Attachment D: Offset Area Management Plan

Westside PL94 Coal Seam Gas Project: EPBC 2021/9117 Offset Area Management Plan






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Prepared for: Westside Corporation Pty Ltd

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Declaration

I declare that to the best of my knowledge, all the information contained in, or accompanying this document is complete, current and correct. I am duly authorised to sign this declaration on behalf of the proponent/approval holder. I am aware that:

a. *section 490 of the* Environment Protection and Biodiversity Conservation Act 1999 *(Cth) (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 (Cth) 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:

Full name:

Organisation: Westside Corporation Pty Ltd

EPBC Referral Number: EPBC 2021/9117

EPBC Offset Management Plan

Date: / /2025

Summary

Westside Corporation Pty Ltd (**Westside**) is the proponent of the Westside PL94 Coal Seam Gas Project (the **Project**), which involves the construction and operation of an additional 350 gas wells and associated infrastructure within petroleum lease (**PL**) 94, that forms part of Westside's existing Greater Meridian Fields asset. PL94 is located in the Moura-Theodore district of the Banana Shire Council within the Bowen Basin of Queensland (see *Figure 1*). The township of Moura is situated within the northern extent of PL94 and supports the operational base of the Project.

The total area of PL94 is approximately 24,284 hectares (**ha**) in area and comprises a total of 1,223 individual land parcels. The Project area comprises approximately 21,002 ha within PL94, as it excludes mining leases. The disturbance footprint of the operation is 60 ha. Land uses in the area include grazing, mining and petroleum activities, with the Dawson Coal Mine operated by Anglo American Australia being located to the immediate east of PL94.

The proposed Project was referred by Westside to the Australian Government for a decision on the assessment approach under the requirements of the *Environmental Protection and Biodiversity Conservation Act 1999* (**EPBC Act**). On 30 June 2022 the proposed Project was determined to be a controlled action, with the assessment approach to be by preliminary documentation.

This Offset Area Management Plan (**OAMP**) provides the details of the proposed offsets for significant residual impacts (**SRI**s) to matters of national environmental significance (**MNES**) as a result of the Project. This impact is to habitat for the ornamental snake (*Denisonia maculata*) and habitat for the koala (*Phascolarctos cinereus)* The impact and the proposed offsets are detailed in *Table 1*.

The offset for this MNES is located on a property known as 'Clements Creek', located 60 km west of Marlborough. This OAMP identifies the proposed offset site and describes the offset outcomes and environmental gains from the proposed offset. This OAMP details the survey methods and results for both the impact and offset areas, and provides details of the management actions of the offset site that will lead to a conservation outcome for the impacted MNES. On that basis, this OAMP demonstrates that the proposed offset will be adequate to compensate for the Project's impact on these MNES and meets the requirements of the EPBC Act Environmental Offsets Policy (**EOP**).

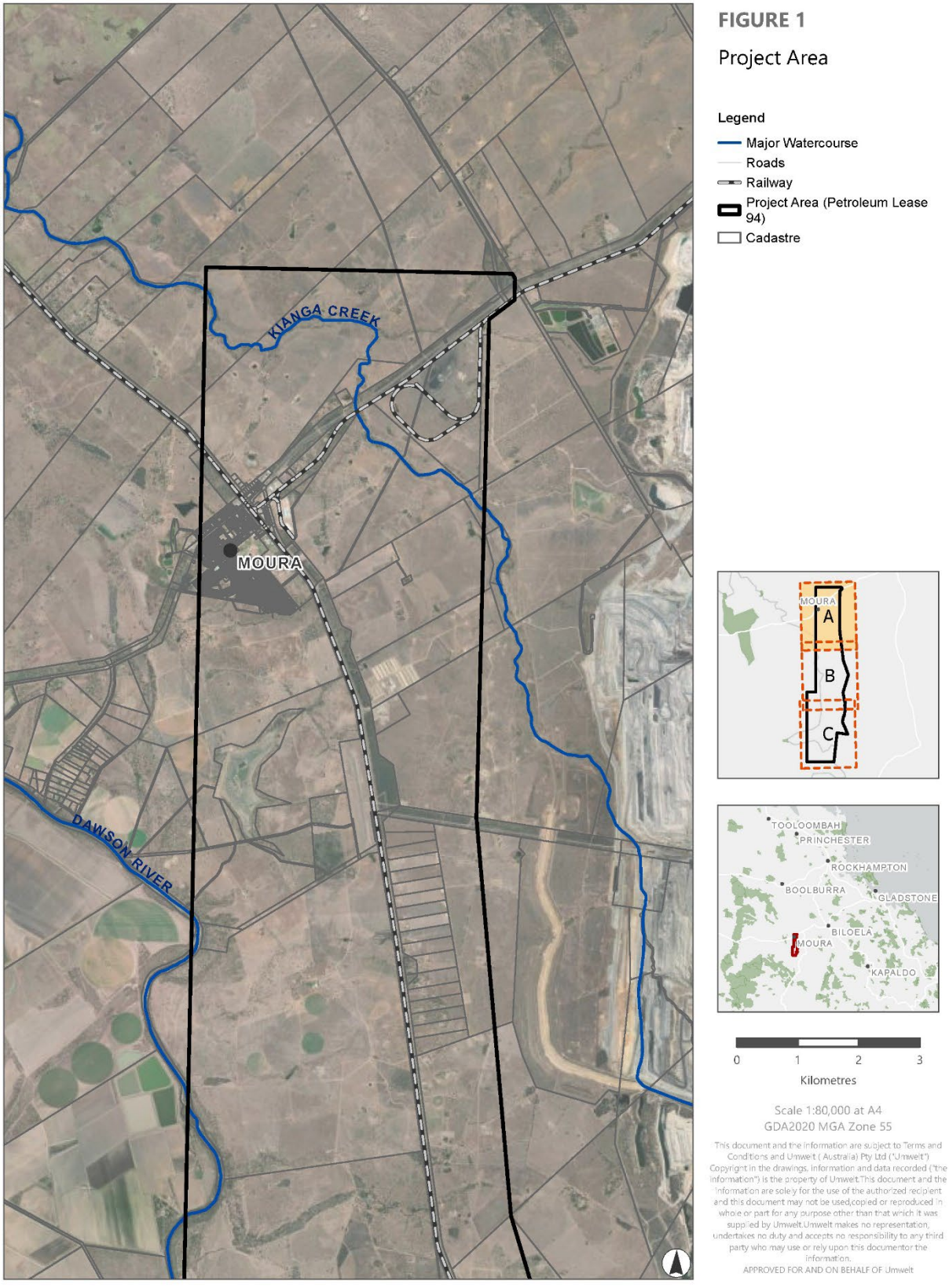
The Project proponent commits to the implementation of this OAMP. Additionally, once the Project has commenced, Westside commits to securing the offset and commencing offset implementation in advance of any Project disturbance to MNES habitat.

