] | Vulnerable | Species or species habitat likely to occur within area |
| Nyctophilus corbeni<br>Corben's Long-eared Bat, South-eastern Long- | Vulnerable | Species or species |

| Name | Status | Type of Presence |
|---|---|---|
| eared Bat [83395] | | habitat may occur within area |
| Petauroides volans | | |
| Greater Glider [254] | Vulnerable | Species or species habitat may occur within area |
| Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) | | |
| Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104] | Vulnerable | Species or species habitat known to occur within area |
| Plants | | |
| Cycas ophiolitica | | |
| [55797] | Endangered | Species or species habitat likely to occur within area |
| Dichanthium queenslandicum | | |
| King Blue-grass [5481] | Endangered | Species or species habitat known to occur within area |
| Dichanthium setosum | | |
| bluegrass [14159] | Vulnerable | Species or species habitat known to occur within area |
| Eucalyptus raveretiana | | |
| Black Ironbox [16344] | Vulnerable | Species or species habitat known to occur within area |
| Omphalea celata | | |
| [64586] | Vulnerable | Species or species habitat likely to occur within area |
| Samadera bidwillii | | |
| Quassia [29708] | Vulnerable | Species or species habitat likely to occur within area |
| Reptiles | | |
| Denisonia maculata | | |
| Ornamental Snake [1193] | Vulnerable | Species or species habitat known to occur within area |
| Egernia rugosa | | |
| Yakka Skink [1420] | Vulnerable | Species or species habitat may occur within area |
| Elseya albagula | | |
| Southern Snapping Turtle, White-throated Snapping Turtle [81648] | Critically Endangered | Species or species habitat likely to occur within area |
| Furina dunmalli | | |
| Dunmall's Snake [59254] | Vulnerable | Species or species habitat may occur within area |
| Lerista allanae | | |
| Allan's Lerista, Retro Slider [1378] | Endangered | Species or species habitat may occur within area |
| Rheodytes leukops | | |
| Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761] | Vulnerable | Species or species habitat may occur within area |

## Listed Migratory Species [ Resource Information ]

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

| Name | Threatened | Type of Presence |
|---|---|---|
| Migratory Marine Birds | | |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Migratory Terrestrial Species | | |
| Cuculus optatus | | |
| Oriental Cuckoo, Horsfield's Cuckoo [86651] | | Species or species |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | habitat may occur within area |
| Monarcha melanopsis<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area |
| Motacilla flava<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| Myiagra cyanoleuca<br>Satin Flycatcher [612] | | Species or species habitat likely to occur within area |
| Rhipidura rufifrons<br>Rufous Fantail [592] | | Species or species habitat may occur within area |
| Migratory Wetlands Species | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| Calidris melanotos<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Gallinago hardwickii<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat likely to occur within area |

## Other Matters Protected by the EPBC Act

| Listed Marine Species [ Resource Information ] | | |
|---|---|---|
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | | |
| Name | Threatened | Type of Presence |
| Birds | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat may occur within area |
| Anseranas semipalmata<br>Magpie Goose [978] | | Species or species habitat may occur within area |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea alba<br>Great Egret, White Egret [59541] | | Species or species |

| Name | Threatened | Type of Presence |
|---|---|---|
| | | habitat likely to occur within area |
| [Ardea ibis](#)<br>Cattle Egret [59542] | | Species or species habitat may occur within area |
| [Calidris acuminata](#)<br>Sharp-tailed Sandpiper [874] | | Species or species habitat may occur within area |
| [Calidris ferruginea](#)<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat may occur within area |
| [Calidris melanotos](#)<br>Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| [Cuculus saturatus](#)<br>Oriental Cuckoo, Himalayan Cuckoo [710] | | Species or species habitat may occur within area |
| [Gallinago hardwickii](#)<br>Latham's Snipe, Japanese Snipe [863] | | Species or species habitat may occur within area |
| [Haliaeetus leucogaster](#)<br>White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur within area |
| [Merops ornatus](#)<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| [Monarcha melanopsis](#)<br>Black-faced Monarch [609] | | Species or species habitat known to occur within area |
| [Motacilla flava](#)<br>Yellow Wagtail [644] | | Species or species habitat may occur within area |
| [Myiagra cyanoleuca](#)<br>Satin Flycatcher [612] | | Species or species habitat likely to occur within area |
| [Numenius madagascariensis](#)<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| [Pandion haliaetus](#)<br>Osprey [952] | | Species or species habitat likely to occur within area |
| [Rhipidura rufifrons](#)<br>Rufous Fantail [592] | | Species or species habitat may occur within area |
| [Rostratula benghalensis (sensu lato)](#)<br>Painted Snipe [889] | Endangered* | Species or species habitat may occur within area |

# Extra Information

## State and Territory Reserves [ Resource Information ]

| Name | State |
|---|---|
| Dipperu | QLD |

## Invasive Species [ Resource Information ]

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

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Anas platyrhynchos<br>Mallard [974] | | Species or species habitat likely to occur within area |
| Passer domesticus<br>House Sparrow [405] | | Species or species habitat likely to occur within area |
| Streptopelia chinensis<br>Spotted Turtle-Dove [780] | | Species or species habitat likely to occur within area |
| **Frogs** | | |
| Rhinella marina<br>Cane Toad [83218] | | Species or species habitat likely to occur within area |
| **Mammals** | | |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Capra hircus<br>Goat [2] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Sus scrofa<br>Pig [6] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| **Plants** | | |
| Acacia nilotica subsp. indica<br>Prickly Acacia [6196] | | Species or species habitat may occur within area |
| Cryptostegia grandiflora<br>Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913] | | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
| --- | --- | --- |
| Jatropha gossypifolia<br>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 |
| Lantana camara<br>Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] | | Species or species habitat likely to occur within area |
| Opuntia spp.<br>Prickly Pears [82753] | | Species or species habitat likely to occur within area |
| Parkinsonia aculeata<br>Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301] | | Species or species habitat likely to occur within area |
| Parthenium hysterophorus<br>Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566] | | Species or species habitat likely to occur within area |
| Vachellia nilotica<br>Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351] | | Species or species habitat likely to occur within area |

# Caveat

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

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

# Coordinates

-21.728652 148.361995,-21.722911 148.400791,-21.745554 148.454349,-21.768194 148.500697,-21.787323 148.496234,-21.74683 148.376415,-21.728971 148.361995,-21.728652 148.361995

# Acknowledgements

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

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

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

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


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Queensland Government

# Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 21.5765 to 21.9166
Longitude: 148.2402 to 148.6271
Email: kateb@ecoaus.com.au
Date submitted: Tuesday 06 Feb 2018 15:18:17
Date extracted: Tuesday 06 Feb 2018 15:20:11

The number of records retrieved = 509

| Kingdom | Class | Family | Scientific Name | Common Name | I | Q | A | Records |
|---|---|---|---|---|---|---|---|---|
| animals | amphibians | Hylidae | *Litoria inermis* | bumpy rocketfrog | | C | | 1 |
| animals | amphibians | Hylidae | *Litoria rubella* | ruddy treefrog | | C | | 2 |
| animals | amphibians | Hylidae | *Litoria caerulea* | common green treefrog | | C | | 4 |
| animals | amphibians | Hylidae | *Cyclorana alboguttata* | greenstripe frog | | C | | 1 |
| animals | amphibians | Limnodynastidae | *Limnodynastes peronii* | striped marshfrog | | C | | 4 |
| animals | amphibians | Limnodynastidae | *Limnodynastes salmini* | salmon striped frog | | C | | 1 |
| animals | amphibians | Limnodynastidae | *Platyplectrum ornatum* | ornate burrowing frog | | C | | 1 |
| animals | amphibians | Limnodynastidae | *Limnodynastes tasmaniensis* | spotted grassfrog | | C | | 4 |
| animals | birds | Acanthizidae | *Acanthiza nana* | yellow thornbill | | C | | 2 |
| animals | birds | Acanthizidae | *Gerygone olivacea* | white-throated gerygone | | C | | 2 |
| animals | birds | Acanthizidae | *Smicrornis brevirostris* | weebill | | C | | 7 |
| animals | birds | Accipitridae | *Aviceda subcristata* | Pacific baza | | C | | 1 |
| animals | birds | Accipitridae | *Haliastur sphenurus* | whistling kite | | C | | 3 |
| animals | birds | Aegothelidae | *Aegotheles cristatus* | Australian owlet-nightjar | | C | | 4 |
| animals | birds | Anatidae | *Cygnus atratus* | black swan | | C | | 1 |
| animals | birds | Anatidae | *Aythya australis* | hardhead | | C | | 1 |
| animals | birds | Anatidae | *Anas superciliosa* | Pacific black duck | | C | | 4 |
| animals | birds | Anatidae | *Chenonetta jubata* | Australian wood duck | | C | | 3 |
| animals | birds | Anatidae | *Nettapus coromandelianus* | cotton pygmy-goose | | C | | 1 |
| animals | birds | Anatidae | *Malacorhynchus membranaceus* | pink-eared duck | | C | | 1 |
| animals | birds | Anatidae | *Anas gracilis* | grey teal | | C | | 1 |
| animals | birds | Anhingidae | *Anhinga novaehollandiae* | Australasian darter | | C | | 1 |
| animals | birds | Ardeidae | *Ardea pacifica* | white-necked heron | | C | | 1 |
| animals | birds | Ardeidae | *Ardea intermedia* | intermediate egret | | C | | 1 |
| animals | birds | Ardeidae | *Ardea alba modesta* | eastern great egret | | C | | 1 |
| animals | birds | Ardeidae | *Bubulcus ibis* | cattle egret | | C | | 1 |
| animals | birds | Ardeidae | *Egretta novaehollandiae* | white-faced heron | | C | | 3 |
| animals | birds | Artamidae | *Strepera graculina* | pied currawong | | C | | 1 |
| animals | birds | Artamidae | *Cracticus torquatus* | grey butcherbird | | C | | 5 |
| animals | birds | Artamidae | *Cracticus nigrogularis* | pied butcherbird | | C | | 6 |
| animals | birds | Artamidae | *Cracticus tibicen* | Australian magpie | | C | | 10 |
| animals | birds | Cacatuidae | *Cacatua galerita* | sulphur-crested cockatoo | | C | | 5 |
| animals | birds | Cacatuidae | *Calyptorhynchus funereus* | yellow-tailed black-cockatoo | | C | | 1 |
| animals | birds | Cacatuidae | *Eolophus roseicapilla* | galah | | C | | 4 |
| animals | birds | Campephagidae | *Coracina papuensis* | white-bellied cuckoo-shrike | | C | | 1 |
| animals | birds | Campephagidae | *Coracina novaehollandiae* | black-faced cuckoo-shrike | | C | | 4 |
| animals | birds | Charadriidae | *Vanellus miles* | masked lapwing | | C | | 1 |
| animals | birds | Charadriidae | *Elseyornis melanops* | black-fronted dotterel | | C | | 1 |
| animals | birds | Ciconiidae | *Ephippiorhynchus asiaticus* | black-necked stork | | C | | 1 |
| animals | birds | Cisticolidae | *Cisticola exilis* | golden-headed cisticola | | C | | 1 |
| animals | birds | Columbidae | *Geophaps scripta scripta* | squatter pigeon (southern subspecies) | | V | V | 5 |
| animals | birds | Columbidae | *Phaps chalcoptera* | common bronzewing | | C | | 1 |
| animals | birds | Columbidae | *Ocyphaps lophotes* | crested pigeon | | C | | 1 |
| animals | birds | Columbidae | *Geopelia striata* | peaceful dove | | C | | 1 |
| animals | birds | Coraciidae | *Eurystomus orientalis* | dollarbird | | C | | 1 |
| animals | birds | Corcoracidae | *Struthidea cinerea* | apostlebird | | C | | 7 |

| Kingdom | Class | Family | Scientific Name | Common Name | I | Q | A | Records |
|---|---|---|---|---|---|---|---|---|
| animals | birds | Corvidae | *Corvus orru* | Torresian crow | | C | | 11 |
| animals | birds | Cuculidae | *Cuculus optatus* | oriental cuckoo | | SL | | 1 |
| animals | birds | Cuculidae | *Eudynamys orientalis* | eastern koel | | C | | 1 |
| animals | birds | Cuculidae | *Scythrops novaehollandiae* | channel-billed cuckoo | | C | | 1 |
| animals | birds | Cuculidae | *Cacomantis flabelliformis* | fan-tailed cuckoo | | C | | 1 |
| animals | birds | Cuculidae | *Centropus phasianinus* | pheasant coucal | | C | | 2 |
| animals | birds | Cuculidae | *Cacomantis variolosus* | brush cuckoo | | C | | 1 |
| animals | birds | Cuculidae | *Chalcites lucidus* | shining bronze-cuckoo | | C | | 1 |
| animals | birds | Estrildidae | *Taeniopygia bichenovii* | double-barred finch | | C | | 2 |
| animals | birds | Falconidae | *Falco longipennis* | Australian hobby | | C | | 1 |
| animals | birds | Falconidae | *Falco cenchroides* | nankeen kestrel | | C | | 1 |
| animals | birds | Gruidae | *Grus rubicunda* | brolga | | C | | 1 |
| animals | birds | Halcyonidae | *Dacelo leachii* | blue-winged kookaburra | | C | | 2 |
| animals | birds | Halcyonidae | *Todiramphus sanctus* | sacred kingfisher | | C | | 2 |
| animals | birds | Halcyonidae | *Dacelo novaeguineae* | laughing kookaburra | | C | | 5 |
| animals | birds | Hirundinidae | *Petrochelidon nigricans* | tree martin | | C | | 1 |
| animals | birds | Jacanidae | *Irediparra gallinacea* | comb-crested jacana | | C | | 1 |
| animals | birds | Maluridae | *Malurus lamberti* | variegated fairy-wren | | C | | 1 |
| animals | birds | Maluridae | *Malurus melanocephalus* | red-backed fairy-wren | | C | | 2 |
| animals | birds | Meliphagidae | *Manorina flavigula* | yellow-throated miner | | C | | 2 |
| animals | birds | Meliphagidae | *Lichmera indistincta* | brown honeyeater | | C | | 4 |
| animals | birds | Meliphagidae | *Melithreptus gularis* | black-chinned honeyeater | | C | | 1 |
| animals | birds | Meliphagidae | *Philemon corniculatus* | noisy friarbird | | C | | 4 |
| animals | birds | Meliphagidae | *Manorina melanocephala* | noisy miner | | C | | 4 |
| animals | birds | Meliphagidae | *Philemon citreogularis* | little friarbird | | C | | 2 |
| animals | birds | Meliphagidae | *Melithreptus albogularis* | white-throated honeyeater | | C | | 8 |
| animals | birds | Meliphagidae | *Plectorhyncha lanceolata* | striped honeyeater | | C | | 2 |
| animals | birds | Meliphagidae | *Entomyzon cyanotis* | blue-faced honeyeater | | C | | 8 |
| animals | birds | Meliphagidae | *Stomiopera flava* | yellow honeyeater | | C | | 1 |
| animals | birds | Meliphagidae | *Meliphaga lewinii* | Lewin's honeyeater | | C | | 1 |
| animals | birds | Meropidae | *Merops ornatus* | rainbow bee-eater | | C | | 2 |
| animals | birds | Monarchidae | *Myiagra rubecula* | leaden flycatcher | | C | | 1 |
| animals | birds | Monarchidae | *Grallina cyanoleuca* | magpie-lark | | C | | 9 |
| animals | birds | Monarchidae | *Monarcha melanopsis* | black-faced monarch | | SL | | 1 |
| animals | birds | Nectariniidae | *Dicaeum hirundinaceum* | mistletoebird | | C | | 2 |
| animals | birds | Neosittidae | *Daphoenositta chrysoptera* | varied sittella | | C | | 3 |
| animals | birds | Oriolidae | *Oriolus sagittatus* | olive-backed oriole | | C | | 2 |
| animals | birds | Otididae | *Ardeotis australis* | Australian bustard | | C | | 1 |
| animals | birds | Pachycephalidae | *Pachycephala rufiventris* | rufous whistler | | C | | 5 |
| animals | birds | Pachycephalidae | *Colluricincla harmonica* | grey shrike-thrush | | C | | 5 |
| animals | birds | Pardalotidae | *Pardalotus striatus* | striated pardalote | | C | | 12 |
| animals | birds | Phalacrocoracidae | *Microcarbo melanoleucos* | little pied cormorant | | C | | 2 |
| animals | birds | Podargidae | *Podargus strigoides* | tawny frogmouth | | C | | 7 |
| animals | birds | Podicipedidae | *Tachybaptus novaehollandiae* | Australasian grebe | | C | | 1 |
| animals | birds | Pomatostomidae | *Pomatostomus temporalis* | grey-crowned babbler | | C | | 7 |
| animals | birds | Psittacidae | *Trichoglossus haematodus moluccanus* | rainbow lorikeet | | C | | 12 |

| Kingdom | Class | Family | Scientific Name | Common Name | I | Q | A | Records |
|---|---|---|---|---|---|---|---|---|
| animals | birds | Psittacidae | *Platycercus adscitus* | pale-headed rosella | | C | | 10 |
| animals | birds | Psittacidae | *Aprosmictus erythropterus* | red-winged parrot | | C | | 3 |
| animals | birds | Ptilonorhynchidae | *Ptilonorhynchus nuchalis* | great bowerbird | | C | | 1 |
| animals | birds | Rallidae | *Fulica atra* | Eurasian coot | | C | | 1 |
| animals | birds | Rallidae | *Gallinula tenebrosa* | dusky moorhen | | C | | 2 |
| animals | birds | Rhipiduridae | *Rhipidura albiscapa* | grey fantail | | C | | 8 |
| animals | birds | Rhipiduridae | *Rhipidura leucophrys* | willie wagtail | | C | | 4 |
| animals | birds | Threskiornithidae | *Threskiornis spinicollis* | straw-necked ibis | | C | | 1 |
| animals | mammals | Cervidae | *Axis axis* | chital | Y | | | 1 |
| animals | mammals | Emballonuridae | *Saccolaimus flaviventris* | yellow-bellied sheathtail bat | | C | | 7 |
| animals | mammals | Felidae | *Felis catus* | cat | Y | | | 1 |
| animals | mammals | Leporidae | *Oryctolagus cuniculus* | rabbit | Y | | | 1 |
| animals | mammals | Macropodidae | *Lagorchestes conspicillatus* | spectacled hare-wallaby | | C | | 2 |
| animals | mammals | Macropodidae | *Macropus dorsalis* | black-striped wallaby | | C | | 1 |
| animals | mammals | Macropodidae | *Wallabia bicolor* | swamp wallaby | | C | | 1 |
| animals | mammals | Macropodidae | *Macropus parryi* | whiptail wallaby | | C | | 1 |
| animals | mammals | Macropodidae | *Macropus giganteus* | eastern grey kangaroo | | C | | 3 |
| animals | mammals | Molossidae | *Mormopterus norfolkensis* | east coast freetail bat | | C | | 1 |
| animals | mammals | Petauridae | *Petaurus norfolcensis* | squirrel glider | | C | | 2 |
| animals | mammals | Petauridae | *Petaurus breviceps* | sugar glider | | C | | 3 |
| animals | mammals | Phascolarctidae | *Phascolarctos cinereus* | koala | | V | V | 3 |
| animals | mammals | Potoroidae | *Aepyprymnus rufescens* | rufous bettong | | C | | 2 |
| animals | mammals | Pseudocheiridae | *Petauroides volans minor* | northern greater glider | | V | V | 8 |
| animals | mammals | Suidae | *Sus scrofa* | pig | Y | | | 2 |
| animals | mammals | Tachyglossidae | *Tachyglossus aculeatus* | short-beaked echidna | | SL | | 1 |
| animals | mammals | Vespertilionidae | *Chalinolobus gouldii* | Gould's wattled bat | | C | | 21 |
| animals | mammals | Vespertilionidae | *Chalinolobus morio* | chocolate wattled bat | | C | | 2 |
| animals | reptiles | Agamidae | *Pogona barbata* | bearded dragon | | C | | 2 |
| animals | reptiles | Boidae | *Antaresia maculosa* | spotted python | | C | | 1 |
| animals | reptiles | Chelidae | *Chelodina longicollis* | eastern snake-necked turtle | | C | | 1 |
| animals | reptiles | Colubridae | *Boiga irregularis* | brown tree snake | | C | | 2 |
| animals | reptiles | Colubridae | *Tropidonophis mairii* | freshwater snake | | C | | 2 |
| animals | reptiles | Diplodactylidae | *Oedura monilis* | ocellated velvet gecko | | C | | 11 |
| animals | reptiles | Diplodactylidae | *Diplodactylus vittatus* | wood gecko | | C | | 2 |
| animals | reptiles | Elapidae | *Pseudonaja textilis* | eastern brown snake | | C | | 6 |
| animals | reptiles | Elapidae | *Demansia psammophis* | yellow-faced whipsnake | | C | | 1 |
| animals | reptiles | Gekkonidae | *Gehyra dubia* | dubious dtella | | C | | 57 |
| animals | reptiles | Gekkonidae | *Gehyra sp.* | | | | | 1 |
| animals | reptiles | Gekkonidae | *Heteronotia binoei* | Bynoe's gecko | | C | | 7 |
| animals | reptiles | Gekkonidae | *Gehyra versicolor* | | | C | | 16 |
| animals | reptiles | Pygopodidae | *Lialis burtonis* | Burton's legless lizard | | C | | 3 |
| animals | reptiles | Pygopodidae | *Delma tincta* | excitable delma | | C | | 1 |
| animals | reptiles | Scincidae | *Carlia rubigo* | orange-flanked rainbow skink | | C | | 4 |
| animals | reptiles | Scincidae | *Ctenotus ingrami* | unspotted yellow-sided ctenotus | | C | | 1 |
| animals | reptiles | Scincidae | *Egernia striolata* | tree skink | | C | | 1 |
| animals | reptiles | Scincidae | *Ctenotus spaldingi* | straight-browed ctenotus | | C | | 3 |

| Kingdom | Class | Family | Scientific Name | Common Name | I | Q | A | Records |
|---|---|---|---|---|---|---|---|---|
| animals | reptiles | Scincidae | *Lygisaurus foliorum* | tree-base litter-skink | | C | | 2 |
| animals | reptiles | Scincidae | *Cryptoblepharus pulcher pulcher* | elegant snake-eyed skink | | C | | 3 |
| animals | reptiles | Scincidae | *Carlia pectoralis sensu lato* | | | C | | 4 |
| animals | reptiles | Scincidae | *Ctenotus taeniolatus* | copper-tailed skink | | C | | 1 |
| animals | reptiles | Scincidae | *Cryptoblepharus pannosus* | ragged snake-eyed skink | | C | | 2 |
| animals | reptiles | Scincidae | *Glaphyromorphus punctulatus* | fine-spotted mulch-skink | | C | | 1 |
| animals | reptiles | Scincidae | *Pygmaeascincus timlowi* | dwarf litter-skink | | C | | 1 |
| animals | reptiles | Varanidae | *Varanus tristis* | black-tailed monitor | | C | | 4 |
| animals | uncertain | Indeterminate | *Indeterminate* | Unknown or Code Pending | | C | | 1 |
| plants | ferns | Adiantaceae | *Cheilanthes sieberi subsp. sieberi* | | | C | | 6 |
| plants | ferns | Adiantaceae | *Cheilanthes distans* | bristly cloak fern | | C | | 1/1 |
| plants | higher dicots | Acanthaceae | *Rostellularia adscendens* | | | C | | 9 |
| plants | higher dicots | Acanthaceae | *Brunoniella australis* | blue trumpet | | C | | 20/1 |
| plants | higher dicots | Acanthaceae | *Pseuderanthemum tenellum* | | | C | | 13 |
| plants | higher dicots | Aizoaceae | *Trianthema triquetra* | red spinach | | C | | 2/1 |
| plants | higher dicots | Aizoaceae | *Zaleya galericulata* | | | C | | 1/1 |
| plants | higher dicots | Amaranthaceae | *Amaranthus cochleitepalus* | | | C | | 1/1 |
| plants | higher dicots | Amaranthaceae | *Alternanthera nana* | hairy joyweed | | C | | 16 |
| plants | higher dicots | Amaranthaceae | *Achyranthes aspera* | | | C | | 4 |
| plants | higher dicots | Amaranthaceae | *Alternanthera denticulata* | lesser joyweed | | C | | 2 |
| plants | higher dicots | Amaranthaceae | *Gomphrena celosioides* | gomphrena weed | Y | | | 2 |
| plants | higher dicots | Amaranthaceae | *Amaranthus mitchellii* | Boggabri weed | | C | | 1/1 |
| plants | higher dicots | Anacardiaceae | *Pleiogynium timorense* | Burdekin plum | | C | | 1 |
| plants | higher dicots | Apocynaceae | *Secamone elliptica* | | | C | | 1 |
| plants | higher dicots | Apocynaceae | *Marsdenia microlepis* | | | C | | 2 |
| plants | higher dicots | Apocynaceae | *Parsonsia lanceolata* | northern silkpod | | C | | 13/1 |
| plants | higher dicots | Apocynaceae | *Gomphocarpus physocarpus* | balloon cottonbush | Y | | | 1 |
| plants | higher dicots | Apocynaceae | *Cynanchum viminale subsp. brunonianum* | | | C | | 7 |
| plants | higher dicots | Apocynaceae | *Marsdenia viridiflora subsp. viridiflora* | | | C | | 5 |
| plants | higher dicots | Apocynaceae | *Carissa ovata* | currantbush | | C | | 13 |
| plants | higher dicots | Araliaceae | *Astrotricha biddulphiana* | | | C | | 1/1 |
| plants | higher dicots | Asteraceae | *Calotis cuneata* | | | C | | 1/1 |
| plants | higher dicots | Asteraceae | *Cirsium vulgare* | spear thistle | Y | | | 1/1 |
| plants | higher dicots | Asteraceae | *Sonchus oleraceus* | common sowthistle | Y | | | 6 |
| plants | higher dicots | Asteraceae | *Xanthium spinosum* | Bathurst burr | Y | | | 1/1 |
| plants | higher dicots | Asteraceae | *Calotis cuneifolia* | burr daisy | | C | | 4/1 |
| plants | higher dicots | Asteraceae | *Emilia sonchifolia* | | Y | | | 5 |
| plants | higher dicots | Asteraceae | *Vittadinia sulcata* | native daisy | | C | | 1/1 |
| plants | higher dicots | Asteraceae | *Lagenophora gracilis* | | | C | | 2 |
| plants | higher dicots | Asteraceae | *Cyanthillium cinereum* | | | C | | 10 |
| plants | higher dicots | Asteraceae | *Acanthospermum hispidum* | star burr | Y | | | 1 |
| plants | higher dicots | Asteraceae | *Parthenium hysterophorus* | parthenium weed | Y | | | 4/1 |
| plants | higher dicots | Asteraceae | *Chrysocephalum apiculatum* | yellow buttons | | C | | 4 |
| plants | higher dicots | Asteraceae | *Sphaeromorphaea australis* | | | C | | 4 |
| plants | higher dicots | Asteraceae | *Apowollastonia spilanthoides* | | | C | | 9 |
| plants | higher dicots | Asteraceae | *Peripleura hispidula var. hispidula* | | | C | | 1 |

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|---|---|---|---|---|---|---|---|---|
| plants | higher dicots | Asteraceae | *Pterocaulon serrulatum var. serrulatum* | | | C | | 1/1 |
| plants | higher dicots | Asteraceae | *Pluchea dentex* | bowl daisy | | C | | 1/1 |
| plants | higher dicots | Boraginaceae | *Heliotropium* | | | C | | 1 |
| plants | higher dicots | Boraginaceae | *Ehretia membranifolia* | weeping koda | | C | | 12 |
| plants | higher dicots | Boraginaceae | *Trichodesma zeylanicum* | | | C | | 3 |
| plants | higher dicots | Brassicaceae | *Lepidium virginicum* | Virginian peppercress | Y | | | 1/1 |
| plants | higher dicots | Byttneriaceae | *Waltheria indica* | | | C | | 7 |
| plants | higher dicots | Cactaceae | *Opuntia tomentosa* | velvety tree pear | Y | | | 12 |
| plants | higher dicots | Cactaceae | *Harrisia martinii* | | Y | | | 10 |
| plants | higher dicots | Caesalpiniaceae | *Cassia tomentella* | | | C | | 10 |
| plants | higher dicots | Caesalpiniaceae | *Senna coronilloides* | | | C | | 1 |
| plants | higher dicots | Caesalpiniaceae | *Chamaecrista concinna* | | | C | | 2 |
| plants | higher dicots | Caesalpiniaceae | *Cassia brewsteri* | | | C | | 1/1 |
| plants | higher dicots | Caesalpiniaceae | *Lysiphyllum carronii* | ebony tree | | C | | 1 |
| plants | higher dicots | Caesalpiniaceae | *Chamaecrista absus* | | | C | | 5 |
| plants | higher dicots | Campanulaceae | *Wahlenbergia gracilis* | sprawling bluebell | | C | | 1 |
| plants | higher dicots | Campanulaceae | *Lobelia concolor* | | | C | | 1 |
| plants | higher dicots | Capparaceae | *Capparis canescens* | | | C | | 1 |
| plants | higher dicots | Capparaceae | *Capparis lasiantha* | nipan | | C | | 6 |
| plants | higher dicots | Casuarinaceae | *Allocasuarina luehmannii* | bull oak | | C | | 3 |
| plants | higher dicots | Casuarinaceae | *Casuarina cristata* | belah | | C | | 13/1 |
| plants | higher dicots | Celastraceae | *Elaeodendron australe* | | | C | | 1 |
| plants | higher dicots | Celastraceae | *Denhamia cunninghamii* | | | C | | 10 |
| plants | higher dicots | Celastraceae | *Denhamia oleaster* | | | C | | 2 |
| plants | higher dicots | Chenopodiaceae | *Dysphania melanocarpa forma melanocarpa* | | | C | | 2 |
| plants | higher dicots | Chenopodiaceae | *Enchylaena tomentosa var. tomentosa* | | | C | | 1/1 |
| plants | higher dicots | Chenopodiaceae | *Chenopodium auricomiforme* | | | C | | 1/1 |
| plants | higher dicots | Chenopodiaceae | *Einadia polygonoides* | knotweed goosefoot | | C | | 1 |
| plants | higher dicots | Chenopodiaceae | *Enchylaena tomentosa* | | | C | | 6 |
| plants | higher dicots | Chenopodiaceae | *Maireana microphylla* | | | C | | 2 |
| plants | higher dicots | Combretaceae | *Terminalia oblongata* | | | C | | 10 |
| plants | higher dicots | Convolvulaceae | *Convolvulus erubescens* | Australian bindweed | | C | | 1 |
| plants | higher dicots | Convolvulaceae | *Polymeria longifolia* | polymeria | | C | | 5 |
| plants | higher dicots | Convolvulaceae | *Evolvulus alsinoides* | | | C | | 11 |
| plants | higher dicots | Convolvulaceae | *Ipomoea plebeia* | bellvine | | C | | 7 |
| plants | higher dicots | Convolvulaceae | *Ipomoea brownii* | | | C | | 1 |
| plants | higher dicots | Convolvulaceae | *Jacquemontia paniculata* | | | C | | 14 |
| plants | higher dicots | Cucurbitaceae | *Cucumis anguria var. anguria* | West Indian gherkin | Y | | | 4 |
| plants | higher dicots | Droseraceae | *Drosera* | | | C | | 4 |
| plants | higher dicots | Ebenaceae | *Diospyros humilis* | small-leaved ebony | | C | | 8/1 |
| plants | higher dicots | Erythroxylaceae | *Erythroxylum australe* | cocaine tree | | C | | 15 |
| plants | higher dicots | Euphorbiaceae | *Euphorbia coghlanii* | | | C | | 1/1 |
| plants | higher dicots | Euphorbiaceae | *Euphorbia drummondii* | | | C | | 10 |
| plants | higher dicots | Euphorbiaceae | *Adriana tomentosa var. tomentosa* | | | C | | 2/2 |
| plants | higher dicots | Euphorbiaceae | *Euphorbia tannensis subsp. eremophila* | | | C | | 3 |
| plants | higher dicots | Euphorbiaceae | *Croton phebalioides* | narrow-leaved croton | | C | | 2/2 |

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|---|---|---|---|---|---|---|---|---|
| plants | higher dicots | Euphorbiaceae | *Bertya pedicellata* | | | NT | | 1/1 |
| plants | higher dicots | Euphorbiaceae | *Euphorbia hyssopifolia* | | Y | | | 8 |
| plants | higher dicots | Fabaceae | *Glycine falcata* | | | C | | 1/1 |
| plants | higher dicots | Fabaceae | *Crotalaria mitchellii subsp. mitchellii* | | | C | | 1 |
| plants | higher dicots | Fabaceae | *Tephrosia juncea* | | | C | | 5 |
| plants | higher dicots | Fabaceae | *Vigna lanceolata* | | | C | | 6 |
| plants | higher dicots | Fabaceae | *Desmodium varians* | slender tick trefoil | | C | | 3 |
| plants | higher dicots | Fabaceae | *Zornia muriculata* | | | C | | 8 |
| plants | higher dicots | Fabaceae | *Crotalaria montana* | | | C | | 3 |
| plants | higher dicots | Fabaceae | *Desmodium muelleri* | | | C | | 1/1 |
| plants | higher dicots | Fabaceae | *Glycine tomentella* | woolly glycine | | C | | 10/1 |
| plants | higher dicots | Fabaceae | *Indigofera colutea* | sticky indigo | | C | | 6 |
| plants | higher dicots | Fabaceae | *Indigofera linnaei* | Birdsville indigo | | C | | 6 |
| plants | higher dicots | Fabaceae | *Zornia muelleriana* | | | C | | 1 |
| plants | higher dicots | Fabaceae | *Galactia tenuiflora* | | | C | | 2 |
| plants | higher dicots | Fabaceae | *Stylosanthes scabra* | | Y | | | 15 |
| plants | higher dicots | Fabaceae | *Alysicarpus muelleri* | | | C | | 2/2 |
| plants | higher dicots | Fabaceae | *Indigofera linifolia* | | | C | | 1 |
| plants | higher dicots | Fabaceae | *Tephrosia leptoclada* | | | C | | 3 |
| plants | higher dicots | Fabaceae | *Desmodium brachypodum* | large ticktrefoil | | C | | 8 |
| plants | higher dicots | Fabaceae | *Tephrosia dietrichiae* | | | C | | 2 |
| plants | higher dicots | Fabaceae | *Crotalaria medicaginea* | trefoil rattlepod | | C | | 4 |
| plants | higher dicots | Fabaceae | *Crotalaria sessiliflora* | | | | | 8 |
| plants | higher dicots | Fabaceae | *Indigofera sericovexilla* | | | C | | 2 |
| plants | higher dicots | Fabaceae | *Vigna radiata var. sublobata* | | | C | | 1/1 |
| plants | higher dicots | Fabaceae | *Rhynchosia minima var. australis* | | | C | | 13/1 |
| plants | higher dicots | Fabaceae | *Zornia dyctiocarpa var. filifolia* | | | C | | 1/1 |
| plants | higher dicots | Fabaceae | *Tephrosia brachyodon var. longifolia* | | | C | | 2 |
| plants | higher dicots | Fabaceae | *Glycine tabacina* | glycine pea | | C | | 14 |
| plants | higher dicots | Goodeniaceae | *Goodenia glabra* | | | C | | 2 |
| plants | higher dicots | Goodeniaceae | *Velleia* | | | C | | 5 |
| plants | higher dicots | Haloragaceae | *Haloragis aspera* | raspweed | | C | | 1/1 |
| plants | higher dicots | Lamiaceae | *Teucrium integrifolium* | | | C | | 1/1 |
| plants | higher dicots | Lamiaceae | *Plectranthus parviflorus* | | | C | | 4 |
| plants | higher dicots | Lamiaceae | *Clerodendrum floribundum* | | | C | | 3 |
| plants | higher dicots | Lamiaceae | *Leucas lavandulifolia* | | Y | | | 1/1 |
| plants | higher dicots | Lamiaceae | *Plectranthus* | | | C | | 1/1 |
| plants | higher dicots | Lamiaceae | *Basilicum polystachyon* | | | C | | 1/1 |
| plants | higher dicots | Loganiaceae | *Mitrasacme alsinoides* | | | C | | 5 |
| plants | higher dicots | Loganiaceae | *Mitrasacme pygmaea* | | | C | | 8 |
| plants | higher dicots | Lythraceae | *Lythrum paradoxum* | | | C | | 1 |
| plants | higher dicots | Lythraceae | *Ammannia multiflora* | jerry-jerry | | C | | 2 |
| plants | higher dicots | Malvaceae | *Sida* | | | C | | 7 |
| plants | higher dicots | Malvaceae | *Sida rohlenae* | | | C | | 7 |
| plants | higher dicots | Malvaceae | *Sida cordifolia* | | Y | | | 13/1 |
| plants | higher dicots | Malvaceae | *Sida hackettiana* | | | C | | 5 |

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|---|---|---|---|---|---|---|---|---|
| plants | higher dicots | Malvaceae | *Sida rhombifolia* | | Y | | | 11 |
| plants | higher dicots | Malvaceae | *Sida cunninghamii* | | | C | | 3 |
| plants | higher dicots | Malvaceae | *Abutilon guineense* | | Y | | | 3/3 |
| plants | higher dicots | Malvaceae | *Abutilon malvifolium* | bastard marshmallow | | C | | 1 |
| plants | higher dicots | Malvaceae | *Abutilon subviscosum* | | | C | | 1/1 |
| plants | higher dicots | Malvaceae | *Hibiscus verdcourtii* | | | C | | 1/1 |
| plants | higher dicots | Malvaceae | *Malvastrum americanum* | | Y | | | 2 |
| plants | higher dicots | Malvaceae | *Hibiscus sturtii var. sturtii* | | | C | | 8 |
| plants | higher dicots | Malvaceae | *Abutilon oxycarpum var. incanum* | | | C | | 1/1 |
| plants | higher dicots | Malvaceae | *Abutilon oxycarpum var. subsagittatum* | | | C | | 16 |
| plants | higher dicots | Meliaceae | *Owenia acidula* | emu apple | | C | | 1 |
| plants | higher dicots | Mimosaceae | *Vachellia farnesiana* | | Y | | | 1/1 |
| plants | higher dicots | Mimosaceae | *Acacia bancroftiorum* | | | C | | 1/1 |
| plants | higher dicots | Mimosaceae | *Vachellia bidwillii* | | | C | | 3 |
| plants | higher dicots | Mimosaceae | *Acacia holosericea* | | | C | | 2 |
| plants | higher dicots | Mimosaceae | *Acacia harpophylla* | brigalow | | C | | 2 |
| plants | higher dicots | Mimosaceae | *Acacia flavescens* | toothed wattle | | C | | 2 |
| plants | higher dicots | Mimosaceae | *Acacia salicina* | doolan | | C | | 4 |
| plants | higher dicots | Mimosaceae | *Acacia oswaldii* | miljee | | C | | 1/1 |
| plants | higher dicots | Mimosaceae | *Acacia julifera* | | | C | | 2 |
| plants | higher dicots | Mimosaceae | *Acacia conferta* | | | C | | 1/1 |
| plants | higher dicots | Mimosaceae | *Acacia excelsa* | | | C | | 4 |
| plants | higher dicots | Mimosaceae | *Neptunia gracilis forma gracilis* | | | C | | 3/1 |
| plants | higher dicots | Mimosaceae | *Acacia blakei subsp. blakei* | | | C | | 1/1 |
| plants | higher dicots | Mimosaceae | *Archidendropsis basaltica* | red lancewood | | C | | 8 |
| plants | higher dicots | Myrtaceae | *Eucalyptus crebra x E.orgadophila* | | | C | | 1/1 |
| plants | higher dicots | Myrtaceae | *Eucalyptus camaldulensis* | | | C | | 1 |
| plants | higher dicots | Myrtaceae | *Eucalyptus tereticornis* | | | C | | 3 |
| plants | higher dicots | Myrtaceae | *Eucalyptus tholiformis* | | | C | | 1/1 |
| plants | higher dicots | Myrtaceae | *Eucalyptus raveretiana* | black ironbox | | C | V | 2/2 |
| plants | higher dicots | Myrtaceae | *Eucalyptus platyphylla* | poplar gum | | C | | 3 |
| plants | higher dicots | Myrtaceae | *Melaleuca fluviatilis* | | | C | | 1/1 |
| plants | higher dicots | Myrtaceae | *Corymbia clarksoniana* | | | C | | 7/1 |
| plants | higher dicots | Myrtaceae | *Corymbia tessellaris* | Moreton Bay ash | | C | | 4/1 |
| plants | higher dicots | Myrtaceae | *Corymbia dallachiana* | | | C | | 6 |
| plants | higher dicots | Myrtaceae | *Eucalyptus tenuipes* | narrow-leaved white mahogany | | C | | 1/1 |
| plants | higher dicots | Myrtaceae | *Eucalyptus populnea* | poplar box | | C | | 13 |
| plants | higher dicots | Myrtaceae | *Melaleuca nervosa* | | | C | | 5 |
| plants | higher dicots | Myrtaceae | *Eucalyptus crebra* | narrow-leaved red ironbark | | C | | 1/1 |
| plants | higher dicots | Nyctaginaceae | *Boerhavia dominii* | | | C | | 9 |
| plants | higher dicots | Oleaceae | *Jasminum didymum subsp. lineare* | | | C | | 6 |
| plants | higher dicots | Oleaceae | *Notelaea microcarpa* | | | C | | 1 |
| plants | higher dicots | Onagraceae | *Ludwigia* | | | C | | 1/1 |
| plants | higher dicots | Phyllanthaceae | *Phyllanthus mitchellii* | | | C | | 1 |
| plants | higher dicots | Phyllanthaceae | *Phyllanthus virgatus* | | | C | | 16 |
| plants | higher dicots | Phyllanthaceae | *Phyllanthus lacunarius* | | | C | | 1/1 |