Table 1: Summarised Project impacts versus proposed offset area values

MNES	EPBC status	Impact area (ha)	Impact site quality (- /10)	Impact quantum	Offset property	Offset Area	Offset start quality (- /10)	Quality without offset (- /10)	Quality with offset (- /10)	Offset quantum and % of liability provided
Habitat for ornamental snake (*Denisonia maculata*)	VUL	16.0	5	8.00	Clements Creek	**104.77 ha**, comprising of: AU1 – 26.55 ha RE 11.3.1 AU3 – 4.26 ha RE 11.3.27f AU4 – 9.83 ha RE 11.3.3 AU5 – 64.14 ha RE 11.3.3	5	5	7	163.58%
Habitat for koala (*Phascolarctos cinereus*)*	END	8.9	3	2.69	Clements Creek		6	6	8	401.85%

** Impacted koala habitat is comprised of 2 ha of breeding and foraging habitat and 6.9 ha of shelter habitat.*

Figure 1: Project location



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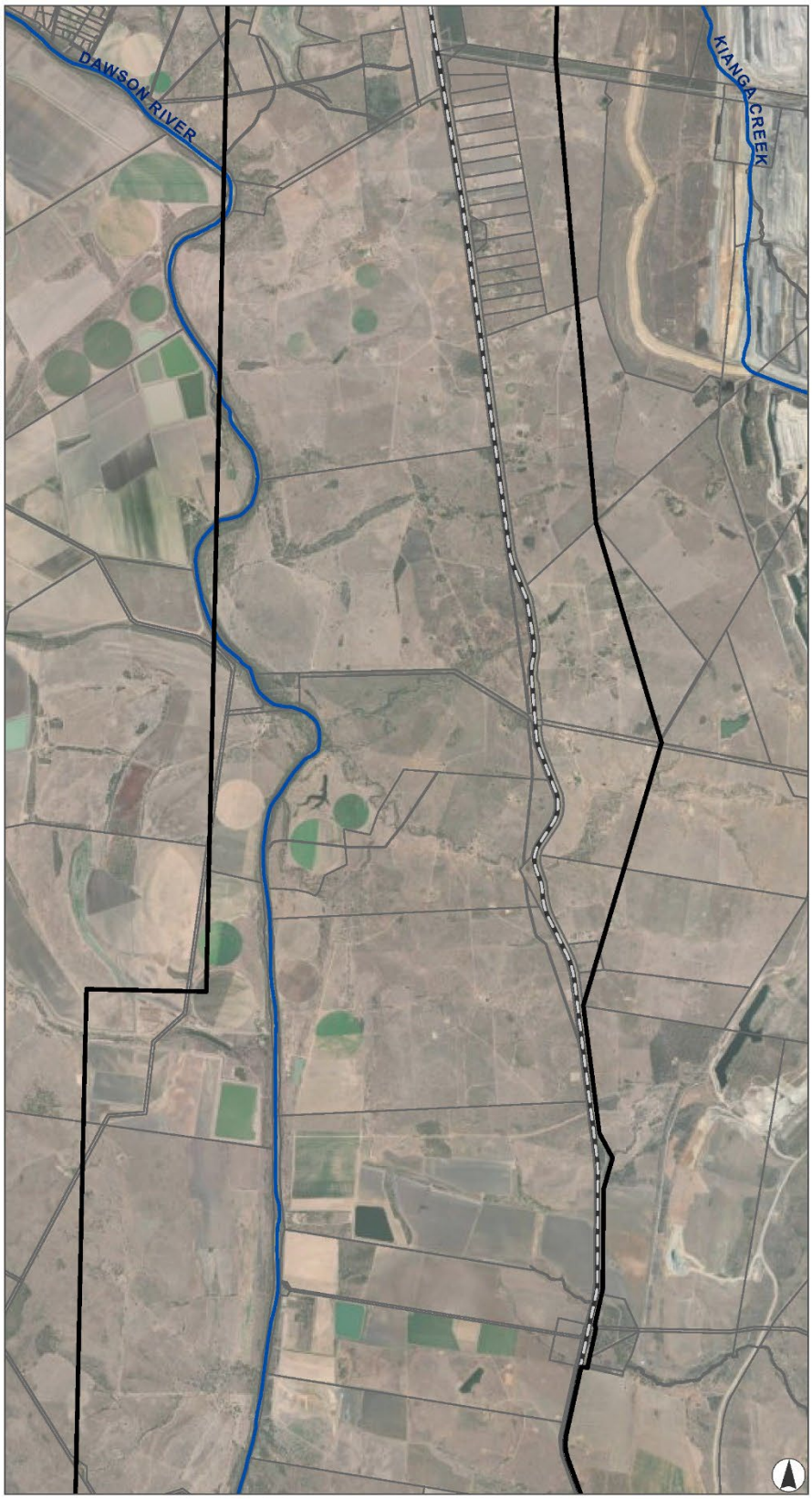
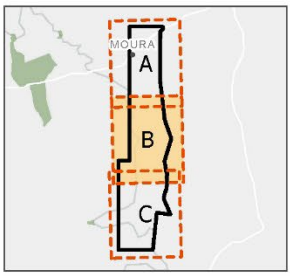