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|---|---|---|---|---|---|---|---|---|
| plants | higher dicots | Phyllanthaceae | *Phyllanthus maderaspatensis* | | | C | | 6 |
| plants | higher dicots | Phyllanthaceae | *Phyllanthus* | | | C | | 1 |
| plants | higher dicots | Phyllanthaceae | *Breynia oblongifolia* | | | C | | 11 |
| plants | higher dicots | Phyllanthaceae | *Phyllanthus fuernrohrii* | | | C | | 1 |
| plants | higher dicots | Picrodendraceae | *Petalostigma pubescens* | quinine tree | | C | | 10 |
| plants | higher dicots | Pittosporaceae | *Bursaria incana* | | | C | | 10/1 |
| plants | higher dicots | Pittosporaceae | *Pittosporum angustifolium* | | | C | | 3 |
| plants | higher dicots | Plantaginaceae | *Stemodia pubescens* | | | C | | 1/1 |
| plants | higher dicots | Plantaginaceae | *Scoparia dulcis* | scoparia | Y | | | 3 |
| plants | higher dicots | Polygonaceae | *Emex australis* | | Y | | | 7 |
| plants | higher dicots | Portulacaceae | *Portulaca pilosa* | | Y | | | 1 |
| plants | higher dicots | Portulacaceae | *Portulaca oleracea* | pigweed | Y | | | 1 |
| plants | higher dicots | Portulacaceae | *Portulaca filifolia* | | | C | | 8 |
| plants | higher dicots | Portulacaceae | *Calandrinia pickeringii* | | | C | | 3/1 |
| plants | higher dicots | Proteaceae | *Grevillea striata* | beefwood | | C | | 1 |
| plants | higher dicots | Proteaceae | *Hakea lorea* | | | C | | 5 |
| plants | higher dicots | Proteaceae | *Persoonia amaliae* | | | C | | 1/1 |
| plants | higher dicots | Proteaceae | *Grevillea parallela* | | | C | | 1 |
| plants | higher dicots | Rhamnaceae | *Alphitonia excelsa* | soap tree | | C | | 11 |
| plants | higher dicots | Rhamnaceae | *Ventilago viminalis* | supplejack | | C | | 11/1 |
| plants | higher dicots | Rubiaceae | *Psydrax saligna forma saligna* | | | C | | 1/1 |
| plants | higher dicots | Rubiaceae | *Psydrax odorata forma buxifolia* | | | C | | 7 |
| plants | higher dicots | Rubiaceae | *Psydrax odorata subsp. australiana* | | | C | | 1/1 |
| plants | higher dicots | Rubiaceae | *Psydrax oleifolia* | | | C | | 2 |
| plants | higher dicots | Rubiaceae | *Psydrax attenuata* | | | C | | 4 |
| plants | higher dicots | Rubiaceae | *Spermacoce multicaulis* | | | C | | 13 |
| plants | higher dicots | Rubiaceae | *Spermacoce brachystema* | | | C | | 1/1 |
| plants | higher dicots | Rutaceae | *Flindersia dissosperma* | | | C | | 12 |
| plants | higher dicots | Rutaceae | *Geijera salicifolia* | brush wilga | | C | | 13/1 |
| plants | higher dicots | Rutaceae | *Citrus glauca* | | | C | | 1/1 |
| plants | higher dicots | Rutaceae | *Flindersia australis* | crow's ash | | C | | 1 |
| plants | higher dicots | Santalaceae | *Santalum lanceolatum* | | | C | | 2 |
| plants | higher dicots | Sapindaceae | *Alectryon pubescens* | | | C | | 1/1 |
| plants | higher dicots | Sapindaceae | *Alectryon oleifolius subsp. elongatus* | | | C | | 2 |
| plants | higher dicots | Sapindaceae | *Alectryon diversifolius* | scrub boonaree | | C | | 4 |
| plants | higher dicots | Sapindaceae | *Atalaya hemiglauca* | | | C | | 11 |
| plants | higher dicots | Sapotaceae | *Planchonella pohlmaniana* | | | C | | 1/1 |
| plants | higher dicots | Sapotaceae | *Planchonella pohlmaniana var. (Gilbert River C.T.White 1409)* | | | C | | 1/1 |
| plants | higher dicots | Scrophulariaceae | *Eremophila debilis* | winter apple | | C | | 5 |
| plants | higher dicots | Scrophulariaceae | *Eremophila deserti* | | | C | | 1 |
| plants | higher dicots | Scrophulariaceae | *Eremophila mitchellii* | | | C | | 10 |
| plants | higher dicots | Scrophulariaceae | *Myoporum acuminatum* | coastal boobialla | | C | | 6/2 |
| plants | higher dicots | Solanaceae | *Solanum parvifolium subsp. parvifolium* | | | C | | 3 |
| plants | higher dicots | Solanaceae | *Solanum ellipticum* | potato bush | | C | | 3 |
| plants | higher dicots | Solanaceae | *Solanum esuriale* | quena | | C | | 2/1 |

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| plants | higher dicots | Sparrmanniaceae | *Grewia latifolia* | dysentery plant | | C | | 19 |
| plants | higher dicots | Sparrmanniaceae | *Corchorus trilocularis* | | | C | | 1/1 |
| plants | higher dicots | Sterculiaceae | *Brachychiton australis* | broad-leaved bottle tree | | C | | 1/1 |
| plants | higher dicots | Sterculiaceae | *Brachychiton populneus subsp. trilobus* | | | C | | 1/1 |
| plants | higher dicots | Thymelaeaceae | *Pimelea linifolia subsp. linifolia* | | | C | | 3 |
| plants | higher dicots | Violaceae | *Afrohybanthus stellarioides* | | | C | | 2 |
| plants | higher dicots | Violaceae | *Afrohybanthus enneaspermus* | | | C | | 9 |
| plants | higher dicots | Vitaceae | *Clematicissus opaca* | | | C | | 1 |
| plants | lower dicots | Lauraceae | *Cassytha filiformis* | dodder laurel | | C | | 1 |
| plants | lower dicots | Menispermaceae | *Tinospora smilacina* | snakevine | | C | | 1 |
| plants | monocots | Amaryllidaceae | *Crinum flaccidum* | Murray lily | | C | | 1 |
| plants | monocots | Centrolepidaceae | *Centrolepis exserta* | | | C | | 1/1 |
| plants | monocots | Commelinaceae | *Cyanotis axillaris* | | | C | | 5 |
| plants | monocots | Commelinaceae | *Murdannia graminea* | murdannia | | C | | 5 |
| plants | monocots | Commelinaceae | *Commelina diffusa* | wandering jew | | C | | 8 |
| plants | monocots | Cyperaceae | *Cyperus difformis* | rice sedge | | C | | 2 |
| plants | monocots | Cyperaceae | *Cyperus scariosus* | | | C | | 1 |
| plants | monocots | Cyperaceae | *Fimbristylis nuda* | | | C | | 1 |
| plants | monocots | Cyperaceae | *Abildgaardia ovata* | | | C | | 5/1 |
| plants | monocots | Cyperaceae | *Cyperus cyperoides* | | | C | | 3 |
| plants | monocots | Cyperaceae | *Cyperus esculentus* | yellow nutgrass | Y | | | 1/1 |
| plants | monocots | Cyperaceae | *Cyperus leiocaulon* | | | C | | 1/1 |
| plants | monocots | Cyperaceae | *Cyperus squarrosus* | bearded flatsedge | | C | | 7 |
| plants | monocots | Cyperaceae | *Cyperus cristulatus* | | | C | | 3 |
| plants | monocots | Cyperaceae | *Cyperus perangustus* | | | C | | 1 |
| plants | monocots | Cyperaceae | *Fimbristylis nutans* | | | C | | 1 |
| plants | monocots | Cyperaceae | *Cyperus sesquiflorus* | | Y | | | 1/1 |
| plants | monocots | Cyperaceae | *Scleria mackaviensis* | | | C | | 13 |
| plants | monocots | Cyperaceae | *Fimbristylis dichotoma* | common fringe-rush | | C | | 12 |
| plants | monocots | Cyperaceae | *Fimbristylis microcarya* | | | C | | 1/1 |
| plants | monocots | Cyperaceae | *Lipocarpha microcephala* | | | C | | 2 |
| plants | monocots | Cyperaceae | *Cyperus concinnus* | | | C | | 3/1 |
| plants | monocots | Cyperaceae | *Cyperus gracilis* | | | C | | 9 |
| plants | monocots | Cyperaceae | *Cyperus fulvus* | | | C | | 1/1 |
| plants | monocots | Cyperaceae | *Cyperus bifax* | western nutgrass | | C | | 1/1 |
| plants | monocots | Cyperaceae | *Cyperus iria* | | | C | | 2 |
| plants | monocots | Cyperaceae | *Cyperus rigidellus* | | | C | | 9 |
| plants | monocots | Hemerocallidaceae | *Dianella* | | | C | | 2 |
| plants | monocots | Hypoxidaceae | *Hypoxis pratensis var. pratensis* | | | C | | 4 |
| plants | monocots | Johnsoniaceae | *Tricoryne elatior* | yellow autumn lily | | C | | 4 |
| plants | monocots | Laxmanniaceae | *Lomandra multiflora* | | | C | | 2 |
| plants | monocots | Laxmanniaceae | *Eustrephus latifolius* | wombat berry | | C | | 6 |
| plants | monocots | Laxmanniaceae | *Lomandra longifolia* | | | C | | 2 |
| plants | monocots | Orchidaceae | *Cymbidium canaliculatum* | | | C | | 3 |
| plants | monocots | Poaceae | *Dichanthium fecundum* | curly bluegrass | | C | | 6/3 |
| plants | monocots | Poaceae | *Dichanthium sericeum* | | | C | | 4 |

| Kingdom | Class | Family | Scientific Name | Common Name | I | Q | A | Records |
|---|---|---|---|---|---|---|---|---|
| plants | monocots | Poaceae | *Enneapogon nigricans* | niggerheads | | C | | 1 |
| plants | monocots | Poaceae | *Enneapogon truncatus* | | | C | | 14 |
| plants | monocots | Poaceae | *Eragrostis lacunaria* | purple lovegrass | | C | | 14/2 |
| plants | monocots | Poaceae | *Iseilema macratherum* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Sporobolus elongatus* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Tripogon loliiformis* | five minute grass | | C | | 2 |
| plants | monocots | Poaceae | *Urochloa praetervisa* | | | C | | 2 |
| plants | monocots | Poaceae | *Whiteochloa airoides* | | | C | | 3/1 |
| plants | monocots | Poaceae | *Alloteropsis cimicina* | | | C | | 3 |
| plants | monocots | Poaceae | *Cenchrus polystachios* | | Y | | | 1/1 |
| plants | monocots | Poaceae | *Cymbopogon bombycinus* | silky oilgrass | | C | | 2 |
| plants | monocots | Poaceae | *Dichanthium aristatum* | angleton grass | Y | | | 2/2 |
| plants | monocots | Poaceae | *Elytrophorus spicatus* | | | C | | 2/1 |
| plants | monocots | Poaceae | *Eragrostis leptocarpa* | drooping lovegrass | | C | | 5 |
| plants | monocots | Poaceae | *Eragrostis tenuifolia* | elastic grass | Y | | | 1/1 |
| plants | monocots | Poaceae | *Heteropogon contortus* | black speargrass | | C | | 15 |
| plants | monocots | Poaceae | *Heteropogon triticeus* | giant speargrass | | C | | 4 |
| plants | monocots | Poaceae | *Alloteropsis semialata* | cockatoo grass | | C | | 4 |
| plants | monocots | Poaceae | *Bothriochloa ewartiana* | desert bluegrass | | C | | 1 |
| plants | monocots | Poaceae | *Dinebra decipiens var. decipiens* | | | C | | 6 |
| plants | monocots | Poaceae | *Aristida benthamii var. benthamii* | | | C | | 2 |
| plants | monocots | Poaceae | *Aristida holathera var. holathera* | | | C | | 4 |
| plants | monocots | Poaceae | *Panicum decompositum var. tenuius* | | | C | | 10 |
| plants | monocots | Poaceae | *Setaria pumila subsp. subtesselata* | | Y | | | 1/1 |
| plants | monocots | Poaceae | *Bothriochloa bladhii subsp. bladhii* | | | C | | 6 |
| plants | monocots | Poaceae | *Megathyrsus maximus var. pubiglumis* | | Y | | | 3 |
| plants | monocots | Poaceae | *Urochloa panicoides var. panicoides* | | Y | | | 1/1 |
| plants | monocots | Poaceae | *Dichanthium sericeum subsp. sericeum* | | | C | | 2/2 |
| plants | monocots | Poaceae | *Bothriochloa decipiens var. decipiens* | | | C | | 7 |
| plants | monocots | Poaceae | *Urochloa holosericea subsp. holosericea* | | | C | | 3 |
| plants | monocots | Poaceae | *Aristida jerichoensis var. subspinulifera* | | | C | | 8 |
| plants | monocots | Poaceae | *Calyptochloa gracillima subsp. gracillima* | | | C | | 4 |
| plants | monocots | Poaceae | *Enneapogon intermedius* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Enteropogon acicularis* | curly windmill grass | | C | | 4 |
| plants | monocots | Poaceae | *Enteropogon unispiceus* | | | C | | 13 |
| plants | monocots | Poaceae | *Moorochloa eruciformis* | | Y | | | 1/1 |
| plants | monocots | Poaceae | *Paspalidium criniforme* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Urochloa mosambicensis* | sabi grass | Y | | | 5 |
| plants | monocots | Poaceae | *Ancistrachne uncinulata* | hooky grass | | C | | 10 |
| plants | monocots | Poaceae | *Dactyloctenium radulans* | button grass | | C | | 4 |
| plants | monocots | Poaceae | *Eragrostis leptostachya* | | | C | | 11 |
| plants | monocots | Poaceae | *Eragrostis megalosperma* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Eragrostis spartinoides* | | | C | | 2/2 |
| plants | monocots | Poaceae | *Paspalidium caespitosum* | brigalow grass | | C | | 11/1 |
| plants | monocots | Poaceae | *Paspalidium constrictum* | | | C | | 14 |
| plants | monocots | Poaceae | *Sporobolus actinocladus* | katoora grass | | C | | 1 |

| Kingdom | Class | Family | Scientific Name | Common Name | I | Q | A | Records |
|---|---|---|---|---|---|---|---|---|
| plants | monocots | Poaceae | *Sporobolus jacquemontii* | | Y | | | 1/1 |
| plants | monocots | Poaceae | *Capillipedium spicigerum* | spicytop | | C | | 3 |
| plants | monocots | Poaceae | *Walwhalleya subxerophila* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Bothriochloa erianthoides* | satintop grass | | C | | 1/1 |
| plants | monocots | Poaceae | *Digitaria divaricatissima* | spreading umbrella grass | | C | | 5 |
| plants | monocots | Poaceae | *Dichanthium queenslandicum* | | | V | E | 1/1 |
| plants | monocots | Poaceae | *Eriochloa pseudoacrotricha* | | | C | | 11/1 |
| plants | monocots | Poaceae | *Aristida calycina var. calycina* | | | C | | 10 |
| plants | monocots | Poaceae | *Dinebra decipiens var. asthenes* | | | C | | 1 |
| plants | monocots | Poaceae | *Perotis rara* | comet grass | | C | | 1 |
| plants | monocots | Poaceae | *Eriachne rara* | | | C | | 4 |
| plants | monocots | Poaceae | *Eulalia aurea* | silky browntop | | C | | 12/1 |
| plants | monocots | Poaceae | *Lolium perenne* | perennial ryegrass | Y | | | 1/1 |
| plants | monocots | Poaceae | *Melinis repens* | red natal grass | Y | | | 12 |
| plants | monocots | Poaceae | *Aristida ramosa* | purple wiregrass | | C | | 11 |
| plants | monocots | Poaceae | *Chloris inflata* | purpletop chloris | Y | | | 4 |
| plants | monocots | Poaceae | *Eleusine indica* | crowsfoot grass | Y | | | 1/1 |
| plants | monocots | Poaceae | *Panicum effusum* | | | C | | 14 |
| plants | monocots | Poaceae | *Setaria surgens* | | | C | | 4 |
| plants | monocots | Poaceae | *Cynodon dactylon* | | Y | | | 2 |
| plants | monocots | Poaceae | *Eriochloa crebra* | spring grass | | C | | 2 |
| plants | monocots | Poaceae | *Themeda avenacea* | | | C | | 1 |
| plants | monocots | Poaceae | *Themeda triandra* | kangaroo grass | | C | | 11 |
| plants | monocots | Poaceae | *Urochloa foliosa* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Cenchrus ciliaris* | | Y | | | 18 |
| plants | monocots | Poaceae | *Dichanthium tenue* | small bluegrass | | C | | 2 |
| plants | monocots | Poaceae | *Digitaria brownii* | | | C | | 13 |
| plants | monocots | Poaceae | *Panicum paludosum* | swamp panic | | C | | 1/1 |
| plants | monocots | Poaceae | *Sporobolus caroli* | fairy grass | | C | | 7 |
| plants | monocots | Poaceae | *Urochloa pubigera* | | | C | | 8 |
| plants | monocots | Poaceae | *Aristida holathera* | | | C | | 3 |
| plants | monocots | Poaceae | *Aristida personata* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Chloris ventricosa* | tall chloris | | C | | 12 |
| plants | monocots | Poaceae | *Chrysopogon fallax* | | | C | | 19 |
| plants | monocots | Poaceae | *Digitaria bicornis* | | | C | | 5/1 |
| plants | monocots | Poaceae | *Echinochloa colona* | awnless barnyard grass | Y | | | 6/3 |
| plants | monocots | Poaceae | *Eragrostis brownii* | Brown's lovegrass | | C | | 1/1 |
| plants | monocots | Poaceae | *Eragrostis sororia* | | | C | | 4 |
| plants | monocots | Poaceae | *Eriachne mucronata* | | | C | | 1 |
| plants | monocots | Poaceae | *Digitaria ammophila* | silky umbrella grass | | C | | 4 |
| plants | monocots | Poaceae | *Enneapogon pallidus* | conetop nineawn | | C | | 7 |
| plants | monocots | Poaceae | *Eragrostis elongata* | | | C | | 13/1 |
| plants | monocots | Poaceae | *Imperata cylindrica* | blady grass | | C | | 1 |
| plants | monocots | Poaceae | *Leptochloa digitata* | | | C | | 1/1 |
| plants | monocots | Poaceae | *Panicum larcomianum* | | | C | | 1 |
| plants | monocots | Poaceae | *Paspalidium distans* | shotgrass | | C | | 4 |

| Kingdom | Class | Family | Scientific Name | Common Name | I | Q | A | Records |
|---|---|---|---|---|---|---|---|---|
| plants | monocots | Poaceae | *Sporobolus fertilis* | giant Parramatta grass | Y | | | 1/1 |
| plants | monocots | Poaceae | *Tragus australianus* | small burr grass | | C | | 4 |
| plants | monocots | Poaceae | *Bothriochloa pertusa* | | Y | | | 20 |
| plants | monocots | Poaceae | *Cymbopogon refractus* | barbed-wire grass | | C | | 7 |