FIGURE 1

Project Area

Legend

- Major Watercourse
- Roads
- Railway
- Project Area (Petroleum Lease 94)
- Cadastre





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Kilometres

Scale 1:80,000 at A4
GDA2020 MGA Zone 55

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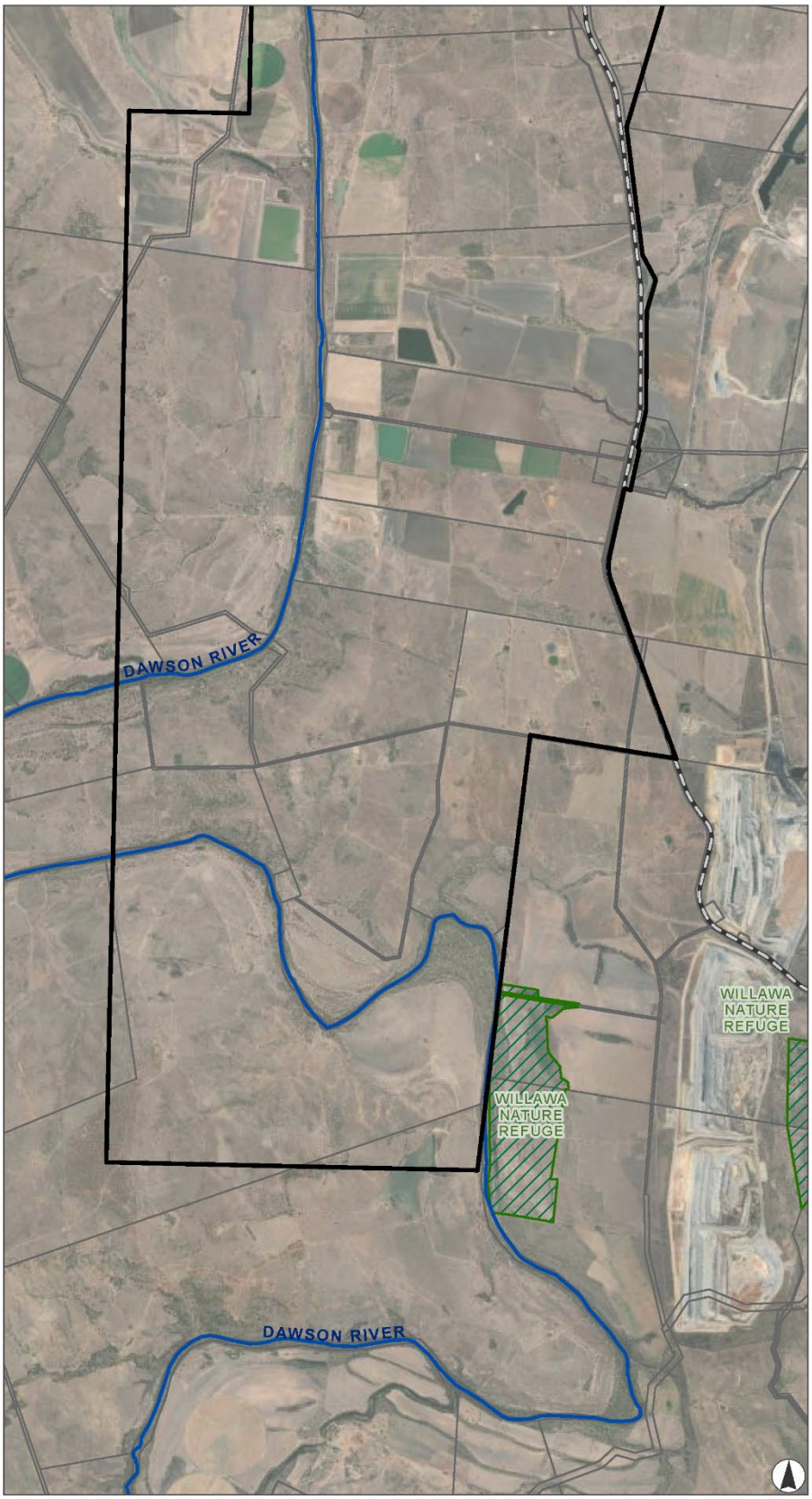
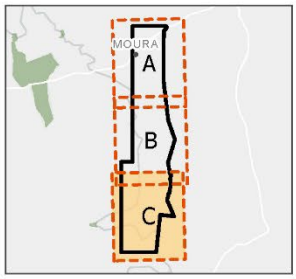


FIGURE 1

Project Area

Legend

- Major Watercourse
- Roads
- Railway
- Project Area (Petroleum Lease 94)
- Cadastre
- Nature Refuge





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1 Introduction

1.1 Project description

The Project area comprises a total of 1,223 individual lots on plans and is largely dominated by private agricultural properties including cattle grazing and some cropping. The Dawson Mine operated by Anglo American Australia occurs immediately east of the Project area and is a visible landmark throughout much of the eastern PL areas. The Project comprises the second stage of development of natural gas production within the Project area and includes the construction, operation, and rehabilitation of the following:

- 350 gas production wellheads: both single and multi-well pads with a preference for multi-well pads where feasible
- Ancillary linear infrastructure including gas and water pipelines, access tracks, power lines, and communication lines
- Upgrades to gas compression facilities as required
- Water management infrastructure
- Other ancillary activities and facilities to support construction and operations.