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.* The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

# Appendix C BioCondition Assessment Data

| BioCondition Scoring Sheet | RE 11.3.2 | RE 11.3.25 | RE 11.3.25 | RE 11.3.27 | RE 11.3.4a | | RE 11.3.9 | RE 11.4.9 | | | RE 11.5.2a |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mrb1 | Mrb17 | Mrb21 | Mrb13 | Mrb15 | Mrb18 | Mrb3 | Mrb9 | Mrb10 | SWC3 | Mrb6 |
| **Site Condition** | | | | | | | | | | | |
| Recruitment of woody perennials | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Native plant species richness | | | | | | | | | | | |
| *Trees* | 5 | 5 | 5 | 5 | 2.5 | 5 | 5 | 2.5 | 5 | 5 | 5 |
| *Shrubs* | 5 | 2.5 | 2.5 | 5 | 5 | 5 | 5 | 2.5 | 5 | 0 | 5 |
| *Grass* | 5 | 0 | 0 | 5 | 2.5 | 2.5 | 2.5 | 2.5 | 5 | 5 | 5 |
| *Forbs* | 2.5 | 0 | 2.5 | 2.5 | 0 | 0 | 2.5 | 2.5 | 5 | 5 | 5 |
| Tree canopy height | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Tree canopy cover | 5 | 3 | 3 | 5 | 3 | 3 | 3 | 3 | 3 | 5 | 5 |
| Shrub canopy cover | 3 | 0 | 5 | 5 | 0 | 5 | 0 | 3 | 3 | 3 | 5 |
| Native perennial grass cover | 3 | 0 | 0 | 5 | 0 | 1 | 3 | 1 | 1 | 5 | 5 |
| Organic litter cover | 5 | 3 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 |
| Large trees | 10 | 15 | 15 | 5 | 5 | 5 | 10 | 5 | 5 | 5 | 5 |
| Coarse woody debris | 2 | 0 | 2 | 5 | 2 | 0 | 2 | 5 | 5 | 5 | 2 |
| Weed cover | 5 | 0 | 0 | 3 | 0 | 0 | 5 | 5 | 5 | 5 | 10 |
| **Total field based attributes** | 60.5 | 38.5 | 50.0 | 58.5 | 33.0 | 41.5 | 53.0 | 47.0 | 57.0 | 58.0 | 67.0 |

| BioCondition Scoring Sheet | RE 11.3.2 | RE 11.3.25 | RE 11.3.25 | RE 11.3.27 | RE 11.3.4a | | RE 11.3.9 | RE 11.4.9 | | | RE 11.5.2a |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mrb1 | Mrb17 | Mrb21 | Mrb13 | Mrb15 | Mrb18 | Mrb3 | Mrb9 | Mrb10 | SWC3 | Mrb6 |
| **Site Context** | | | | | | | | | | | |
| Patch size | 10 | 5 | 10 | 10 | 10 | 5 | 10 | 10 | 10 | 10 | 10 |
| Connectivity | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Context | 5 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 5 |
| Distance from Water | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| **Total GIS attributes** | 20.1 | 14.1 | 19.1 | 18.1 | 19.1 | 14.1 | 20.1 | 20.1 | 20.1 | 19.1 | 20.1 |
| **BioCondition Score** | 0.81 | 0.53 | 0.69 | 0.77 | 0.52 | 0.56 | 0.73 | 0.67 | 0.77 | 0.77 | 0.87 |
| **Average BioCondition Score** | 0.81 | 0.53 | 0.69 | 0.77 | 0.54 | | 0.73 | 0.74 | | | 0.87 |

| BioCondition Scoring Sheet | RE 11.5.3 | | | | | Regrowth | RE 11.5.8b | | RE 11.5.8c | | Regrowth | | RE 11.5.9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mrb4 | Mrb7 | Mbr14 | SWC1 | SWC4 | Mrb19 | Mrb8 | Mrb20 | Mrb2 | Mrb5 | Mrb11 | Mrb12 | Mrb16 | SWC2 |
| **Site Condition** | | | | | | | | | | | | | | |
| Recruitment of woody perennials | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Native plant species richness | | | | | | | | | | | | | | |
| *Trees* | 5 | 5 | 5 | 2.5 | 5 | 5 | 5 | 5 | 5 | 5 | 2.5 | 5 | 5 | 5 |
| *Shrubs* | 2.5 | 5 | 5 | 5 | 2.5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2.5 | 5 |

| BioCondition Scoring Sheet | RE 11.5.3 | | | | | Regrowth | RE 11.5.8b | | RE 11.5.8c | | Regrowth | | RE 11.5.9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mrb4 | Mrb7 | Mbr14 | SWC1 | SWC4 | Mrb19 | Mrb8 | Mrb20 | Mrb2 | Mrb5 | Mrb11 | Mrb12 | Mrb16 | SWC2 |
| *Grass* | 2.5 | 5 | 5 | 5 | 5 | 5 | 5 | 2.5 | 5 | 5 | 2.5 | 5 | 2.5 | 2.5 |
| *Forbs* | 2.5 | 2.5 | 2.5 | 5 | 5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 0 | 2.5 | 5 | 2.5 |
| Tree canopy height | 5 | 5 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| Tree canopy cover | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 2 | 5 | 5 | 5 |
| Shrub canopy cover | 3 | 5 | 3 | 3 | 3 | 5 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 3 |
| Native perennial grass cover | 3 | 5 | 3 | 5 | 1 | 5 | 3 | 1 | 3 | 3 | 3 | 3 | 5 | 5 |
| Organic litter cover | 5 | 3 | 3 | 5 | 5 | 3 | 5 | 3 | 5 | 5 | 5 | 5 | 5 | 5 |
| Large trees | 15 | 10 | 0 | 15 | 15 | 0 | 15 | 15 | 0 | 0 | 0 | 0 | 10 | 15 |
| Coarse woody debris | 2 | 5 | 5 | 5 | 2 | 2 | 5 | 5 | 5 | 2 | 5 | 5 | 2 | 2 |
| Weed cover | 5 | 10 | 5 | 5 | 0 | 0 | 10 | 3 | 5 | 5 | 10 | 5 | 10 | 5 |
| **Total field based attributes** | 60.5 | 68.5 | 51.5 | 70.5 | 58.5 | 45.5 | 68.5 | 57.0 | 50.5 | 50.5 | 45.0 | 50.5 | 65.0 | 65.0 |
| **Site Context** | | | | | | | | | | | | | | |
| Patch size | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 5 | 10 |
| Connectivity | 5 | 5 | 5 | 5 | 2 | 4 | 5 | 4 | 5 | 5 | 2 | 2 | 2 | 5 |
| Context | 5 | 5 | 5 | 5 | 4 | 2 | 5 | 4 | 5 | 5 | 4 | 4 | 4 | 5 |
| Distance from Water | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| **Total GIS attributes** | 20.1 | 20.1 | 20.1 | 20.1 | 16.1 | 16.1 | 20.1 | 18.1 | 20.1 | 20.1 | 16.1 | 16.1 | 11.1 | 20.1 |
| **BioCondition Score** | 0.81 | 0.89 | 0.72 | 0.91 | 0.75 | 0.62 | 0.89 | 0.75 | 0.71 | 0.71 | 0.61 | 0.67 | 0.76 | 0.85 |

| BioCondition Scoring Sheet | RE 11.5.3 | | | | | Regrowth | RE 11.5.8b | | RE 11.5.8c | | Regrowth | | RE 11.5.9 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mrb4 | Mrb7 | Mbr14 | SWC1 | SWC4 | Mrb19 | Mrb8 | Mrb20 | Mrb2 | Mrb5 | Mrb11 | Mrb12 | Mrb16 | SWC2 |
| **Average BioCondition Score** | 0.82 | | | | | 0.62 | 0.82 | | 0.71 | | 0.64 | | 0.80 | |

# Appendix D TEC Assessments Results

| Brigalow Patch ID | TEC Threshold Criteria | Field Evidence |
|---|---|---|
| BTEC1 | Tree layer | *A. harpophylla* dominant |
| | Age | >15 years |
| | Patch size | >0.5 ha |
| | Weed cover | 0 % |
| BTEC2 | Tree layer | *A. harpophylla* dominant |
| | Age | >15 years |
| | Patch size | >0.5 ha |
| | Weed cover | 5 % |
| BTEC3 | Tree layer | *A. harpophylla* dominant |
| | Age | >15 years |
| | Patch size | >0.5 ha |
| | Weed cover | 10 % |
| BTEC4 | Tree layer | *A. harpophylla* dominant |
| | Age | >15 years |
| | Patch size | >0.5 ha |
| | Weed cover | 5 % |

# Appendix E Bird Survey Abundance Data

| Common Name | Species Name | Total Count | Average occurrence across 40 bird surveys |
|---|---|---|---|
| Apostle Bird | *Struthidea cinerea* | 6 | 0.15 |
| Australasian Pipit | *Anthus novaeseelandiae* | 1 | 0.03 |
| Australian Magpie | *Cracticus tibicen* | 6 | 0.15 |
| Black-faced Cuckoo-Shrike | *Coracina novaehollandiae* | 25 | 0.63 |
| Bar-shouldered Dove | *Geopelia humeralis* | 4 | 0.10 |
| Blue-faced Honeyeater | *Entomyzon cyanotis* | 83 | 2.08 |
| Blue-winged Kookaburra | *Dacelo leachii* | 1 | 0.03 |
| Brolga | *Grus rubicunda* | 3 | 0.08 |
| Brown Honeyeater | *Lichmera indistincta* | 2 | 0.05 |
| Brown Quail | *Coturnix ypsilophora* | 5 | 0.13 |
| Budgerigar | *Melopsittacus undulatus* | 8 | 0.20 |
| Channel-billed Cuckoo | *Scythrops novaehollandiae* | 4 | 0.10 |
| Cicadabird | *Coracina tenuirostris* | 10 | 0.25 |
| Dollarbird | *Eurystomus orientalis* | 20 | 0.50 |
| Double-barred Finch | *Taeniopygia bichenovii* | 32 | 0.80 |
| Spangled Drongo | *Dicrurus bracteatus* | 25 | 0.63 |
| Eastern Koel | *Eudynamys orientalis* | 3 | 0.08 |
| Emu | *Dromaius novaehollandiae* | 2 | 0.05 |
| Figbird | *Sphecotheres vieilloti* | 33 | 0.83 |
| Forest Kingfisher | *Todiramphus macleayii* | 18 | 0.45 |
| Eastern Great Egret | *Ardea modesta* | 1 | 0.03 |
| Grey Butcherbird | *Cracticus torquatus* | 15 | 0.38 |
| Grey-crowned Babbler | *Pomatostomus temporalis* | 11 | 0.28 |
| Grey Shrike-thrush | *Colluricincla harmonica* | 1 | 0.03 |
| Grey Teal | *Anas gracilis* | 1 | 0.03 |
| Hardhead | *Aythya australis* | 4 | 0.10 |
| Horsefield's Bronze Cuckoo | *Chrysococcyx basalis* | 1 | 0.03 |
| Intermediate Egret | *Ardea intermedia* | 1 | 0.03 |
| Laughing Kookaburra | *Dacelo novaeguineae* | 45 | 1.13 |
| Leaden Flycatcher | *Myiagra rubecula* | 9 | 0.23 |
| Little Bronze Cuckoo | *Chrysococcyx minutillus* | 3 | 0.08 |
| Little Friarbird | *Philemon citreogularis* | 8 | 0.20 |
| Magpie-lark | *Grallina cyanoleuca* | 7 | 0.18 |
| Masked Lapwing | *Vanellus miles* | 4 | 0.10 |
| Masked Woodswallow | *Artamus personatus* | 50 | 1.25 |
| Mistletoebird | *Dicaeum hirundinaceum* | 2 | 0.05 |
| Noisy Friarbird | *Philemon corniculatus* | 47 | 1.18 |
| Noisy Minor | *Manorina melanocephala* | 32 | 0.80 |

| Common Name | Species Name | Total Count | Average occurrence across 40 bird surveys |
|---|---|---|---|
| Olive-backed Oriole | *Oriolus sagittatus* | 2 | 0.05 |
| Pacific Baza | *Aviceda subcristata* | 1 | 0.03 |
| Pacific Black Duck | *Anas superciliosa* | 2 | 0.05 |
| Pale-headed Rosella | *Platycercus adscitus* | 81 | 2.03 |
| Peaceful Dove | *Geopelia striata* | 30 | 0.75 |
| Pheasant Coucal | *Centropus phasianinus* | 7 | 0.18 |
| Pied Butcherbird | *Cracticus nigrogularis* | 41 | 1.05 |
| Pied Currawong | *Strepera graculina* | 8 | 0.20 |
| Plumed Whistling-duck | *Dendrocygna eytoni* | 2 | 0.05 |
| Rainbow Bee-eater | *Merops ornatus* | 15 | 0.38 |
| Rainbow Lorikeet | *Trichoglossus haematodus* | 68 | 1.70 |
| Red-Backed Fairy-Wren | *Malurus melanocephalus* | 71 | 1.78 |
| Red-Winged Parrot | *Aprosmictus erythropterus* | 15 | 0.38 |
| Restless Flycatcher | *Myiagra inquieta* | 1 | 0.03 |
| Singing Honeyeater | *Gavicalis virescens* | 7 | 0.18 |
| Spotted Bowerbird | *Ptilonorhynchus maculatus* | 4 | 0.10 |
| Squatter Pigeon | *Geophaps scripta* | 11 | 0.28 |
| Striated Pardalote | *Pardalotus striatus* | 90 | 2.25 |
| Straw-Necked Ibis | *Threskiornis spinicollis* | 2 | 0.05 |
| Striped Honeyeater | *Plectorhyncha lanceolata* | 1 | 0.03 |
| Sulphur-crested Cockatoo | *Cacatua galerita* | 15 | 0.38 |
| Tawny Frogmouth | *Podargus strigoides* | 1 | 0.03 |
| Torresian Crow | *Corvus orru* | 54 | 1.35 |
| Varied Sittella | *Daphoenositta chrysoptera* | 28 | 0.70 |
| Wedge-tailed Eagle | *Aquila audax* | 9 | 0.23 |
| Weebill | *Smicrornis brevirostris* | 89 | 2.23 |
| Whistling Kite | *Haliastur sphenurus* | 5 | 0.13 |
| White-breasted Woodswallow | *Artamus leucorynchus* | 2 | 0.05 |
| White-Browed Woodswallow | *Artamus superciliosus* | 85 | 2.13 |
| White-faced Heron | *Egretta novaehollandiae* | 5 | 0.13 |
| White-necked Heron | *Ardea pacifica* | 3 | 0.08 |
| White-throated Gerygone | *Gerygone olivacea* | 2 | 0.05 |
| White-throated Honeyeater | *Melithreptus albogularis* | 170 | 4.25 |
| Willie Wagtail | *Rhipidura leucophrys* | 1 | 0.03 |
| White-bellied Cuckoo Shrike | *Coracina papuensis* | 19 | 0.48 |
| Australian Wood Duck | *Chenonetta jubata* | 44 | 1.10 |
| Yellow Honeyeater | *Stomiopera flavus* | 1 | 0.03 |
| Yellow-Throated Miner | *Manorina flavigula* | 7 | 0.18 |

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ISO 14001 Environmental Management

AS/NZS 4801:2001 Occupational Health and Safety Management

ISO 9001 Quality Management


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**Appendix D**

# Species Habitat Scoring Attributes

## Quality and availability of foraging habitat

| Indicator | Description | | | Score |
|---|---|---|---|---|
| Presence, abundance and variety of gilgai | 5<br>Sparse, isolated gilgai with minimal surrounding deep cracking soil or no gilgai present | 20<br>Multiple gilgai present within assessment unit with some variety of depth and size. Deep cracking soil present. | 40<br>Abundant connected gilgai with a variety of size and depth. | **40** |
| Vegetation Structure | 1<br>Cleared paddocks dominated by exotic grass species. | 7<br>Regrowth vegetation with some areas of leaf litter and woody debris. | 15<br>Remnant or advanced regrowth with abundant areas of deep leaf litter, course woody debris and native tussock grasses. | **15** |
| Total | | | | **55** |

The species appears to be is a habitat specialist with few records occurring outside of gilgai and cracking clay habitats. This species is most commonly found in vegetation communities that occur on Cainozoic clay plains, with REs 11.4.3, 11.4.6, 11.4.8 and 11.4.9 representing the most common Regional Ecosystems in which this species has been recorded (DCCEEW, 2024). This species has also been recorded on REs 11.3.3 and 11.5.16 (DCCEEW, 2024), as well as RE 11.9.5 and non-remnant vegetation where gilgai are prevalent (Marston pers comms). The capacity of soils within gilgai systems to form deep cracks and retain ponded areas following rainfall, appears to be the main criteria for the distribution and preferential selection of gilgai habitats by the species (Veary, Veary, Burgess, & Fell, 2011).

The diet of this species consists predominately of frogs and particularly frogs of the Cyclorana genus (TSSC, 2016). The prey species of Ornamental Snake are associated with gilgai, cracking clay soils and ephemeral water bodies. As an example, a high abundance of snakes at a site near Nebo was observed to coincide with an abundance of young frogs emerging from an ephemeral pool (DCCEEW, 2024).

The quality of gilgai habitat will be assessed during field surveys and will be determined by assessing the presence, abundance and variety of gilgai habitat within an assessment unit. Gilgai presence will require consultation of current and historic aerial photographic imagery and walking areas of the assessment unit with apparent gilgai formations. This indicator will be measured qualitatively based on the combination of size, depth, bank angle and vegetation structure of gilgai within the assessment unit. Assessment units that show no indication of gilgai and cracking soils and are not on land zone 4 (with an exemption for gilgai formations on land zone 9) will not be considered suitable habitat for the species.

## Quality and availability of habitat required for shelter and breeding.

| Indicator | Description | | | Score |
|---|---|---|---|---|
| Presence, abundance and variety of gilgai | 0<br>Sparse, isolated gilgai with minimal surrounding deep cracking soil. | 5<br>Multiple gilgai present within assessment unit with some variety of depth and size. Deep cracking soil present. | 10<br>Abundant connected gilgai with a variety of size and depth. Abundant areas of deep cracking soil. | **10** |
| Presence of ground timber, deep leaf litter and tussock grass | 0<br>Sparse tussock grass and coarse woody debris | 3<br>Abundant tussock grass and coarse woody debris particularly adjacent or close to gilgai | 5<br>Abundant tussock grass and coarse woody debris particularly adjacent or close to gilgai | **5** |
| Total | | | | **15** |

The species is known to seek refuge during dry periods in deep cracking clay associated with gilgai habitat (DCCEEW, 2024). The species is not known to leave gilgai habitat for breeding purposes. The presence and abundance of gilgai habitat within an assessment unit is the most important characteristic of quality and availability of habitat required for shelter and breeding. While the habitat conducive to the species is likely to be governed by underlying soil, in periods of extreme rainfall the species has been observed utilising the dense cover of tussock grasses for diurnal shelter (Veary, Veary, Burgess, & Fell, 2011). The species is also thought to shelter in logs and under course woody debris and ground litter (DCCEEW, 2024).

Both of these indicators will be determined during field survey assessments through habitat quality plots and visual qualitative assessments.

## Quality and availability of habitat required for mobility.

| Indicator | Description | | | Score |
|---|---|---|---|---|
| Presence, abundance and variety of gilgai | 1<br>Sparse, isolated gilgai with minimal surrounding deep cracking soil. | 5<br>Multiple gilgai present within assessment unit with some variety of depth and size. Deep cracking soil present. | 10<br>Abundant connected gilgai with a variety of size and depth. Abundant areas of deep cracking soil. | **10** |
| Patch size | 1<br>No adjacent suitable habitat. Habitat patch <10 Ha. | 3<br>Some adjacent suitable habitat. Habitat patch >10 Ha. | 5<br>Significant adjacent suitable habitat. Habitat patch >20 Ha. | **5** |
| Total | | | | **15** |

A study conducted in Central Queensland in 2009 found that the species is primarily restricted to gilgai habitat and does not move in or out of adjacent habitats during seasonal variation of (Veary, Veary, Burgess, & Fell, 2011). Therefore, the abundance, variety and connectivity of gilgai habitat within an assessment unit is a vital aspect of habitat quality required for mobility. Sites where the species have been recorded in abundance are also in habitat patches that are typically greater than 10 hectares in area and are within or connected, to larger areas of remnant vegetation (DCCEEW, 2024).

## Absence of threats

| Indicator | Description | | | Score |
|---|---|---|---|---|
| Potential for habitat loss or fragmentation | 1<br>Habitat within the assessment unit is located in an area that is likely to be degraded for infrastructure of agriculture. | 3<br>Habitat within the assessment unit is located in an area that will be potentially degraded. | 5<br>Habitat within the assessment unit not likely to be degraded. | **5** |
| Presence and abundance of livestock or feral pigs | 1<br>Livestock or pigs abundant with obvious ground compaction and over grazing in gilgai habitat. | 3<br>Livestock or pigs abundant with obvious ground compaction and over grazing in gilgai habitat. | 5<br>Livestock or pigs not present | **5** |
| Presence and abundance of Cane Toads | 1<br>Cane toads present throughout habitat. Toad tadpoles present in standing water | 3<br>Occasional mature cane toads observed. | 5<br>No Cane Toads observed. | **5** |
| Total | | | | **15** |

The Approved Conservation Advice for the species (TSSC, 2016) lists the main threat identified to the Ornamental Snake is a continued legacy of past broadscale land clearing and habitat degradation. As the species appears to reside at shallow depths within the soil profile, any process which disturbs the land form of gilgai habitats such as clearing, ploughing or the development of access tracks has the potential to significantly impact the species (Veary, Veary, Burgess, & Fell, 2011). The species is highly susceptible to the impacts of cattle grazing during periods when gilgai support water as cattle access can significantly alter the structure and integrity of gilgai form and function (Veary, Veary, Burgess, & Fell, 2011). The destruction of wetland habitats by feral pigs is also likely a threat (TSSC, 2016). The species has been observed to persist in areas where Cane Toads are present, however the species is susceptible to the Cane Toad toxin and death is highly likely if a Cane Toad is bitten or consumed (Veary, Veary, Burgess, & Fell, 2011). The risk habitat loss, fragmentation and degradation will be determined by assessing the state and federal status of the vegetation which defines an assessment unit. Threatened regional ecosystems (state) and threatened ecological communities (Commonwealth) have a greater level of legislative protection and hence the likelihood of that patch being cleared is reduced. There are numerous factors that can contribute to the degree of risk that an assessment unit might be cleared, such as;

- the vegetation within the assessment unit is on freehold land and is listed as Category X (non remnant vegetation) or Category B (remnant vegetation),
- the assessment unit is located under an existing PMAV,
- the assessment unit is located on a mining lease or within an infrastructure corridor.,

- the assessment unit is protected under an approved offset management plan and tenure arrangement.

This indicator will be determined through desktop analysis of relevant local, State and Commonwealth databases.

The presence and abundance of cattle, feral pigs and Cane Toads will be estimated by indicators such as direct observation, scats and tracks during field surveys.

**Appendix E**

# Habitat Quality Data

| Assessment Unit - Regional Ecosystem | Impact Area | | | | | | |
|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark | Impact 1 (MRB9)(os3) | | | Impact 2 (MRB10)(os4) | | |
| | 11.4.9 | Raw Data | % Benchma | Score | Raw Data | % Benchma | Score |
| **Site Condition** | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 4 | 200% | 5 |
| Native plant species richness - shrubs | **5** | 13 | 260% | 5 | 6 | 120% | 5 |
| Native plant species richness - grasses | **5** | 10 | 200% | 5 | 4 | 80% | 2.5 |
| Native plant species richness - forbes | **10** | 10 | 100% | 5 | 8 | 80% | 2.5 |
| Tree emergant height | | | | | | | |
| Tree canopy height | **10** | 16 | 160% | | 16 | 160% | |
| Tree canopy height subcanopy | **6** | 7 | 117% | 5 | 7 | 117% | 5 |
| Tree emergent cover | | | | | | | |
| Tree canopy cover | **25** | 74.9 | 300% | | 81.4 | 326% | |
| Tree canopy cover subcanopy | **11** | 9 | 82% | 5 | 15.7 | 143% | 3 |
| Shrub canopy cover | **5** | 17 | 340% | 3 | 14.9 | 298% | 3 |
| Native grass cover | **16** | 5.2 | 33% | 1 | 4.2 | 26% | 1 |
| Organic litter | **45** | 63.6 | 141% | 5 | 83.6 | 186% | 5 |
| Large trees (euc plus non-euc) | **47** | 20 | 43% | 5 | 6 | 13% | 5 |
| Coarse woody debris | **980** | 1670 | 170% | 5 | 1685 | 172% | 5 |
| Non-native plant cover | **0** | 5 | | 5 | 5 | | 5 |
| Quality and availability of food and foraging habitat | **55** | 55 | | 55 | 35 | | 35 |
| Quality and availability of shelter | **15** | 15 | | 15 | 15 | | 15 |
| Site Condition Score | | | | 129 | | | 102 |
| *MAX Site Condition Score* | | | | *140* | | | *140* |
| **Site Condition Score - out of 3** | | | | **2.76** | | | **2.19** |
| **Site Context** | | | | | | | |
| Size of patch | | | | 10 | | | 10 |
| Connectedness | | | | 5 | | | 5 |
| Context | | | | 5 | | | 5 |
| Threats to the species | | | | 4 | | | 4 |
| Species mobility capacity | | | | 11 | | | 11 |
| Site Context Score | | | | 35 | | | 35 |
| *MAX Site Context Score* | | | | *50* | | | *50* |
| **Site Context Score - out of 3** | | | | **2.10** | | | **2.10** |

| **Species Stocking Rate (SSR)** | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | 10 | | 5 |
| | | No | Yes - adjacent | Yes - on site | | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | 0 |
| | | Not habitat | Dispersal | Foraging | Breeding | breeding |
| Role/importance of species population on site* | Score (Total from supplementary table below) | 0 | 5 | 10 | 15 | 0 |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 70) | | | | | 40 | 5 |
| **SRR Score (out of 4)** | | | 0.5 | | | |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 0 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 0 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** |
|---|---|
| Site Condition score (out of 3) | 2.48 |
| Site Context Score (out of 3) | 2.10 |
| Species Stocking Rate Score (out of 4) | 0.5 |
| Habitat Quality score (out of 10) | *5.1* |
| Assessment Unit area (ha) | 47.39 |
| Total offset area (ha) | 47.39 |
| Size Weighting | 1.00 |
| ***Weighted Habitat Quality Score*** | ***5.08*** |

**BRIGALOW - BASELINE**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 4 | 80% | 2.5 | 4 | 80% | 2.5 | 11 | 220% | 5 | 5 | 100% | 5 | 127% | 3.75 |
| Native plant species richness - forbes | **10** | 1 | 10% | 0 | 4 | 40% | 2.5 | 6 | 60% | 2.5 | 5 | 50% | 2.5 | 37% | 1.88 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | | 0% | | | 0% | | | 0% | | | 0% | | 0% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | | 0% | | | 0% | | | 0% | | | 0% | | 0% | |
| Tree canopy cover subcanopy | **11** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Shrub canopy cover | **5** | 17.1 | 342% | 3 | 10.6 | 212% | 3 | 19.5 | 390% | 3 | 57 | 1140% | 3 | 315% | 3 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 40 | | 3 | 75 | | 0 | 30 | | 3 | 35 | | 3 | | 2.25 |
| Site Condition Score | | | | 28.5 | | | 27 | | | 30.5 | | | 26.5 | | 28.13 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **2.85** | | | **2.70** | | | **3.05** | | | **2.65** | | **2.81** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Site Context Score | | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **0.20** | | | **0.00** | | | **0.40** | | | **0.40** | | **0.20** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 2 | 40% | 2.5 | 2 | 40% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 80% | 3.8 |
| Native plant species richness - forbes | **10** | 2 | 20% | 0 | 4 | 40% | 2.5 | 7 | 70% | 2.5 | 7 | 70% | 2.5 | 50% | 1.9 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 4.5 | 45% | | 4.5 | 45% | | 11.5 | 115% | | 8.5 | 85% | | 73% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | 4 | 67% | 5 | 3 | 50% | 3 | 29% | 2 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | | 0% | 5 | | 0% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 82% | 3.75 |
| Shrub canopy cover | **5** | 0.6 | 12% | 3 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 137% | 5 |
| Native grass cover | **16** | 0.6 | 4% | 0 | | 0% | 0 | 29 | 181% | 5 | 28 | 175% | 5 | 90% | 3.3 |
| Organic litter | **45** | 2.6 | 6% | 0 | 3.8 | 8% | 0 | 2 | 4% | 0 | 6 | 13% | 3 | 8% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.7 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.3 |
| Non-native plant cover | **0** | 35 | | 3 | 35 | | 3 | 55 | | 0 | 25 | | 3 | | 2.0 |
| Site Condition Score | | | | 28.5 | | | 30 | | | 50.5 | | | 48.5 | | 41.7 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **2.85** | | | **3.00** | | | **5.05** | | | **4.85** | | **4.17** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Average/Final** |
|---|---|---|---|
| Site Condition score | 2.81 | 4.17 | 3.49 |
| Site Context Score | 0.20 | 1.45 | 0.83 |
| Habitat Quality score (out of 10) | *3.0* | *5.6* | 4.32 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***2.20*** | ***1.51*** | ***3.71*** |

**BRIGALOW - YEAR 1**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | benchma | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 2 | 20% | 0 | 5 | 50% | 2.5 | 7 | 70% | 2.5 | 6 | 60% | 2.5 | 47% | 1.9 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 2 | 20% | | 2 | 20% | | 2 | 20% | | 2 | 20% | | 20% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 3.4 | 14% | | 2.1 | 8% | | 3.9 | 16% | | 11 | 44% | | 13% | |
| Tree canopy cover subcanopy | **11** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 2 | 0% | 0.5 |
| Shrub canopy cover | **5** | 13.7 | 274% | 3 | 8.5 | 170% | 5 | 15.2 | 304% | 3 | 45 | 900% | 3 | 249% | 3.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.8 |
| Non-native plant cover | **0** | 35 | | 3 | 70 | | 0 | 30 | | 3 | 30 | | 3 | | 2.3 |
| Site Condition Score | | | | 33.5 | | | 34 | | | 33 | | | 31 | | 32.9 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **3.35** | | | **3.40** | | | **3.30** | | | **3.10** | | **3.29** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Site Context Score | | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **0.20** | | | **0.00** | | | **0.40** | | | **0.40** | | **0.20** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | benchma | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 3 | 60% | 2.5 | 3 | 60% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 90% | 3.8 |
| Native plant species richness - forbes | **10** | 6 | 60% | 2.5 | 7 | 70% | 2.5 | 5 | 50% | 2.5 | 2 | 20% | 0 | 50% | 1.9 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 5 | 50% | | 5 | 50% | | 11.5 | 115% | | 8.5 | 85% | | 75% | |
| Tree canopy height subcanopy | **6** | | 0% | 3 | | 0% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 29% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | | 0% | 5 | | 0% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 82% | 3.8 |
| Shrub canopy cover | **5** | 2 | 40% | 3 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 144% | 5 |
| Native grass cover | **16** | 0.6 | 4% | 0 | | 0% | 0 | 29 | 181% | 5 | 28 | 175% | 5 | 90% | 3.3 |
| Organic litter | **45** | 2.6 | 6% | 0 | 3.8 | 8% | 0 | 2 | 4% | 0 | 6 | 13% | 3 | 8% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.7 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.3 |
| Non-native plant cover | **0** | 30 | | 3 | 30 | | 3 | 30 | | 3 | 50 | | 3 | | 3 |
| Site Condition Score | | | | 34 | | | 33 | | | 53.5 | | | 46 | | 44.2 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **3.40** | | | **3.30** | | | **5.35** | | | **4.60** | | **4.42** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Average/Final** |
|---|---|---|---|
| Site Condition score | 3.29 | 4.42 | 3.85 |
| Site Context Score | 0.20 | 1.45 | 0.83 |
| Habitat Quality score (out of 10) | *3.5* | *5.9* | 4.68 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***2.55*** | ***1.58*** | ***4.13*** |

**BRIGALOW - YEAR 2**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | benchmark | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 3 | 30% | 2.5 | 6 | 60% | 2.5 | 8 | 80% | 2.5 | 7 | 70% | 2.5 | 57% | 2.5 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 2.5 | 25% | | 2.5 | 25% | | 2.5 | 25% | | 2.5 | 25% | | 25% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 6 | 24% | | 5 | 20% | | 6 | 24% | | 15 | 60% | | 23% | |
| Tree canopy cover subcanopy | **11** | | 0% | 2 | | 0% | 2 | | 0% | 2 | | 0% | 2 | 0% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 12 | 240% | 3 | 30 | 600% | 3 | 203% | 4 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 30 | | 3 | 65 | | 0 | 25 | | 3 | 25 | | 3 | | 2.25 |
| Site Condition Score | | | | 40 | | | 36 | | | 35 | | | 31 | | 35.5 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.00** | | | **3.60** | | | **3.50** | | | **3.10** | | **3.55** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Site Context Score | | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **0.20** | | | **0.00** | | | **0.40** | | | **0.40** | | **0.20** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | benchmark | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 3 | 60% | 2.5 | 3 | 60% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 90% | 3.8 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 6 | 60% | 2.5 | 3 | 30% | 2.5 | 60% | 2.5 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 5.5 | 55% | | 5.5 | 55% | | 11.5 | 115% | | 8.5 | 85% | | 78% | |
| Tree canopy height subcanopy | **6** | | 0% | 3 | | 0% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 29% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | | 0% | 5 | | 0% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 82% | 3.8 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 6 | 13% | 3 | 6 | 13% | 3 | 4 | 9% | 0 | 4 | 9% | 0 | 11% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.7 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.3 |
| Non-native plant cover | **0** | 25 | | 3 | 25 | | 3 | 25 | | 3 | 35 | | 3 | | 3 |
| Site Condition Score | | | | 40 | | | 37 | | | 53.5 | | | 45.5 | | 45.2 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.00** | | | **3.70** | | | **5.35** | | | **4.55** | | **4.52** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Average/Final** |
|---|---|---|---|
| Site Condition score | 3.55 | 4.52 | 4.03 |
| Site Context Score | 0.20 | 1.45 | 0.83 |
| Habitat Quality score (out of 10) | *3.8* | *6.0* | 4.86 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***2.74*** | ***1.60*** | ***4.35*** |

**BRIGALOW - YEAR 3**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 4 | 40% | 2.5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 8 | 80% | 2.5 | 67% | 3.13 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 3 | 30% | | 3 | 30% | | 3 | 30% | | 3 | 30% | | 30% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 8 | 32% | | 7 | 28% | | 8 | 32% | | 15 | 60% | | 31% | |
| Tree canopy cover subcanopy | **11** | | 0% | 2 | | 0% | 2 | | 0% | 2 | | 0% | 2 | 0% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 12 | 240% | 3 | 25 | 500% | 3 | 203% | 4 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 25 | | 3 | 60 | | 0 | 20 | | 5 | 20 | | 5 | | 3.25 |
| Site Condition Score | | | | 40 | | | 36 | | | 39.5 | | | 33 | | 37.13 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.00** | | | **3.60** | | | **3.95** | | | **3.30** | | **3.71** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Site Context Score | | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **0.20** | | | **0.00** | | | **0.40** | | | **0.40** | | **0.20** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 3 | 60% | 2.5 | 3 | 60% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 90% | 3.8 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 6 | 60% | 2.5 | 3 | 30% | 2.5 | 60% | 2.5 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 6 | 60% | | 6 | 60% | | 11.5 | 115% | | 8.5 | 85% | | 80% | |
| Tree canopy height subcanopy | **6** | 2 | 33% | 3 | 2 | 33% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 46% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | 1 | 9% | 5 | 1 | 9% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 87% | 3.75 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 6 | 13% | 3 | 6 | 13% | 3 | 4 | 9% | 0 | 4 | 9% | 0 | 11% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.7 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.3 |
| Non-native plant cover | **0** | 25 | | 3 | 25 | | 3 | 25 | | 3 | 35 | | 3 | | 3 |
| Site Condition Score | | | | 40 | | | 37 | | | 53.5 | | | 45.5 | | 45.2 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.00** | | | **3.70** | | | **5.35** | | | **4.55** | | **4.52** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Average/Final** |
|---|---|---|---|
| Site Condition score | 3.71 | 4.52 | 4.11 |
| Site Context Score | 0.20 | 1.45 | 0.83 |
| Habitat Quality score (out of 10) | *3.9* | *6.0* | 4.94 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***2.86*** | ***1.60*** | ***4.46*** |

**BRIGALOW - YEAR 4**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 4 | 40% | 2.5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 8 | 80% | 2.5 | 67% | 3.13 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 3.5 | 35% | | 3.5 | 35% | | 3.5 | 35% | | 3.5 | 35% | | 35% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 12 | 48% | | 11 | 44% | | 14 | 56% | | 15 | 60% | | 49% | |
| Tree canopy cover subcanopy | **11** | | 0% | 2 | | 0% | 2 | | 0% | 2 | | 0% | 2 | 0% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 12 | 240% | 3 | 25 | 500% | 3 | 203% | 4 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 20 | | 5 | 55 | | 0 | 15 | | 5 | 15 | | 5 | | 3.75 |
| Site Condition Score | | | | 42 | | | 36 | | | 39.5 | | | 33 | | 37.63 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.20** | | | **3.60** | | | **3.95** | | | **3.30** | | **3.76** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 5 | | | 5 | | | 5 | | | 5 | | 5 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Site Context Score | | | | 9 | | | 7 | | | 11 | | | 11 | | 9 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **0.90** | | | **0.70** | | | **1.10** | | | **1.10** | | **0.90** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 3 | 60% | 2.5 | 3 | 60% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 90% | 3.8 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 6 | 60% | 2.5 | 3 | 30% | 2.5 | 60% | 2.5 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 6.5 | 65% | | 6.5 | 65% | | 11.5 | 115% | | 8.5 | 85% | | 83% | |
| Tree canopy height subcanopy | **6** | 2.5 | 42% | 3 | 2.5 | 42% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 50% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | 1 | 9% | 5 | 1 | 9% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 87% | 3.8 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 6 | 13% | 3 | 6 | 13% | 3 | 4 | 9% | 0 | 4 | 9% | 0 | 11% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.7 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.3 |
| Non-native plant cover | **0** | 20 | | 5 | 20 | | 5 | 20 | | 5 | 30 | | 3 | | 4.3 |
| Site Condition Score | | | | 42 | | | 39 | | | 55.5 | | | 45.5 | | 46.5 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.20** | | | **3.90** | | | **5.55** | | | **4.55** | | **4.65** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Average/Final** |
|---|---|---|---|
| Site Condition score | 3.76 | 4.65 | 4.21 |
| Site Context Score | 0.90 | 1.45 | 1.18 |
| Habitat Quality score (out of 10) | *4.7* | *6.1* | 5.38 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***3.41*** | ***1.64*** | ***5.05*** |