The Project does not have a firm footprint or layout. The final number, well type, and location of these activities will be determined progressively over the life of the Project development. As understanding of the gas resource increases, investment decisions will be made about the location, scale and timing of the field development. Development timing will also be determined by the proximity to, and synergies with, existing and planned facilities that have been previously approved.

As the Project is the construction and operation of coal seam gas wells and associated infrastructure, it requires the removal of habitat within the Project footprint (impact area). The proposed Project was referred by the proponent to the Australian Government for a decision on the assessment approach under the requirements of the EPBC Act. On 30 June 2022 the proposed Project was determined to be a controlled action, with the assessment approach to be by preliminary documentation.

An Offset Strategy (**OS**) was developed by the proponent and submitted to the Department of Climate Change, Energy, the Environment and Water (**DCCEEW**) in December 2023.This document is the OAMP that provides the details of the direct land-based offsets that will be provided for SRIs to MNES as a result of the Project.

1.2 Purpose and objectives of this management plan

DCCEEW's requirements for preliminary documentation (**PD**) include the development of a draft OAMP as an appendix to the PD. The draft OAMP must meet the information requirements set out in Appendix B.2 of DCCEEW's request for additional information dated 5 August 2022. The purpose of this OAMP is to address these information requirements.

1.3 Impact avoidance and mitigation measures

Westside have developed a Constraints Protocol (refer to Attachment B of the report titled *Westside Corporation PL94 Coal Seam Gas Project, Moura, Queensland (EPBC 2021/9117) Additional information required for assessment by preliminary documentation*) (Westside 2024) (**the PD Additional Information report**). The Constraints Protocol will ensure that during the development of the Project area, Westside will plan and design project infrastructure to avoid, minimise and mitigate impacts to the MNES values identified within the Project Area. The Constraints Protocol will be the key process for the avoidance, minimisation, and mitigation of any impacts to these MNES.

Westside also has another number of additional Management Plans (refer to Attachment C of the Constraints Protocol) that are used to ensure that the risks to MNES are managed during the construction, operation, maintenance, and decommissioning. These include:

- Environmental Management Plan
- Significant Species Management Plan
- Produced Water Management Plan
- Rehabilitation Management Plan.

These management plans are presented as final plans to be approved and conditioned for implementation with construction.

Westside follows a hierarchy of environmental management principles for the location of planned petroleum activities, which are:

- Avoidance – avoid direct and indirect adverse environmental impacts to MNES values.
- Minimisation – minimise direct and indirect adverse environmental impacts to MNES values where disturbance to MNES cannot reasonably and practically be avoided.
- Mitigation – mitigation and management measures for both direct and indirect impacts to MNES values for the Project in accordance with the Significant Species Management Plan
- Rehabilitation – actively rehabilitate all disturbed areas in accordance with the PL94 EA (EPPG00783713) and Rehabilitation Management Plan.
- Offset (only where required) – provide suitable offsets for areas of impact that result in significant residual impact to MNES.

These principles are discussed further in the following sections.

Avoidance

Proposed petroleum infrastructure locations will avoid significant impacts on MNES values by utilising the following measures:

- Redesigning the proposed petroleum infrastructure
- Relocating the proposed petroleum infrastructure
- Utilising areas of existing significant disturbance, and
- Utilising pad drilling with horizontal wells.

Minimisation

Disturbances will be minimised within habitats with broad habitat extents. Minimisation of disturbance will include the following measures:

- Pipeline right of ways widths limited to 18 meters through these areas
- Multi-well pads with horizontal wells to minimise disturbances (maximum 2 hectares)

- Non-linear infrastructure excluded from watercourses, and
- Utilisation of areas of existing significant disturbances.

Mitigation

Where avoidance cannot be achieved Westside will undertake both minimisation and mitigation measures to reduce both direct and indirect impacts to MNES and other environmental values. Mitigation measures are set out in Table 18 of the PD Additional Information report.

Rehabilitation

All disturbances will be rehabilitated in accordance with the PL94 Rehabilitation Management Plan and the rehabilitation conditions set out in the PL94 EA (EPPG00783713). The timeframe for rehabilitation works to be undertaken is determined by the type of infrastructure that is built.

Offset

In keeping with the principles of the mitigation hierarchy, it is as a last resort that environmental offsets are being implemented. This document is the OAMP that provides the details of the offsets that will be provided for the SRIs to MNES as a result of the Project.

1.4 Significant residual impacts to protected matters

Ecological assessment studies for the Project (Umwelt, 2025) have determined that it is possible that the Project will result in a significant impact to 2 MNES values, being habitat for the ornamental snake and habitat for the koala. Project-related impacts to these species, are considered potentially significant, primarily based on the magnitude of direct impacts.

For the ornamental snake, the removal of 16.0 ha of suitable habitat is very minor relative to the extent of habitat that will remain. The species-specific guidance outlined in the *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* (DCCEEW, 2024) indicates there is a 'high risk of significant impacts' where 2.0 ha or more of important habitat is lost.

For the koala, breeding and foraging habitat is present in the Project area, primarily in disjunct patches in a highly fragmented landscape. Although habitat may provide the resources necessary for the species ecological requirements, it is not considered highly unique or important given that patches are typically small and disconnected and the Dawson Mine presents a complete barrier to movement from west-east. This habitat will be avoided as a priority, however a maximum of 2.0 ha of breeding and foraging habitat would be directly impacted as a result of the Project.

Shelter habitat exists primarily as fragmented patches of vegetation surrounded by highly modified paddocks (dispersal habitat). This habitat is not considered to be of high value as it does not contain preferred foraging species but may provide ancillary habitat functions such as thermoregulation and temporary refuge from predators for dispersing animals. A maximum of 6.9 ha of this habitat would be impacted by the Project.

This OAMP details the offset that will be provided for these SRIs.

1.5 OAMP structure

The OAMP is divided into 10 sections that provide the following information:

- Legislative framework and approval requirements
- Matters requiring offsets
- Offset property and offset area descriptions

- Risk analysis
- Offset management measures
- Completion criteria and performance targets
- Offset management and protection additional to those that currently exist
- Monitoring and reporting
- Legally binding mechanism
- Adaptive management and plan review.

2 Legislative framework and approval requirements

2.1 EPBC Act environmental offset policy principles

The EPBC Act EOP sets out 8 key overarching principles to determine the suitability of offsets. *Table 2* outlines each of the policy principles and how it has been considered in the OAMP, with a reference to the relevant OAMP section.

Table 2: EPBC Act Environmental Offset Policy principles

Policy principle	Comment
Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matters.	The offsets will deliver a conservation outcome by providing habitat for the ornamental snake and koala species. The habitat will be managed to improve the habitat values for these species, and the offset area will be secured as a declared area under the *Vegetation Management Act 1999* (Qld) (**VM Act**) to ensure legal protection of the offset area. An additional legally binding mechanism (e.g. conservation covenant) will be established within 5 years of commencement of the implementation of the OAMP. The proponent will legally secure the offset areas for the term of the approval through the use of a declared area for the offset, followed by an additional mechanism such as a conservation covenant. Thus, the ecological benefits to the species from the implementation of this OAMP will result in a permanent change to the legal status of the vegetation/habitat which will be protected under the EPBC Act as MNES habitat, by being mapped under the VM Act as remnant vegetation and the N*ature Conservation Act 1992 (Qld)* (**NC Act**) as habitat for a protected species. Conservation covenants are registered to the title of the property under the *Land Title Act 1994* (Qld) (**LT Act**). Additionally, the completion criteria and the 'with offset' non-native species attribute (provided in *Appendix A*) establishes the acceptable limits to non-native species in the offset area. These will be achieved as a requirement of this OAMP.
Suitable offsets must be built around direct offsets but may include other compensatory measures.	100% of the Project's MNES offset obligations for the ornamental snake and koala will be acquitted by the proposed direct land-based offset.
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	The status of the ornamental snake and koala species have been taken into account by the offset assessment guide that has been used to calculate the offset area requirements. The ornamental snake is listed as vulnerable under the EPBC Act. The koala is listed as endangered under the EPBC Act.
Suitable offsets must be of a size and scale proportionate to the	The extent of the offset has been calculated using ecological reports that include both flora and fauna surveys, for both the impact and offset sites to inform inputs into the offset assessment guide (**OAG**).

Policy principle	Comment
residual impacts on the protected matter.	The inputs to the OAGs for the protected matters impacted are detailed in *Section 5.7* and *Section 5.8.*
Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	The risks associated with the offsets have been assessed (*Table 27* and *Table 28*) and mitigation and appropriate management actions proposed in the offset area management measures shown in *Table 26*. In addition, uncertainty, and therefore risk, associated with averted loss and net gain in habitat quality were addressed by applying the offset assessment guide.
Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs.	Vegetation clearing as a native forest practice, or a forest practice, the use of fire to manage regrowth, and grazing on the offset site is not currently prohibited by legal mechanisms at either the local, state or Australian government legislative level. See *Section 6* and *Section 9*. The offset areas are zoned rural and have previously been used for timber harvesting and cattle grazing. Areas of the offset properties have been subject to vegetation clearing[1] under the land management practices of previous owners over the last 3 decades. The current regulated vegetation will be secured via a declared area that has its head of power under the VM Act. This threat will be removed from the offset sites. See *Section 11* for further detail. The offset area is not subject to other schemes or programs. The offset area is being rehabilitated from intensive grazing. The *Biosecurity Act 2014* (**Biosecurity Act**) has a baseline duty of care for weed and pest animal control as detailed in *Table 30*. All of the management actions detailed in *Table 26* inclusive are above and beyond the requirements of the Biosecurity Act.
Suitable offsets must be efficient, timely, transparent, scientifically robust and reasonable	The proposed offsets will be efficient and timely as the offset will be secured and implementation commenced before any disturbance to MNES habitat as a result of the commencement of the Project. The offset's scale and suitability is transparent, and the offsets are based on the terrestrial ecology reports prepared by suitably qualified ecologists for the impact and offset sites (Umwelt, 2024; Lyngco 2023, 2024, Earthtrade, 2024); They have been prepared using the EPBC Act OAG inputs and calculators. Refer to *Section 3* for further detailed application of the OAG.
Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The offset sites were surveyed in August 2023, December 2023 and February 2024, providing the baseline habitat quality assessment. These scores were compared against the relevant BioCondition benchmarks for each regional ecosystem (**RE**).[2] Habitat quality assessments were conducted in accordance with the *Guide to Determining Terrestrial Habitat Quality Version 1.3, 2020* (Queensland Department of Environment and Science (**DES**)) which involved collecting spatial data; and conducting in situ vegetation surveys, assessing site condition, spatial context as well as targeted species habitat criteria (refer to Lyngco 2023, 2024a, 2024b, Earthtrade, 2024). Future habitat assessment measurements will be conducted in accordance with this OAMP during its implementation phase. Monitoring and reporting are detailed in the Offset Area Management Measures outlined in *Table 26*, and the monitoring schedule and reporting schedule are shown in *Table 31* and *Table 32*. The offset will be protected from clearing and secured via a declared area that has its head of power under the VM Act. Refer to *Section 11* for further detail.