**BRIGALOW - YEAR 5**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | benchmar | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 5 | 50% | 2.5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 8 | 80% | 2.5 | 70% | 3.1 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 4 | 40% | | 4 | 40% | | 4 | 40% | | 4 | 40% | | 40% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 14 | 56% | | 13 | 52% | | 16 | 64% | | 17 | 68% | | 57% | |
| Tree canopy cover subcanopy | **11** | | 0% | 2 | | 0% | 2 | | 0% | 2 | | 0% | 2 | 0% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 10 | 200% | 5 | 20 | 400% | 3 | 190% | 4.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 4 | 25% | 1 | 40 | 250% | 5 | 4 | 25% | 1 | 123% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 750 | 77% | 5 | 750 | 77% | 5 | 750 | 77% | 5 | 750 | 77% | 5 | 77% | 5 |
| Non-native plant cover | **0** | 20 | | 5 | 55 | | 0 | 15 | | 5 | 15 | | 5 | | 3.75 |
| Site Condition Score | | | | 45 | | | 36 | | | 44.5 | | | 36 | | 40.4 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.50** | | | **3.60** | | | **4.45** | | | **3.60** | | **4.04** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 5 | | | 5 | | | 5 | | | 5 | | 5 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Site Context Score | | | | 9 | | | 7 | | | 11 | | | 11 | | 9 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **0.90** | | | **0.70** | | | **1.10** | | | **1.10** | | **0.90** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | benchmar | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 4 | 80% | 2.5 | 4 | 80% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 100% | 3.75 |
| Native plant species richness - forbes | **10** | 8 | 80% | 2.5 | 9 | 90% | 5 | 7 | 70% | 2.5 | 6 | 60% | 2.5 | 75% | 3.13 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 7 | 70% | | 7 | 70% | | 11.5 | 115% | | 8.5 | 85% | | 85% | |
| Tree canopy height subcanopy | **6** | 3 | 50% | 3 | 3 | 50% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 54% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | 4 | 36% | 5 | 4 | 36% | 5 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 100% | 4.5 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.67 |
| Organic litter | **45** | 6 | 13% | 3 | 6 | 13% | 3 | 4 | 9% | 0 | 4 | 9% | 0 | 11% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.67 |
| Coarse woody debris | **980** | 750 | 77% | 5 | 750 | 77% | 5 | 742 | 76% | 5 | 750 | 77% | 5 | 76% | 5 |
| Non-native plant cover | **0** | 15 | | 5 | 15 | | 5 | 15 | | 5 | 15 | | 5 | | 5 |
| Site Condition Score | | | | 47 | | | 49.5 | | | 55.5 | | | 50.5 | | 51.21 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.70** | | | **4.95** | | | **5.55** | | | **5.05** | | **5.12** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Average/Final** |
|---|---|---|---|
| Site Condition score | 4.04 | 5.12 | 4.58 |
| Site Context Score | 0.90 | 1.45 | 1.18 |
| Habitat Quality score (out of 10) | *4.9* | *6.6* | 5.75 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***3.61*** | ***1.77*** | ***5.38*** |

**BRIGALOW - YEAR 10**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | benchma | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 5 | 50% | 2.5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 8 | 80% | 2.5 | 70% | 3.1 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 6.5 | 65% | | 6.5 | 65% | | 6.5 | 65% | | 6.5 | 65% | | 65% | |
| Tree canopy height subcanopy | **6** | 2 | 33% | 3 | 2 | 33% | 3 | 2 | 33% | 3 | 2 | 33% | 3 | 33% | 3 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 18 | 72% | | 16 | 64% | | 18 | 72% | | 18 | 72% | | 69% | |
| Tree canopy cover subcanopy | **11** | 3 | 27% | 2 | 3 | 27% | 2 | 3 | 27% | 2 | 3 | 27% | 2 | 27% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 10 | 200% | 5 | 20 | 400% | 3 | 190% | 4.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 6 | 38% | 1 | 40 | 250% | 5 | 10 | 63% | 3 | 128% | 3.5 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 8 | 18% | 3 | 10 | 22% | 3 | 28% | 3 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 100% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 30 | | 3 | 10 | | 5 | 10 | | 5 | | 4.5 |
| Site Condition Score | | | | 48 | | | 42 | | | 50.5 | | | 44 | | 46.1 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **4.80** | | | **4.20** | | | **5.05** | | | **4.40** | | **4.61** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 5 | | | 5 | | | 5 | | | 5 | | 5 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 2 | | | 4 | | | 4 | | 2.7 |
| Site Context Score | | | | 9 | | | 9 | | | 11 | | | 11 | | 9.7 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **0.90** | | | **0.90** | | | **1.10** | | | **1.10** | | **0.97** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | benchma | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 6 | 120% | 5 | 6 | 120% | 5 | 110% | 5 |
| Native plant species richness - forbes | **10** | 8 | 80% | 2.5 | 9 | 90% | 5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 83% | 3.8 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 8 | 80% | | 8 | 80% | | 11.5 | 115% | | 10 | 100% | | 94% | |
| Tree canopy height subcanopy | **6** | 5 | 83% | 5 | 5 | 83% | 5 | 4 | 67% | 5 | 5 | 83% | 5 | 79% | 5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | 4 | 36% | 5 | 4 | 36% | 5 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 100% | 4.5 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 44% | 3 |
| Large trees (euc plus non-euc) | **47** | 5 | 11% | 5 | 5 | 11% | 5 | 6 | 13% | 5 | 6 | 13% | 5 | 12% | 5 |
| Coarse woody debris | **980** | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 100% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 10 | | 5 | 10 | | 5 | 10 | | 5 | | 5 |
| Site Condition Score | | | | 56.5 | | | 59 | | | 58.5 | | | 63 | | 59.9 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **5.65** | | | **5.90** | | | **5.85** | | | **6.30** | | **5.99** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| Final habitat quality score (weighted) | AU1 | AU2 | Average/Final |
|---|---|---|---|
| Site Condition score | 4.61 | 5.99 | 5.30 |
| Site Context Score | 0.97 | 1.45 | 1.21 |
| Habitat Quality score (out of 10) | *5.6* | *7.4* | 6.51 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***4.08*** | ***2.00*** | ***6.08*** |

**BRIGALOW - YEAR 15**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | benchma | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 9 | 90% | 5 | 9 | 90% | 5 | 80% | 3.8 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 7.5 | 75% | | 7.5 | 75% | | 7.5 | 75% | | 7.5 | 75% | | 75% | |
| Tree canopy height subcanopy | **6** | 3 | 50% | 3 | 3 | 50% | 3 | 3 | 50% | 3 | 3 | 50% | 3 | 50% | 3 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 20 | 80% | | 20 | 80% | | 20 | 80% | | 20 | 80% | | 80% | |
| Tree canopy cover subcanopy | **11** | 5 | 45% | 5 | 5 | 45% | 5 | 5 | 45% | 5 | 5 | 45% | 5 | 45% | 5 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 10 | 200% | 5 | 20 | 400% | 3 | 190% | 4.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 6 | 38% | 1 | 40 | 250% | 5 | 10 | 63% | 3 | 128% | 3.5 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 8 | 18% | 3 | 10 | 22% | 3 | 28% | 3 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 100% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 30 | | 3 | 10 | | 5 | 10 | | 5 | | 4.5 |
| Site Condition Score | | | | 51 | | | 45 | | | 53.5 | | | 49.5 | | 49.8 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **5.10** | | | **4.50** | | | **5.35** | | | **4.95** | | **4.98** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Site Context Score | | | | 14 | | | 12 | | | 16 | | | 16 | | 14 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.40** | | | **1.20** | | | **1.60** | | | **1.60** | | **1.40** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % | Average |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | benchma | Score |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 6 | 120% | 5 | 6 | 120% | 5 | 110% | 5 |
| Native plant species richness - forbes | **10** | 8 | 80% | 2.5 | 9 | 90% | 5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 83% | 3.8 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 8 | 80% | | 8 | 80% | | 11.5 | 115% | | 10 | 100% | | 94% | |
| Tree canopy height subcanopy | **6** | 5 | 83% | 5 | 5 | 83% | 5 | 4 | 67% | 5 | 5 | 83% | 5 | 79% | 5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 40 | 160% | | 24.3 | 97% | | 129% | |
| Tree canopy cover subcanopy | **11** | 4 | 36% | 5 | 4 | 36% | 5 | 21.5 | 195% | 5 | 14.7 | 134% | 5 | 100% | 5 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 44% | 3 |
| Large trees (euc plus non-euc) | **47** | 5 | 11% | 5 | 5 | 11% | 5 | 6 | 13% | 5 | 6 | 13% | 5 | 12% | 5 |
| Coarse woody debris | **980** | 750 | 77% | 5 | 750 | 77% | 5 | 742 | 76% | 5 | 750 | 77% | 5 | 76% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 10 | | 5 | 10 | | 5 | 10 | | 5 | | 5 |
| Site Condition Score | | | | 56.5 | | | 59 | | | 60.5 | | | 63 | | 60.4 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **5.65** | | | **5.90** | | | **6.05** | | | **6.30** | | **6.04** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Average/Final** |
|---|---|---|---|
| Site Condition score | 4.98 | 6.04 | 5.51 |
| Site Context Score | 1.40 | 1.45 | 1.43 |
| Habitat Quality score (out of 10) | *6.4* | *7.5* | 6.93 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***4.66*** | ***2.01*** | ***6.68*** |

**BRIGALOW - YEAR 20**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 2 | 100% | 5 | 2 | 100% | 5 | 2 | 100% | 5 | 2 | 100% | 5 | 100% | 5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 9 | 90% | 5 | 9 | 90% | 5 | 80% | 3.8 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 8 | 80% | | 8 | 80% | | 8 | 80% | | 8 | 80% | | 80% | |
| Tree canopy height subcanopy | **6** | 3 | 50% | 3 | 3 | 50% | 3 | 3 | 50% | 3 | 3 | 50% | 3 | 50% | 3 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 20 | 80% | | 20 | 80% | | 20 | 80% | | 20 | 80% | | 80% | |
| Tree canopy cover subcanopy | **11** | 5 | 45% | 5 | 5 | 45% | 5 | 5 | 45% | 5 | 5 | 45% | 5 | 45% | 5 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 10 | 200% | 5 | 20 | 400% | 3 | 190% | 4.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 6 | 38% | 1 | 40 | 250% | 5 | 10 | 63% | 3 | 128% | 3.5 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 8 | 18% | 3 | 10 | 22% | 3 | 28% | 3 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 100% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 10 | | 5 | 10 | | 5 | 10 | | 5 | | 5 |
| Site Condition Score | | | | 53.5 | | | 49.5 | | | 56 | | | 52 | | 52.8 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **5.35** | | | **4.95** | | | **5.60** | | | **5.20** | | **5.28** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 14 | | | 12 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.40** | | | **1.20** | | | **1.60** | | | **1.60** | | **1.40** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 6 | 120% | 5 | 6 | 120% | 5 | 110% | 5 |
| Native plant species richness - forbes | **10** | 9 | 90% | 5 | 9 | 90% | 5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 85% | 4.38 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 9 | 90% | | 9 | 90% | | 11.5 | 115% | | 10 | 100% | | 99% | |
| Tree canopy height subcanopy | **6** | 5 | 83% | 5 | 5 | 83% | 5 | 4 | 67% | 5 | 5 | 83% | 5 | 79% | 5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 40 | 160% | | 24.3 | 97% | | 129% | |
| Tree canopy cover subcanopy | **11** | 4 | 36% | 5 | 4 | 36% | 5 | 21.5 | 195% | 5 | 14.7 | 134% | 5 | 100% | 5 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 9 | 56% | 3 | 9 | 56% | 3 | 29 | 181% | 5 | 28 | 175% | 5 | 117% | 4.33 |
| Organic litter | **45** | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 44% | 3 |
| Large trees (euc plus non-euc) | **47** | 10 | 21% | 5 | 10 | 21% | 5 | 10 | 21% | 5 | 10 | 21% | 5 | 21% | 5 |
| Coarse woody debris | **980** | 750 | 77% | 5 | 750 | 77% | 5 | 742 | 76% | 5 | 750 | 77% | 5 | 76% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 10 | | 5 | 10 | | 5 | 10 | | 5 | | 5 |
| Site Condition Score | | | | 61 | | | 61 | | | 60.5 | | | 63 | | 61.71 |
| *MAX Site Condition Score* | | | | *80* | | | *80* | | | *80* | | | *80* | | *80* |
| **Site Condition Score - out of 8** | | | | **6.10** | | | **6.10** | | | **6.05** | | | **6.30** | | **6.17** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Site Context Score | | | | 12 | | | 14 | | | 16 | | | 16 | | 14.5 |
| *MAX Site Context Score* | | | | *20* | | | *20* | | | *20* | | | *20* | | *20* |
| **Site Context Score - out of 2** | | | | **1.20** | | | **1.40** | | | **1.60** | | | **1.60** | | **1.45** |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Average/Final** |
|---|---|---|---|
| Site Condition score | 5.28 | 6.17 | 5.72 |
| Site Context Score | 1.45 | 1.45 | 1.45 |
| Habitat Quality score (out of 10) | *6.7* | *7.6* | 7.17 |
| Assessment Unit area (ha) | 79.9 | 29.37 | 54.64 |
| Total offset area (ha) | 109.27 | 109.27 | 109.27 |
| Size Weighting | 0.73 | 0.27 | 0.50 |
| ***Weighted Habitat Quality Score*** | ***4.9*** | ***2.0*** | ***7.0*** |

**ORNAMENTAL SNAKE - BASELINE**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 4 | 80% | 2.5 | 4 | 80% | 2.5 | 11 | 220% | 5 | 5 | 100% | 5 | 127% | 3.75 |
| Native plant species richness - forbes | **10** | 1 | 10% | 0 | 4 | 40% | 2.5 | 6 | 60% | 2.5 | 5 | 50% | 2.5 | 37% | 1.88 |
| Tree emergant height | **n/a** | | | | | | | | | | | | | | |
| Tree canopy height | **10** | | 0% | | | 0% | | | 0% | | | 0% | | 0% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | **n/a** | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | | 0% | | | 0% | | | 0% | | | 0% | | 0% | |
| Tree canopy cover subcanopy | **11** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Shrub canopy cover | **5** | 17.1 | 342% | 3 | 10.6 | 212% | 3 | 19.5 | 390% | 3 | 57 | 1140% | 3 | 315% | 3 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 40 | | 3 | 75 | | 0 | 30 | | 3 | 35 | | 3 | | 2.25 |
| Quality and availability of food and foraging habitat | **55** | 41 | | 41 | 21 | | 21 | 21 | | 21 | 41 | | 41 | | 31 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 82.5 | | | 54.0 | | | 59.5 | | | 80.5 | | 69.13 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **1.77** | | | **1.16** | | | **1.28** | | | **1.73** | | **1.48** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 6.67 |
| Species mobility capacity | **15** | | | 11 | | | 6 | | | 6 | | | 11 | | 7.67 |
| Site Context Score | | | | 23.0 | | | 11.0 | | | 15.0 | | | 25.0 | | 16.33 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.38** | | | **0.66** | | | **0.90** | | | **1.50** | | **0.98** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5.00 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5.00 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5.00 |
| Native plant species richness - grasses | **5** | 2 | 40% | 2.5 | 2 | 40% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 80% | 3.75 |
| Native plant species richness - forbes | **10** | 2 | 20% | 0 | 4 | 40% | 2.5 | 7 | 70% | 2.5 | 7 | 70% | 2.5 | 50% | 1.88 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 4.5 | 45% | | 4.5 | 45% | | 11.5 | 115% | | 8.5 | 85% | | 73% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | 4 | 67% | 5 | 3 | 50% | 3 | 29% | 2.00 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | | 0% | 5 | | 0% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 82% | 3.75 |
| Shrub canopy cover | **5** | 0.6 | 12% | 3 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 137% | 5.00 |
| Native grass cover | **16** | 0.6 | 4% | 0 | | 0% | 0 | 29 | 181% | 5 | 28 | 175% | 5 | 90% | 3.33 |
| Organic litter | **45** | 2.6 | 6% | 0 | 3.8 | 8% | 0 | 2 | 4% | 0 | 6 | 13% | 3 | 8% | 1.00 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.67 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.33 |
| Non-native plant cover | **0** | 35 | | 3 | 35 | | 3 | 55 | | 0 | 25 | | 3 | | 2.00 |
| Quality and availability of food and foraging habitat | **55** | 47 | | 47 | 47 | | 47 | 27 | | 27 | 27 | | 27 | | 33.67 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.67 |
| Site Condition Score | | | | 86.5 | | | 90 | | | 85.5 | | | 83.5 | | 85.04 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **1.85** | | | **1.93** | | | **1.83** | | | **1.79** | | **1.82** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 9.5 |
| Site Context Score | | | | 33.0 | | | 33.0 | | | 29.0 | | | 29.0 | | 31.0 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.98** | | | **1.98** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | 10 |
| | | No | Yes - adjacent | | Yes - on site | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 70) | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | 3 | | | |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 1.48 | 1.82 | 1.65 |
| Site Context Score (out of 3) | 0.98 | 1.86 | 1.42 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *5.5* | *6.7* | *6.1* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***3.99*** | ***1.80*** | ***5.79*** |

**ORNAMENTAL SNAKE** - YEAR 1

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 2 | 20% | 0 | 5 | 50% | 2.5 | 7 | 70% | 2.5 | 6 | 60% | 2.5 | 47% | 1.88 |
| Tree emergant height | **n/a** | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 2 | 20% | | 2 | 20% | | 2 | 20% | | 2 | 20% | | 20% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | **n/a** | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 3.4 | 14% | | 2.1 | 8% | | 3.9 | 16% | | 11 | 44% | | 13% | |
| Tree canopy cover subcanopy | **11** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 2 | 0% | 0.5 |
| Shrub canopy cover | **5** | 13.7 | 274% | 3 | 8.5 | 170% | 5 | 15.2 | 304% | 3 | 45 | 900% | 3 | 249% | 3.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 35 | | 3 | 70 | | 0 | 30 | | 3 | 30 | | 3 | | 2.25 |
| Quality and availability of food and foraging habitat | **55** | 41 | | 41 | 21 | | 21 | 21 | | 21 | 41 | | 41 | | 31 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 87.5 | | | 61.0 | | | 62 | | | 85 | | 73.88 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **1.88** | | | **1.31** | | | **1.33** | | | **1.82** | | **1.58** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 6.67 |
| Species mobility capacity | **15** | | | 11 | | | 6 | | | 6 | | | 11 | | 7.67 |
| Site Context Score | | | | 23.0 | | | 11.0 | | | 15.0 | | | 25.0 | | 16.33 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.38** | | | **0.66** | | | **0.90** | | | **1.50** | | **0.98** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 3 | 60% | 2.5 | 3 | 60% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 90% | 3.75 |
| Native plant species richness - forbes | **10** | 6 | 60% | 2.5 | 7 | 70% | 2.5 | 5 | 50% | 2.5 | 2 | 20% | 0 | 50% | 1.875 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 5 | 50% | | 5 | 50% | | 11.5 | 115% | | 8.5 | 85% | | 75% | |
| Tree canopy height subcanopy | **6** | | 0% | 3 | | 0% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 29% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | | 0% | 5 | | 0% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 82% | 3.75 |
| Shrub canopy cover | **5** | 2 | 40% | 3 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 144% | 5 |
| Native grass cover | **16** | 0.6 | 4% | 0 | | 0% | 0 | 29 | 181% | 5 | 28 | 175% | 5 | 90% | 3.3333333 |
| Organic litter | **45** | 2.6 | 6% | 0 | 3.8 | 8% | 0 | 2 | 4% | 0 | 6 | 13% | 3 | 8% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.6666667 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.3333333 |
| Non-native plant cover | **0** | 30 | | 3 | 30 | | 3 | 30 | | 3 | 50 | | 3 | | 3 |
| Quality and availability of food and foraging habitat | **55** | 47 | | 47 | 47 | | 47 | 27 | | 27 | 27 | | 27 | | 33.67 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.67 |
| Site Condition Score | | | | 92 | | | 93 | | | 88.5 | | | 81 | | 87.54 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **1.97** | | | **1.99** | | | **1.90** | | | **1.74** | | **1.88** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 9.5 |
| Site Context Score | | | | 33.0 | | | 33.0 | | | 29.0 | | | 29.0 | | 31.0 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.98** | | | **1.98** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | 10 |
| | | No | Yes - adjacent | | Yes - on site | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 70) | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | | 3 | | |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 1.58 | 1.88 | 1.73 |
| Site Context Score (out of 3) | 0.98 | 1.86 | 1.42 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *5.6* | *6.7* | *6.1* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***4.07*** | ***1.81*** | ***5.88*** |