[1] *Vegetation Management Act 1999*, Schedule dictionary

[2] Benchmarks are quantitative values derived from data collected from field-based reference sites for each site condition attribute assessed in BioCondition

2.2 Information requirements related to the OAMP

The information requirements for this OAMP are contained in Appendix B.2 of DCCEEW's request for additional information. These are listed in *Table 3*, and references are provided to the OAMP section that addresses each requirement.

The environmental outcomes of this OAMP are specific improvements in ecological values in habitat for the ornamental snake and koala. These improvements are defined in detail in *Section 8* of this OAMP (Offset completion criteria and performance targets).

Table 3: Information requirements for a draft OAMP

No.	Item	Section reference
B2.1	Specific, committal and measurable environmental outcomes which detail the nature of the conservation gain to be achieved for relevant MNES, including the creation, restoration and revegetation of habitat in the proposed offset area/s.	*Section 8*
B2.2	Details, with supporting evidence, to demonstrate how the environmental offset/s compensate for residual significant impacts of the proposed action on relevant MNES, and/or their habitat, in accordance with the principles of the Offsets Policy and all requirements of the Offsets Assessment Guide including: • time over which loss is averted (max. 20 years); • time until ecological benefit; • risk of loss (%) without offset; • risk of loss (%) with offset; and • confidence in result (%).	*Section 5.7 and Section 5.8*
B2.3	A description of the offset area/s, including location, size, condition, environmental values present and surrounding land uses.	*Section 3.2.2 and Section 5*
B2.4	Baseline data and other supporting evidence that documents the presence of the relevant MNES, and the quality of their habitat within the offset area/s.	*Section 4.3, Appendix B*
B2.5	An assessment of the site habitat quality for the offset area/s (e.g. using the Queensland Government *Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy* (version 1.3, 2020)).	*Section 5.1 Appendix B Attachment 1*
B2.6	Details of how the offset area/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant MNES.	*Section 5.6.5*
B2.7	Maps and shapefiles to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes (e.g. physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the relevant MNES that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares).	*Figure 7, Figure 8 and accompanying shapefiles*
B2.8	Specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of habitat in the offset area/s over a 20-year period.	*Section 8*
B2.9	Details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria.	*Section 6*
B2.10	Interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria.	*Section 8*

2.3 Commitments made in the OAMP

This section summarises the commitments made throughout this OAMP to achieve ecological benefit(s) for the relevant MNES. These ecological benefits will be achieved through the integrated implementation of many elements of this OAMP. Additional commitments are also made in alignment with the principles of the EPBC Act EOP. *Table 4* below lists each of these commitments and provides references to the sections in this OAMP where these commitments are detailed.

Table 4: Commitments made in this OAMP

Commitment	OAMP section or comment
The approval holder commits to the implementation of this OAMP at project commencement.	*Section 11*
The approval holder commits to the implementation of this OAMP until the expiry of the EPBC approval.	*Summary and Section 13*
The approval holder commits to registering a legally binding mechanism within 12 months of commencing the action to provide long-term protection to the offset area/s in advance of any proposed disturbance to MNES habitat as a result of the commencement of the Project.	*Section 11*
The approval holder commits to registering an additional legally binding mechanism (e.g. conservation covenant) within 5 years of commencement of the implementation of the OAMP.	*Section 11*
The approval holder commits to avoiding any direct impacts to MNES before the legally binding mechanism is fully secured, with the exception of the following species habitat: • squatter pigeon (southern) dispersal habitat; and • koala dispersal habitat.	*Section 11*
Evidence of the legally binding mechanisms will be provided to DCCEEW within 2 weeks of being registered.	*Section 11*
The approval holder commits to undertaking the management actions as described in *Section 6 and Table 26*.	*Section 6*
The approval holder will provide an annual report on implementation of the management actions described in the OAMP to DCCEEW by 31 August. This report will cover the previous financial year.	*Section 10*
If the approval holder wishes to carry out any activity otherwise than in accordance with this OAMP, the approval holder will submit to DCCEEW for the Minister's written approval a revised version of the OAMP. The varied activity will not commence until the Minister has approved the varied OAMP in writing. If the Minister approves the revised OAMP, that OAMP will be implemented in place of the OAMP originally approved.	*Section 12*
If the Minister requests that Westside make specified revisions to the OAMP, Westside will develop and submit the revised OAMP for the Minister's written approval. Westside will implement the revised OAMP. Unless the Minister has approved the revised OAMP, then Westside will continue to implement the OAMP originally approved.	*Section 12*
This OAMP will be submitted electronically to DCCEEW and will be published on Westside's website within 2 weeks of the Minister approving the OAMP in writing. The OAMP will remain on Westside's website until the expiry date of the approval.	*Section 12*

3 Matters requiring offsets

This section provides details of the MNES impacted by the Project. Numerous desktop assessments and field survey work nearby and across the Project area have been undertaken between 2013 and 2024. A review of these historical surveys and reports, and the most recent field surveys were undertaken by Umwelt. The consolidated results of this desktop and field work are detailed in the report titled *Westside PL94 Coal Seam Gas Project: Matters of National Environmental Significance Assessment* (Umwelt, 2025) (the **impact ecology report**).