**ORNAMENTAL SNAKE** - YEAR 2

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 3 | 30% | 2.5 | 6 | 60% | 2.5 | 8 | 80% | 2.5 | 7 | 70% | 2.5 | 57% | 2.5 |
| Tree emergant height | **n/a** | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 2.5 | 25% | | 2.5 | 25% | | 2.5 | 25% | | 2.5 | 25% | | 25% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | **n/a** | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 6 | 24% | | 5 | 20% | | 6 | 24% | | 15 | 60% | | 23% | |
| Tree canopy cover subcanopy | **11** | | 0% | 2 | | 0% | 2 | | 0% | 2 | | 0% | 2 | 0% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 12 | 240% | 3 | 30 | 600% | 3 | 203% | 4 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 30 | | 3 | 65 | | 0 | 25 | | 3 | 25 | | 3 | | 2.25 |
| Quality and availability of food and foraging habitat | **55** | 41 | | 41 | 21 | | 21 | 21 | | 21 | 41 | | 41 | | 31 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 94 | | | 63.0 | | | 64 | | | 85 | | 76.50 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.01** | | | **1.35** | | | **1.37** | | | **1.82** | | **1.64** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 6.67 |
| Species mobility capacity | **15** | | | 11 | | | 6 | | | 6 | | | 11 | | 7.67 |
| Site Context Score | | | | 23.0 | | | 11.0 | | | 15.0 | | | 25.0 | | 16.33 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.38** | | | **0.66** | | | **0.90** | | | **1.50** | | **0.98** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 3 | 60% | 2.5 | 3 | 60% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 90% | 3.75 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 6 | 60% | 2.5 | 3 | 30% | 2.5 | 60% | 2.5 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 5.5 | 55% | | 5.5 | 55% | | 11.5 | 115% | | 8.5 | 85% | | 78% | |
| Tree canopy height subcanopy | **6** | | 0% | 3 | | 0% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 29% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | | 0% | 5 | | 0% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 82% | 3.75 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.67 |
| Organic litter | **45** | 6 | 13% | 3 | 6 | 13% | 3 | 4 | 9% | 0 | 4 | 9% | 0 | 11% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.67 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.33 |
| Non-native plant cover | **0** | 25 | | 3 | 25 | | 3 | 25 | | 3 | 35 | | 3 | | 3 |
| Quality and availability of food and foraging habitat | **55** | 47 | | 47 | 47 | | 47 | 27 | | 27 | 27 | | 27 | | 33.67 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.67 |
| Site Condition Score | | | | 98 | | | 97 | | | 88.5 | | | 80.5 | | 88.50 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.10** | | | **2.08** | | | **1.90** | | | **1.73** | | **1.90** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 9.5 |
| Site Context Score | | | | 33.0 | | | 33.0 | | | 29.0 | | | 29.0 | | 31.0 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.98** | | | **1.98** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | 10 |
| | | No | Yes - adjacent | | Yes - on site | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 70) | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | | 3 | | |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 1.64 | 1.90 | 1.77 |
| Site Context Score (out of 3) | 0.98 | 1.86 | 1.42 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *5.6* | *6.8* | *6.2* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***4.11*** | ***1.82*** | ***5.92*** |

**ORNAMENTAL SNAKE** - YEAR 3

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 4 | 40% | 2.5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 8 | 80% | 2.5 | 67% | 3.13 |
| Tree emergant height | **n/a** | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 3 | 30% | | 3 | 30% | | 3 | 30% | | 3 | 30% | | 30% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | **n/a** | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 8 | 32% | | 7 | 28% | | 8 | 32% | | 15 | 60% | | 31% | |
| Tree canopy cover subcanopy | **11** | | 0% | 2 | | 0% | 2 | | 0% | 2 | | 0% | 2 | 0% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 12 | 240% | 3 | 25 | 500% | 3 | 203% | 4 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 25 | | 3 | 60 | | 0 | 20 | | 5 | 20 | | 5 | | 3.25 |
| Quality and availability of food and foraging habitat | **55** | 41 | | 41 | 21 | | 21 | 21 | | 21 | 41 | | 41 | | 31 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 94 | | | 63.0 | | | 68.5 | | | 87 | | 78.13 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.01** | | | **1.35** | | | **1.47** | | | **1.86** | | **1.67** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 6.67 |
| Species mobility capacity | **15** | | | 11 | | | 6 | | | 6 | | | 11 | | 7.67 |
| Site Context Score | | | | 23.0 | | | 11.0 | | | 15.0 | | | 25.0 | | 16.33 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.38** | | | **0.66** | | | **0.90** | | | **1.50** | | **0.98** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 3 | 60% | 2.5 | 3 | 60% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 90% | 3.8 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 6 | 60% | 2.5 | 3 | 30% | 2.5 | 60% | 2.5 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 6 | 60% | | 6 | 60% | | 11.5 | 115% | | 8.5 | 85% | | 80% | |
| Tree canopy height subcanopy | **6** | 2 | 33% | 3 | 2 | 33% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 46% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | 1 | 9% | 5 | 1 | 9% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 87% | 3.75 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 6 | 13% | 3 | 6 | 13% | 3 | 4 | 9% | 0 | 4 | 9% | 0 | 11% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.7 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.3 |
| Non-native plant cover | **0** | 25 | | 3 | 25 | | 3 | 25 | | 3 | 35 | | 3 | | 3 |
| Quality and availability of food and foraging habitat | **55** | 47 | | 47 | 47 | | 47 | 27 | | 27 | 27 | | 27 | | 33.67 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.67 |
| Site Condition Score | | | | 98 | | | 97 | | | 88.5 | | | 80.5 | | 88.50 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.10** | | | **2.08** | | | **1.90** | | | **1.73** | | **1.90** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 9.5 |
| Site Context Score | | | | 33.0 | | | 33.0 | | | 29.0 | | | 29.0 | | 31.0 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.98** | | | **1.98** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | 10 |
| | | No | Yes - adjacent | | Yes - on site | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 70) | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | | 3 | | |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 1.67 | 1.90 | 1.79 |
| Site Context Score (out of 3) | 0.98 | 1.86 | 1.42 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *5.7* | *6.8* | *6.2* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***4.13*** | ***1.82*** | ***5.95*** |

**ORNAMENTAL SNAKE** - YEAR 4

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 140% | 5 |
| Native plant species richness - forbes | **10** | 4 | 40% | 2.5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 8 | 80% | 2.5 | 67% | 3.125 |
| Tree emergant height | **n/a** | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 3.5 | 35% | | 3.5 | 35% | | 3.5 | 35% | | 3.5 | 35% | | 35% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | **n/a** | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 12 | 48% | | 11 | 44% | | 14 | 56% | | 15 | 60% | | 49% | |
| Tree canopy cover subcanopy | **11** | | 0% | 2 | | 0% | 2 | | 0% | 2 | | 0% | 2 | 0% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 12 | 240% | 3 | 25 | 500% | 3 | 203% | 4 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 2 | 13% | 1 | 50 | 313% | 5 | 3 | 19% | 1 | 140% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 190 | 19% | 2 | 498 | 51% | 5 | 369 | 38% | 2 | 454 | 46% | 2 | 36% | 2.75 |
| Non-native plant cover | **0** | 20 | | 5 | 55 | | 0 | 15 | | 5 | 15 | | 5 | | 3.75 |
| Quality and availability of food and foraging habitat | **55** | 41 | | 41 | 21 | | 21 | 21 | | 21 | 41 | | 41 | | 31 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 96 | | | 63.0 | | | 68.5 | | | 87 | | 78.63 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.06** | | | **1.35** | | | **1.47** | | | **1.86** | | **1.68** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 5 | | | 5 | | | 5 | | | 5 | | 5 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 6.67 |
| Species mobility capacity | **15** | | | 11 | | | 6 | | | 6 | | | 11 | | 7.67 |
| Site Context Score | | | | 30.0 | | | 18.0 | | | 22.0 | | | 32.0 | | 23.33 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.80** | | | **1.08** | | | **1.32** | | | **1.92** | | **1.40** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | Raw Data | % Benchmark | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 3 | 60% | 2.5 | 3 | 60% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 90% | 3.75 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 6 | 60% | 2.5 | 3 | 30% | 2.5 | 60% | 2.5 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 6.5 | 65% | | 6.5 | 65% | | 11.5 | 115% | | 8.5 | 85% | | 83% | |
| Tree canopy height subcanopy | **6** | 2.5 | 42% | 3 | 2.5 | 42% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 50% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | 1 | 9% | 5 | 1 | 9% | 2 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 87% | 3.75 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.6666667 |
| Organic litter | **45** | 6 | 13% | 3 | 6 | 13% | 3 | 4 | 9% | 0 | 4 | 9% | 0 | 11% | 1 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.6666667 |
| Coarse woody debris | **980** | 42 | 4% | 0 | 47 | 5% | 0 | 742 | 76% | 5 | 336 | 34% | 2 | 30% | 2.3333333 |
| Non-native plant cover | **0** | 20 | | 5 | 20 | | 5 | 20 | | 5 | 30 | | 3 | | 4.3333333 |
| Quality and availability of food and foraging habitat | **55** | 47 | | 47 | 47 | | 47 | 27 | | 27 | 27 | | 27 | | 33.67 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.67 |
| Site Condition Score | | | | 100 | | | 99 | | | 90.5 | | | 80.5 | | 89.83 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.14** | | | **2.12** | | | **1.94** | | | **1.73** | | **1.93** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 9.5 |
| Site Context Score | | | | 33.0 | | | 33.0 | | | 29.0 | | | 29.0 | | 31.0 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.98** | | | **1.98** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | 10 |
| | | No | Yes - adjacent | | Yes - on site | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 70) | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | 3 | | | |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 1.68 | 1.93 | 1.80 |
| Site Context Score (out of 3) | 1.40 | 1.86 | 1.63 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *6.1* | *6.8* | *6.4* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***4.45*** | ***1.82*** | ***6.27*** |

**ORNAMENTAL SNAKE - YEAR 5**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 2 | 40% | 2.5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 120% | 4.38 |
| Native plant species richness - forbes | **10** | 5 | 50% | 2.5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 8 | 80% | 2.5 | 70% | 3.13 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 4 | 40% | | 4 | 40% | | 4 | 40% | | 4 | 40% | | 40% | |
| Tree canopy height subcanopy | **6** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 14 | 56% | | 13 | 52% | | 16 | 64% | | 17 | 68% | | 57% | |
| Tree canopy cover subcanopy | **11** | | 0% | 2 | | 0% | 2 | | 0% | 2 | | 0% | 2 | 0% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 10 | 200% | 5 | 20 | 400% | 3 | 190% | 4.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 4 | 25% | 1 | 40 | 250% | 5 | 4 | 25% | 1 | 123% | 3 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 2 | 4% | 0 | 2 | 4% | 0 | 23% | 1.5 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 750 | 77% | 5 | 750 | 77% | 5 | 750 | 77% | 5 | 750 | 77% | 5 | 77% | 5 |
| Non-native plant cover | **0** | 20 | | 5 | 55 | | 0 | 15 | | 5 | 15 | | 5 | | 3.75 |
| Quality and availability of food and foraging habitat | **55** | 41 | | 41 | 21 | | 21 | 21 | | 21 | 41 | | 41 | | 31 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 96.5 | | | 63 | | | 73.5 | | | 90 | | 80.75 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.07** | | | **1.35** | | | **1.58** | | | **1.93** | | **1.73** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Connectedness | **5** | | | 0 | | | 0 | | | 0 | | | 0 | | 0 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 7.5 |
| Species mobility capacity | **15** | | | 11 | | | 6 | | | 6 | | | 11 | | 8.5 |
| Site Context Score | | | | 23 | | | 11 | | | 15 | | | 25 | | 18.5 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.38** | | | **0.66** | | | **0.90** | | | **1.50** | | **1.11** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5.0 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5.0 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5.0 |
| Native plant species richness - grasses | **5** | 4 | 80% | 2.5 | 4 | 80% | 2.5 | 6 | 120% | 5 | 6 | 120% | 5 | 100% | 3.8 |
| Native plant species richness - forbes | **10** | 8 | 80% | 2.5 | 9 | 90% | 5 | 7 | 70% | 2.5 | 6 | 60% | 2.5 | 75% | 3.1 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 7 | 70% | | 7 | 70% | | 11.5 | 115% | | 8.5 | 85% | | 85% | |
| Tree canopy height subcanopy | **6** | 3 | 50% | 3 | 3 | 50% | 3 | 4 | 67% | 5 | 3 | 50% | 3 | 54% | 3.5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | 4 | 36% | 5 | 4 | 36% | 5 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 100% | 4.5 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5.0 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 6 | 13% | 3 | 6 | 13% | 3 | 4 | 9% | 0 | 4 | 9% | 0 | 11% | 1.0 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | 1 | 2% | 5 | | 0% | 0 | 1% | 1.7 |
| Coarse woody debris | **980** | 750 | 77% | 5 | 750 | 77% | 5 | 742 | 76% | 5 | 750 | 77% | 5 | 76% | 5.0 |
| Non-native plant cover | **0** | 15 | | 5 | 15 | | 5 | 15 | | 5 | 15 | | 5 | | 5.0 |
| Quality and availability of food and foraging habitat | **55** | 47 | | 47 | 47 | | 47 | 27 | | 27 | 27 | | 27 | | 33.7 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.7 |
| Site Condition Score | | | | 105 | | | 109.5 | | | 90.5 | | | 85.5 | | 94.5 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.25** | | | **2.35** | | | **1.94** | | | **1.83** | | **2.03** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 9.5 |
| Site Context Score | | | | 33 | | | 33 | | | 29 | | | 29 | | 31 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.98** | | | **1.98** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | | Site Scores |
|---|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | | 10 |
| | | No | Yes - adjacent | | Yes - on site | | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | | 40 - 45 | |
| Total SRR score (out of 70) | | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | | | | | 3 |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 1.73 | 2.03 | 1.88 |
| Site Context Score (out of 3) | 1.11 | 1.86 | 1.49 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *5.8* | *6.9* | *6.4* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***4.27*** | ***1.85*** | ***6.12*** |

**ORNAMENTAL SNAKE - YEAR 10**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 2 | 40% | 2.5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 120% | 4.4 |
| Native plant species richness - forbes | **10** | 5 | 50% | 2.5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 8 | 80% | 2.5 | 70% | 3.1 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 6.5 | 65% | | 6.5 | 65% | | 6.5 | 65% | | 6.5 | 65% | | 65% | |
| Tree canopy height subcanopy | **6** | 2 | 33% | 3 | 2 | 33% | 3 | 2 | 33% | 3 | 2 | 33% | 3 | 33% | 3 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 18 | 72% | | 16 | 64% | | 18 | 72% | | 18 | 72% | | 69% | |
| Tree canopy cover subcanopy | **11** | 3 | 27% | 2 | 3 | 27% | 2 | 3 | 27% | 2 | 3 | 27% | 2 | 27% | 2 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 10 | 200% | 5 | 20 | 400% | 3 | 190% | 4.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 6 | 38% | 1 | 40 | 250% | 5 | 10 | 63% | 3 | 128% | 3.5 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 8 | 18% | 3 | 10 | 22% | 3 | 28% | 3 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 100% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 30 | | 3 | 10 | | 5 | 10 | | 5 | | 4.5 |
| Quality and availability of food and foraging habitat | **55** | 47 | | 47 | 27 | | 27 | 27 | | 27 | 47 | | 47 | | 37 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 105.5 | | | 75 | | | 85.5 | | | 104 | | 92.5 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.26** | | | **1.61** | | | **1.83** | | | **2.23** | | **1.98** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 5 | | | 5 | | | 5 | | | 5 | | 5 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 2 | | | 4 | | | 4 | | 3 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 7.5 |
| Species mobility capacity | **15** | | | 11 | | | 6 | | | 6 | | | 11 | | 8.5 |
| Site Context Score | | | | 30 | | | 20 | | | 22 | | | 32 | | 26 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.80** | | | **1.20** | | | **1.32** | | | **1.92** | | **1.56** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 6 | 120% | 5 | 6 | 120% | 5 | 110% | 5 |
| Native plant species richness - forbes | **10** | 8 | 80% | 2.5 | 9 | 90% | 5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 83% | 3.75 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 8 | 80% | | 8 | 80% | | 11.5 | 115% | | 10 | 100% | | 94% | |
| Tree canopy height subcanopy | **6** | 5 | 83% | 5 | 5 | 83% | 5 | 4 | 67% | 5 | 5 | 83% | 5 | 79% | 5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 51.7 | 207% | | 24.3 | 97% | | 141% | |
| Tree canopy cover subcanopy | **11** | 4 | 36% | 5 | 4 | 36% | 5 | 21.5 | 195% | 3 | 14.7 | 134% | 5 | 100% | 4.5 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 44% | 3.0 |
| Large trees (euc plus non-euc) | **47** | 5 | 11% | 5 | 5 | 11% | 5 | 6 | 13% | 5 | 6 | 13% | 5 | 12% | 5.0 |
| Coarse woody debris | **980** | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 100% | 5.0 |
| Non-native plant cover | **0** | 10 | | 5 | 10 | | 5 | 10 | | 5 | 10 | | 5 | | 5.0 |
| Quality and availability of food and foraging habitat | **55** | 55 | | 55 | 55 | | 55 | 35 | | 35 | 35 | | 35 | | 41.7 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.7 |
| Site Condition Score | | | | 122.5 | | | 127 | | | 101.5 | | | 106 | | 111.25 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.63** | | | **2.72** | | | **2.18** | | | **2.27** | | **2.38** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 9.5 |
| Site Context Score | | | | 33 | | | 33 | | | 29 | | | 29 | | 31 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.98** | | | **1.98** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | Site Scores |
|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | 10 |
| | | No | Yes - adjacent | | Yes - on site | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | 40 - 45 | |
| Total SRR score (out of 70) | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | | | | 3 |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 1.98 | 2.38 | 2.18 |
| Site Context Score (out of 3) | 1.56 | 1.86 | 1.71 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *6.5* | *7.2* | *6.9* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***4.78*** | ***1.95*** | ***6.73*** |

**ORNAMENTAL SNAKE - YEAR 15**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 1 | 50% | 2.5 | 50% | 2.5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 2 | 40% | 2.5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 120% | 4.38 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 9 | 90% | 5 | 9 | 90% | 5 | 80% | 3.75 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 7.5 | 75% | | 7.5 | 75% | | 7.5 | 75% | | 7.5 | 75% | | 75% | |
| Tree canopy height subcanopy | **6** | 3 | 50% | 3 | 3 | 50% | 3 | 3 | 50% | 3 | 3 | 50% | 3 | 50% | 3 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 20 | 80% | | 20 | 80% | | 20 | 80% | | 20 | 80% | | 80% | |
| Tree canopy cover subcanopy | **11** | 5 | 45% | 5 | 5 | 45% | 5 | 5 | 45% | 5 | 5 | 45% | 5 | 45% | 5 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 10 | 200% | 5 | 20 | 400% | 3 | 190% | 4.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 6 | 38% | 1 | 40 | 250% | 5 | 10 | 63% | 3 | 128% | 3.5 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 8 | 18% | 3 | 10 | 22% | 3 | 28% | 3 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 100% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 30 | | 3 | 10 | | 5 | 10 | | 5 | | 4.5 |
| Quality and availability of food and foraging habitat | **55** | 47 | | 47 | 27 | | 27 | 27 | | 27 | 47 | | 47 | | 37 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 108.5 | | | 78 | | | 88.5 | | | 109.5 | | 96.13 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.33** | | | **1.67** | | | **1.90** | | | **2.35** | | **2.06** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 6.7 |
| Species mobility capacity | **15** | | | 6 | | | 6 | | | 6 | | | 6 | | 6 |
| Site Context Score | | | | 30 | | | 23 | | | 27 | | | 32 | | 26.7 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.80** | | | **1.38** | | | **1.62** | | | **1.92** | | **1.60** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 6 | 120% | 5 | 6 | 120% | 5 | 110% | 5 |
| Native plant species richness - forbes | **10** | 8 | 80% | 2.5 | 9 | 90% | 5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 83% | 3.75 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 8 | 80% | | 8 | 80% | | 11.5 | 115% | | 10 | 100% | | 94% | |
| Tree canopy height subcanopy | **6** | 5 | 83% | 5 | 5 | 83% | 5 | 4 | 67% | 5 | 5 | 83% | 5 | 79% | 5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 40 | 160% | | 24.3 | 97% | | 129% | |
| Tree canopy cover subcanopy | **11** | 4 | 36% | 5 | 4 | 36% | 5 | 21.5 | 195% | 5 | 14.7 | 134% | 5 | 100% | 5 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 8 | 50% | 1 | 8 | 50% | 1 | 29 | 181% | 5 | 28 | 175% | 5 | 114% | 3.7 |
| Organic litter | **45** | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 44% | 3.0 |
| Large trees (euc plus non-euc) | **47** | 5 | 11% | 5 | 5 | 11% | 5 | 6 | 13% | 5 | 6 | 13% | 5 | 12% | 5.0 |
| Coarse woody debris | **980** | 750 | 77% | 5 | 750 | 77% | 5 | 742 | 76% | 5 | 750 | 77% | 5 | 76% | 5.0 |
| Non-native plant cover | **0** | 10 | | 5 | 10 | | 5 | 10 | | 5 | 10 | | 5 | | 5.0 |
| Quality and availability of food and foraging habitat | **55** | 55 | | 55 | 55 | | 55 | 35 | | 35 | 35 | | 35 | | 41.7 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.7 |
| Site Condition Score | | | | 122.5 | | | 127 | | | 103.5 | | | 106 | | 111.75 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.63** | | | **2.72** | | | **2.22** | | | **2.27** | | **2.39** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 7 |
| Site Context Score | | | | 28 | | | 28 | | | 29 | | | 29 | | 31 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.68** | | | **1.68** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | | Site Scores |
|---|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | | 10 |
| | | No | Yes - adjacent | | Yes - on site | | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | | 40 - 45 | |
| Total SRR score (out of 70) | | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | 3 | | | | | |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 2.06 | 2.39 | 2.23 |
| Site Context Score (out of 3) | 1.60 | 1.86 | 1.73 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *6.7* | *7.3* | *6.9* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***4.87*** | ***1.96*** | ***6.82*** |