3.1 Impact survey methodology

3.1.1 Desktop assessment

A comprehensive desktop assessment was undertaken to compile all existing information on ecological values and associated MNES that may be supported in the Project area and areas adjacent. The desktop assessment included a review of scientific literature relating to MNES, review of the methods and results of existing ecological surveys conducted in the Project area, and searches of publicly available datasets and online mapping. The results were used to compile preliminary likelihood assessments, which identified the target threatened species and communities and any potential habitat areas within the Project area. Survey methods were based on this information and were prepared in accordance with the appropriate Commonwealth and State guidelines.

As part of this assessment, the following information database sources were reviewed, with the Protected Matters Search Tool (PMST) re-run in February 2025 to ensure a contemporary assessment of MNES:

- EPBC Act Protected Matters Search Tool for MNES with a 10 km buffer applied to the Project area
- Department of Environment, Science and Innovation (**DESI**) Wildlife Online database for species records (with a 10 km buffer applied to the Project area)
- Atlas of Living Australia spatial portal (ala.org.au) for publicly available species records
- DESI Protected Plants Flora Survey Trigger map to identify the locations of previously recorded threatened flora species
- DESI certified Biodiversity Planning Assessment mapping to identify significant wildlife corridors of state, regional and local biodiversity significance
- DESI Groundwater dependent ecosystems and potential aquifer mapping
- Department of Resources (**DoR**) Vegetation Management Supporting Report, including Essential Habitat mapping
- DoR Vegetation Management Preclear Regional Ecosystem map (Version 3)
- DoR Vegetation Management Regional Ecosystem map (Version 13)
- DoR Contours – 1 m and 10 m interval map
- DoR Soil and land use mapping for the Dawson Valley (2007)
- The Cornell Lab of Ornithology eBird webpage
- The DCCEEW Interactive National Flying-fox monitoring viewer
- The Australasian Bat Society BATMAP
- Queensland Herbarium Regional Ecosystem Description Database (Version 13)
- DES Habitat Suitability Models Queensland
- Species of National Environmental Significance distribution mapping
- Historical aerial imagery (Q Imagery, 2024).

3.1.2 Literature reviews

The literature review was two-fold and incorporated both reviewing of scientific literature relating to MNES, and a review of the methods and results of previous ecological studies undertaken within the Project area to broaden the understanding of potentially occurring MNES.

The following relevant scientific literature was reviewed in relation to potentially occurring MNES to increase understanding of values and required survey methods:

- Species Profile and Threats database for detailed MNES information (DCCEEW)
- Survey Guidelines for Australia's Threatened Mammals (DSEWPAC, 2011a)
- Survey Guidelines for Australia's Threatened Birds (DEWHA, 2010)
- Survey Guidelines for Australia's Threatened Reptiles (DSEWPAC, 2011b)
- Draft Referral Guidelines for nationally listed Brigalow Belt reptiles (DCCEEW, 2024)
- Draft referral guideline for the 14 birds listed migratory under the EPBC Act (DOE, 2015)
- Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DOEE, 2017)
- Terrestrial Vertebrate Fauna Survey Guidelines for Qld Version 4 (Eyre, et al., 2022)
- A review of koala habitat assessment criteria and methods (Youngentob et al., 2021)
- Assessment of Seasonal Habitat Characteristics as Predictors of Habitat Suitability for the Threatened Ornamental Snake (*Denisonia maculata*) (Veary, 2011)
- Available conservation advice, listing advice and recovery plans for all species identified during the desktop assessment.

Several ecological assessments have been conducted within the Project Area or adjacent since 2013. The methodology and results in these reports were reviewed to determine previously identified MNES and associated survey effort, where applicable. The results of the older studies were reviewed in the context of updated threatened species and community listings (including habitat definitions) under EPBC Act, where relevant. The details of all of these survey reports are provided in Table 4.1 of the impact ecology report (Umwelt, 2025).

3.1.3 Field assessments

RE field survey and mapping

Vegetation has been classified and mapped across the Project Area from 2019 to 2024, in accordance with the Queensland Herbarium guidelines *Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland*. Assessments were completed in accordance with the document version available at the time including Version 5.0 (Neldner et al., 2019), Version 6.0 (Neldner et al., 2022) and the current Version 7.0 (Neldner et al., 2023).

A full list of REs that have been ground-truthed during the various ecological assessments within PL94 is provided at *Appendix D1*. In line with this method, different survey site types are recognised which differ primarily by the level of detail in the data collected. A total of 23 secondary, 32 tertiary and 334 quaternary sites have been completed for the Project. Incidental flora species observed during the survey were also recorded including exotic species. To support data collected via secondary, tertiary and quaternary sites, rapid vegetation observations were also recorded. Rapid vegetation observations largely captured high-level vegetation community characteristics, including dominant and notable species. These sites were recorded primarily in locations where time or access limited the surveyor's ability to complete a more detailed assessment. Locations of vegetation survey sites completed by Umwelt across 2019 to 2024 are depicted in *Figure 2*.