**ORNAMENTAL SNAKE - YEAR 20**

| Assessment Unit - Regional Ecosystem | AU 1 - Non-remnant Regrowth Brigalow | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A3 | | | HQAP_A5 | | | HQAP_F7 | | | HQAP_F8 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 2 | 100% | 5 | 2 | 100% | 5 | 2 | 100% | 5 | 2 | 100% | 5 | 100% | 5 |
| Native plant species richness - shrubs | **5** | 6 | 120% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 12 | 240% | 5 | 147% | 5 |
| Native plant species richness - grasses | **5** | 2 | 40% | 2.5 | 5 | 100% | 5 | 11 | 220% | 5 | 5 | 100% | 5 | 120% | 4.4 |
| Native plant species richness - forbes | **10** | 7 | 70% | 2.5 | 8 | 80% | 2.5 | 9 | 90% | 5 | 9 | 90% | 5 | 80% | 3.8 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 8 | 80% | | 8 | 80% | | 8 | 80% | | 8 | 80% | | 80% | |
| Tree canopy height subcanopy | **6** | 3 | 50% | 3 | 3 | 50% | 3 | 3 | 50% | 3 | 3 | 50% | 3 | 50% | 3 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 20 | 80% | | 20 | 80% | | 20 | 80% | | 20 | 80% | | 80% | |
| Tree canopy cover subcanopy | **11** | 5 | 45% | 5 | 5 | 45% | 5 | 5 | 45% | 5 | 5 | 45% | 5 | 45% | 5 |
| Shrub canopy cover | **5** | 10 | 200% | 5 | 8.5 | 170% | 5 | 10 | 200% | 5 | 20 | 400% | 3 | 190% | 4.5 |
| Native grass cover | **16** | 15.2 | 95% | 5 | 6 | 38% | 1 | 40 | 250% | 5 | 10 | 63% | 3 | 128% | 3.5 |
| Organic litter | **45** | 18.6 | 41% | 3 | 11 | 24% | 3 | 8 | 18% | 3 | 10 | 22% | 3 | 28% | 3 |
| Large trees (euc plus non-euc) | **47** | | 0% | 0 | | 0% | 0 | | 0% | 0 | | 0% | 0 | 0% | 0 |
| Coarse woody debris | **980** | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 980 | 100% | 5 | 100% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 20 | | 5 | 10 | | 5 | 10 | | 5 | | 5 |
| Quality and availability of food and foraging habitat | **55** | 55 | | 55 | 35 | | 35 | 35 | | 35 | 55 | | 55 | | 45 |
| Quality and availability of shelter | **15** | 13 | | 13 | 6 | | 6 | 8 | | 8 | 13 | | 13 | | 10 |
| Site Condition Score | | | | 119 | | | 90.5 | | | 99 | | | 120 | | 107.1 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.55** | | | **1.94** | | | **2.12** | | | **2.57** | | **2.30** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 2 | | | 0 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 5 | | | 5 | | | 10 | | 7.5 |
| Species mobility capacity | **15** | | | 11 | | | 8 | | | 8 | | | 11 | | 9.5 |
| Site Context Score | | | | 35 | | | 25 | | | 29 | | | 37 | | 31.5 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **2.10** | | | **1.50** | | | **1.74** | | | **2.22** | | **1.89** |

| Assessment Unit - Regional Ecosystem | AU 2 - Remnant 11.4.9 | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site Reference | Benchmark /Max score | HQAP_A2 | | | HQAP_A4 | | | HQAP_F6 | | | HQAP_F9 | | | Average % benchmark | Average Score |
| | 11.4.9 | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | Raw Data | Benchmar | Score | | |
| **Site Condition** | | | | | | | | | | | | | | | |
| Recruitment of woody perennial species in EDL | **100** | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100 | 100% | 5 | 100% | 5 |
| Native plant species richness - trees | **2** | 5 | 250% | 5 | 3 | 150% | 5 | 4 | 200% | 5 | 6 | 300% | 5 | 225% | 5 |
| Native plant species richness - shrubs | **5** | 5 | 100% | 5 | 7 | 140% | 5 | 9 | 180% | 5 | 6 | 120% | 5 | 135% | 5 |
| Native plant species richness - grasses | **5** | 5 | 100% | 5 | 5 | 100% | 5 | 6 | 120% | 5 | 6 | 120% | 5 | 110% | 5 |
| Native plant species richness - forbes | **10** | 9 | 90% | 5 | 9 | 90% | 5 | 7 | 70% | 2.5 | 9 | 90% | 5 | 85% | 4.4 |
| Tree emergant height | | | | | | | | | | | | | | | |
| Tree canopy height | **10** | 9 | 90% | | 9 | 90% | | 11.5 | 115% | | 10 | 100% | | 99% | |
| Tree canopy height subcanopy | **6** | 5 | 83% | 5 | 5 | 83% | 5 | 4 | 67% | 5 | 5 | 83% | 5 | 79% | 5 |
| Tree emergent cover | | | | | | | | | | | | | | | |
| Tree canopy cover | **25** | 42.7 | 171% | | 22.2 | 89% | | 40 | 160% | | 24.3 | 97% | | 129% | |
| Tree canopy cover subcanopy | **11** | 4 | 36% | 5 | 4 | 36% | 5 | 21.5 | 195% | 5 | 14.7 | 134% | 5 | 100% | 5 |
| Shrub canopy cover | **5** | 4 | 80% | 5 | 9.8 | 196% | 5 | 7 | 140% | 5 | 9.9 | 198% | 5 | 154% | 5 |
| Native grass cover | **16** | 9 | 56% | 3 | 9 | 56% | 3 | 29 | 181% | 5 | 28 | 175% | 5 | 117% | 4.3 |
| Organic litter | **45** | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 20 | 44% | 3 | 44% | 3 |
| Large trees (euc plus non-euc) | **47** | 10 | 21% | 5 | 10 | 21% | 5 | 10 | 21% | 5 | 10 | 21% | 5 | 21% | 5 |
| Coarse woody debris | **980** | 750 | 77% | 5 | 750 | 77% | 5 | 742 | 76% | 5 | 750 | 77% | 5 | 76% | 5 |
| Non-native plant cover | **0** | 10 | | 5 | 10 | | 5 | 10 | | 5 | 10 | | 5 | | 5 |
| Quality and availability of food and foraging habitat | **55** | 55 | | 55 | 55 | | 55 | 35 | | 35 | 35 | | 35 | | 41.7 |
| Quality and availability of shelter | **15** | 11 | | 11 | 13 | | 13 | 8 | | 8 | 8 | | 8 | | 9.7 |
| Site Condition Score | | | | 127 | | | 129 | | | 103.5 | | | 106 | | 113.0 |
| *MAX Site Condition Score* | | | | *140* | | | *140* | | | *140* | | | *140* | | *140* |
| **Site Condition Score - out of 3** | | | | **2.72** | | | **2.76** | | | **2.22** | | | **2.27** | | **2.42** |
| **Site Context** | | | | | | | | | | | | | | | |
| Size of patch | **10** | | | 10 | | | 10 | | | 10 | | | 10 | | 10 |
| Connectedness | **5** | | | 2 | | | 2 | | | 2 | | | 2 | | 2 |
| Context | **5** | | | 0 | | | 2 | | | 4 | | | 4 | | 2.5 |
| Threats to the species | **15** | | | 10 | | | 8 | | | 5 | | | 5 | | 7 |
| Species mobility capacity | **15** | | | 11 | | | 11 | | | 8 | | | 8 | | 9.5 |
| Site Context Score | | | | 33 | | | 33 | | | 29 | | | 29 | | 31 |
| *MAX Site Context Score* | | | | *50* | | | *50* | | | *50* | | | *50* | | *50* |
| **Site Context Score - out of 3** | | | | **1.98** | | | **1.98** | | | **1.74** | | | **1.74** | | **1.86** |

| **Species Stocking Rate (SSR)** | | | | | | | Site Scores |
|---|---|---|---|---|---|---|---|
| Presence detected on or adjacent to site (neighbouring property with connecting habitat) | Score | 0 | 5 | | 10 | | 10 |
| | | No | Yes - adjacent | | Yes - on site | | yes - on site |
| Species usage of the site (habitat type & evidenced usage) | Score | 0 | 5 | 10 | 15 | | 15 |
| | | Not habitat | Dispersal | Foraging | Breeding | | breeding |
| Role/importance of species population on site* | Score (Total from | 0 | 5 | 10 | | 15 | 5 |
| | | 0 | 5 - 15 | 20 - 35 | | 40 - 45 | |
| Total SRR score (out of 70) | | | | | | 40 | 30 |
| **SRR Score (out of 4)** | | | | | | | 3 |

| ***SSR Supplementary Table** | | | | Site Scores |
|---|---|---|---|---|
| *Key source population for breeding | Score | 0 | 10 | 10 |
| | | No | Yes/ Possibly | yes |
| *Key source population for dispersal | Score | 0 | 5 | 5 |
| | | No | Yes/ Possibly | yes |
| *Necessary for maintaining genetic diversity | Score | 0 | 15 | 0 |
| | | No | Yes/ Possibly | no |
| *Near the limit of the species range | Score | 0 | 15 | 0 |
| | | No | Yes | no |

| **Final habitat quality score (weighted)** | **AU1** | **AU2** | **Total** |
|---|---|---|---|
| Site Condition score (out of 3) | 2.30 | 2.42 | 2.36 |
| Site Context Score (out of 3) | 1.89 | 1.86 | 1.88 |
| Species Stocking Rate Score (out of 4) | 3 | 3 | 3.00 |
| Habitat Quality score (out of 10) | *7.2* | *7.3* | *7.2* |
| Assessment Unit area (ha) | 79.91 | 29.37 | |
| Total offset area (ha) | 109.28 | | |
| Size Weighting | 0.73 | 0.27 | |
| ***Weighted Habitat Quality Score*** | ***5.25*** | ***1.96*** | ***7.21*** |

**Appendix F**

# EPBC Offset Area Calculator

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Brigalow TEC |
| **EPBC Act status** | Endangered |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **1.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | Yes | | **Area** | 20.5 | Hectares | |
| | | | **Quality** | 7 | Scale 0-10 | |
| | | | **Total quantum of impact** | 14.35 | Adjusted hectares | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Description** | **Quantum of impact** | | **Units** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | Yes | 14.35 | Adjusted hectares | | **Risk-related time horizon (max. 20 years)** | 20 | **Start area (hectares)** | 102 | **Risk of loss (%) without offset** | 0% | **Risk of loss (%) with offset** | | 0.00 | 90% | 0.00 | 0.00 | 14.46 | 100.79% | Yes | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 102.0 | **Future area with offset (adjusted hectares)** | 102.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | 4 | **Future quality without offset (scale of 0-10)** | 4 | **Future quality with offset (scale of 0-10)** | 7 | 3.00 | 60% | 1.80 | 1.42 | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | No | | | | **Time over which loss is averted (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | 0% | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| **Protected matter attributes** | **Attribute relevant to case?** | **Total quantum of impact** | **Units** | **Proposed offset** | **Time horizon (years)** | | **Start value** | | **Future value without offset** | | **Future value with offset** | | **Raw gain** | **Confidence in result (%)** | **Adjusted gain** | **Net present value** | **% of impact offset** | **Minimum (90%) direct offset requirement met?** | **Cost ($ total)** | **Information source** |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

# Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
2 October 2012

This guide relies on Macros being enabled in your browser.

| Matter of National Environmental Significance | |
|---|---|
| **Name** | Ornamental Snake |
| **EPBC Act status** | Vulnerable |
| **Annual probability of extinction**<br>Based on IUCN category definitions | **0.2%** |

| Key to Cell Colours |
|---|
| User input required |
| Drop-down list |
| Calculated output |
| Not applicable to attribute |

## Impact calculator

| Protected matter attributes | Attribute relevant to case? | Description | Quantum of impact | | Units | Information source |
|---|---|---|---|---|---|---|
| ***Ecological communities*** | | | | | | |
| **Area of community** | No | | **Area** | | | |
| | | | **Quality** | | | |
| | | | **Total quantum of impact** | 0.00 | | |
| ***Threatened species habitat*** | | | | | | |
| **Area of habitat** | No | | **Area** | 18.7 | | |
| | | | **Quality** | **5** | | |
| | | | **Total quantum of impact** | 9.35 | | |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | |
| ***Threatened species*** | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | |

## Offset calculator

| Protected matter attributes | Attribute relevant to case? | Total quantum of impact | Units | Proposed offset | Time horizon (years) | | Start area and quality | | Future area and quality without offset | | Future area and quality with offset | | Raw gain | Confidence in result (%) | Adjusted gain | Net present value (adjusted hectares) | % of impact offset | Minimum (90%) direct offset requirement met? | Cost ($ total) | Information source |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Ecological Communities*** | | | | | | | | | | | | | | | | | | | | |
| **Area of community** | No | | | | **Risk-related time horizon (max. 20 years)** | | **Start area (hectares)** | | **Risk of loss (%) without offset** | | **Risk of loss (%) with offset** | | | | | | | | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 0.0 | **Future area with offset (adjusted hectares)** | 0.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | | **Start quality (scale of 0-10)** | | **Future quality without offset (scale of 0-10)** | | **Future quality with offset (scale of 0-10)** | | | | | | | | | |
| ***Threatened species habitat*** | | | | | | | | | | | | | | | | | | | | |
| **Area of habitat** | yes | 9.35 | Adjusted hectares | | **Time over which loss is averted (max. 20 years)** | 20 | **Start area (hectares)** | 109 | **Risk of loss (%) without offset** | 0% | **Risk of loss (%) with offset** | | 0.00 | 90% | 0.00 | 9.43 | 100.81% | Yes | | |
| | | | | | | | | | **Future area without offset (adjusted hectares)** | 109.0 | **Future area with offset (adjusted hectares)** | 109.0 | | | | | | | | |
| | | | | | **Time until ecological benefit** | 20 | **Start quality (scale of 0-10)** | 6 | **Future quality without offset (scale of 0-10)** | 6 | **Future quality with offset (scale of 0-10)** | 7 | 1.00 | 90% | 0.90 | 0.86 | | | | |
| **Number of features**<br>e.g. Nest hollows, habitat trees | No | | | | | | | | | | | | | | | | | | | |
| **Condition of habitat**<br>Change in habitat condition, but no change in extent | No | | | | | | | | | | | | | | | | | | | |
| ***Threatened species*** | | | | | | | | | | | | | | | | | | | | |
| **Birth rate**<br>e.g. Change in nest success | No | | | | | | | | | | | | | | | | | | | |
| **Mortality rate**<br>e.g Change in number of road kills per year | No | | | | | | | | | | | | | | | | | | | |
| **Number of individuals**<br>e.g. Individual plants/animals | No | | | | | | | | | | | | | | | | | | | |

**Appendix G**

# Regional Ecosystem Fire Management Guidlines

# Regional ecosystem details for 11.4.9

| | |
|---|---|
| Regional ecosystem | 11.4.9 |
| Vegetation Management Act class | Endangered |
| Wetlands | Contains Palustrine |
| Biodiversity status | Endangered |
| Subregion | 7, 11, 10, 6, (23), (5), (13), (21), (8), (14), (9), (15), (17), (12), (19), (16), (18), (24), (4), (2), (20), (10.2) |
| Estimated extent[1] | Pre-clearing 989000 ha; Remnant 2021 89000 ha |
| Short description | Acacia harpophylla shrubby woodland with Terminalia oblongata on Cainozoic clay plains |
| Structure code | Woodland |
| Description | Acacia harpophylla woodland to open forest, usually with a low tree mid-storey of Terminalia oblongata and Eremophila mitchellii. Casuarina cristata sometimes replaces Acacia harpophylla in the overstorey and Lysiphyllum cunninghamii sometimes co-dominates. Other low tree or shrub species such as Alectryon diversifolius, Carissa ovata, Pittosporum spinescens, Ehretia membranifolia, Geijera parviflora and Flindersia dissosperma may occur in the mid-storey or low shrub layer. Occurs on level to gently undulating Cainozoic plains, including weathered basalt. Associated soils are predominantly moderately deep to deep cracking clays that may be brown, red-brown or grey-brown, and with much surface gravel in some areas. Contains Palustrine. (BVG1M: |

| | |
|---|---|
| | 25a).<br><br>Vegetation communities in this regional ecosystem include:<br>11.4.9a: Acacia harpophylla, Lysiphyllum carronii +/- Casuarina cristata open forest to woodland. Occurs on level to gently undulating Cainozoic plains, including weathered basalt. Associated soils are predominantly moderately deep to deep cracking clays that may be brown, red-brown or grey-brown, and with much surface gravel in some areas. Not a Wetland. (BVG1M: 25a).<br>11.4.9b: Acacia harpophylla, Eucalyptus thozetiana (sometimes E. cambageana) open forest to woodland. Occurs on level to gently undulating Cainozoic plains, including weathered basalt. Associated soils are predominantly moderately deep to deep cracking clays that may be brown, red-brown or grey-brown, and with much surface gravel in some areas. Not a Wetland. (BVG1M: 25a). |
| Supplementary description | Gunn et al. (1967), Avon (2), Blackwater (2, 3, 4), Cungelella (3), Disney (3), Durrandella (4), Humboldt (4, 5), Islay (2), Kareela (3), Kinsale (1,3,4), Loudon (5), Monteagle (5), Peak Vale (3), Playfair (4), Somerby (2,3,4), Ulcanbah (3), Waterford (2) |
| Protected areas | Carnarvon NP, Junee NP, Dipperu NP (S), Nairana NP, Taunton NP (S), Peak Range NP, Belmah CP, Zamia Creek CP, Mazeppa NP, Humboldt NP, Roundstone CP, Albinia NP, Albinia CP, Blackwater CP, Tooloombah Creek CP, Snake Range NP, Narrien Range NP |
| Special values | 11.4.9: Potential habitat for NCA listed species: Cadellia pentastylis, Solanum adenophorum, Solanum dissectum, Solanum elachophyllum, Solanum johnsonianum, Xerothamnella herbacea. |
| Fire management guidelines | INTERVAL: Fire return interval not relevant. INTERVAL_MIN: 100. INTERVAL_MAX: 100. STRATEGY: Maintain fire management of surrounding country so that wildfires will be very limited in extent. Frequent fire at the edge of this RE keeps fuel loads low. Protection from fire is necessary. ISSUES: Casuarina cristata is fire sensitive, although germination can be good in bare areas. Brigalow is soft-seeded, so germination is not promoted by fire. Buffel grass invasion will increase risk from fire. High intensity fires will cause damage to overstorey. Grazing may be an option for reducing fuel loads where exotic grass such as buffel have invaded. |
| Comments | 11.4.9: The presence of Terminalia oblongata often distinguishes this regional ecosystem from Acacia harpophylla on clay plains in southern Queensland (11.4.3). Areas mapped as 11.4.9b have been re-classified as 11.4.8a (Acacia harpophylla, Eucalyptus cambageana open forest to woodland). Extensively cleared for cropping and pasture. |

[1] Estimated extent is from version 13 pre-clearing and 2021 remnant regional ecosystem mapping. Figures are rounded for simplicity. For more precise estimates, including breakdowns by tenure and other themes see remnant vegetation in Queensland ( https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/remnant-vegetation/ ).

## Access vegetation management regional ecosystem descriptions

The Queensland Herbarium REDD lookup tool searches for information on regional ecosystems for a range of planning and management applications. If you're looking for vegetation management information you can use the vegetation management regional ecosystems description database (VM REDD ( https://www.qld.gov.au/environment/land/management/vegetation/maps/regional-ecosystems-lookup ))



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