Figure 2: Field survey sites from 2019 to 2024 (impact site)

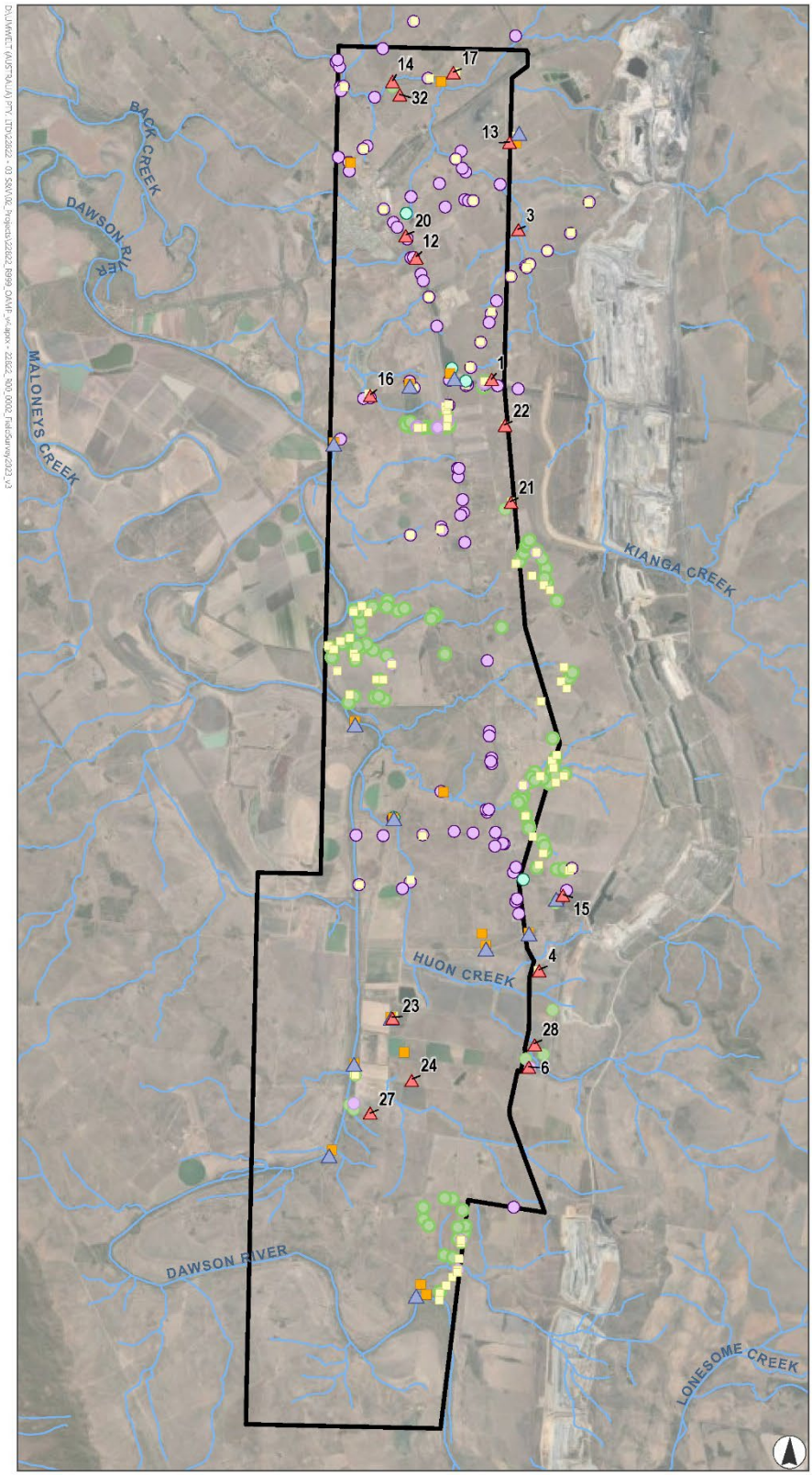

FIGURE 2

Umwelt Field Survey Sites 2019/2020, 2023 and 2024

Legend

- Watercourse
- Roads
- Project Area

Field Survey Sites

- Quaternaries
- Tertiary Sites
- Habitat Assessments
- Rapid Vegetation/Habitat Assessments
- Spotlighting Sites
- Active Search Sites
- Habitat Quality Assessment Sites



0 2 4 6

Kilometres

Scale 1:150,000 at A4
GDA2020 MGA Zone 55

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Image Source: ESRI Basemap (2023) | **Data Source:** Umwelt (2024), DNRM (2023)

Using land zone information and dominant species data, each vegetation community was classified to a specific RE in accordance with the Regional Ecosystem Description Database (Qld Herbarium, 2023). The spatial extent of vegetation was identified in the field via satellite imagery to confirm vegetation boundaries for larger polygons.

Secondary sites are used for classification and detailed descriptions of REs and vegetation communities. Using this method, vegetation data is collected along a 10 x 50 m plot, however modified plots may be used where narrow fringing-communities exist; i.e. 5 x 100 m plot. Data collected during a secondary flora site includes:

- all location, environmental and overall structural information (heights and cover of each layer)
- a list of all species present, including the ground layer
- basal area of woody stems (using the Bitterlich stick method)
- percentage cover and stem density measures of abundance
- presence of disturbances (erosion, weeds etc).

Tertiary sites are less detailed than secondary sites but can still be used to classify and produce detailed vegetation community descriptions. Tertiary sites are often collected instead of secondary sites where seasonal conditions such as drought make a full assessment of species impractical. Data collected during a tertiary site is the same as a secondary, with the exception of the species recorded in the ground layer (in this instance only the dominant or conspicuous).

Quaternary site data are used primarily as a record of field traverses and to verify RE/vegetation mapping. Quaternary sites were collected at regular intervals along a traverse, and/or made where REs/vegetation communities were observed to have changed. The minimum data captured at each quaternary location included:

- date, collector and location
- unique site identifier
- dominant flora species present
- additional data such as remnant vegetation cover, RE mapping unit and structural heights.

Following this RE survey work, vegetation mapping was refined based on the survey results. This refined mapping is illustrated in *Figure 3*. This mapping also shows the survey sites overlaid with the RE mapping. *Figure 3* illustrates that Site 12 is located in RE 11.9.2, and that Site 15 is contained within RE 11.4.9. Supporting vegetation descriptions and photographs for these 2 individual sites are contained within *Table 5*.

Figure 3: Refined vegetation mapping of the impact site following field survey work

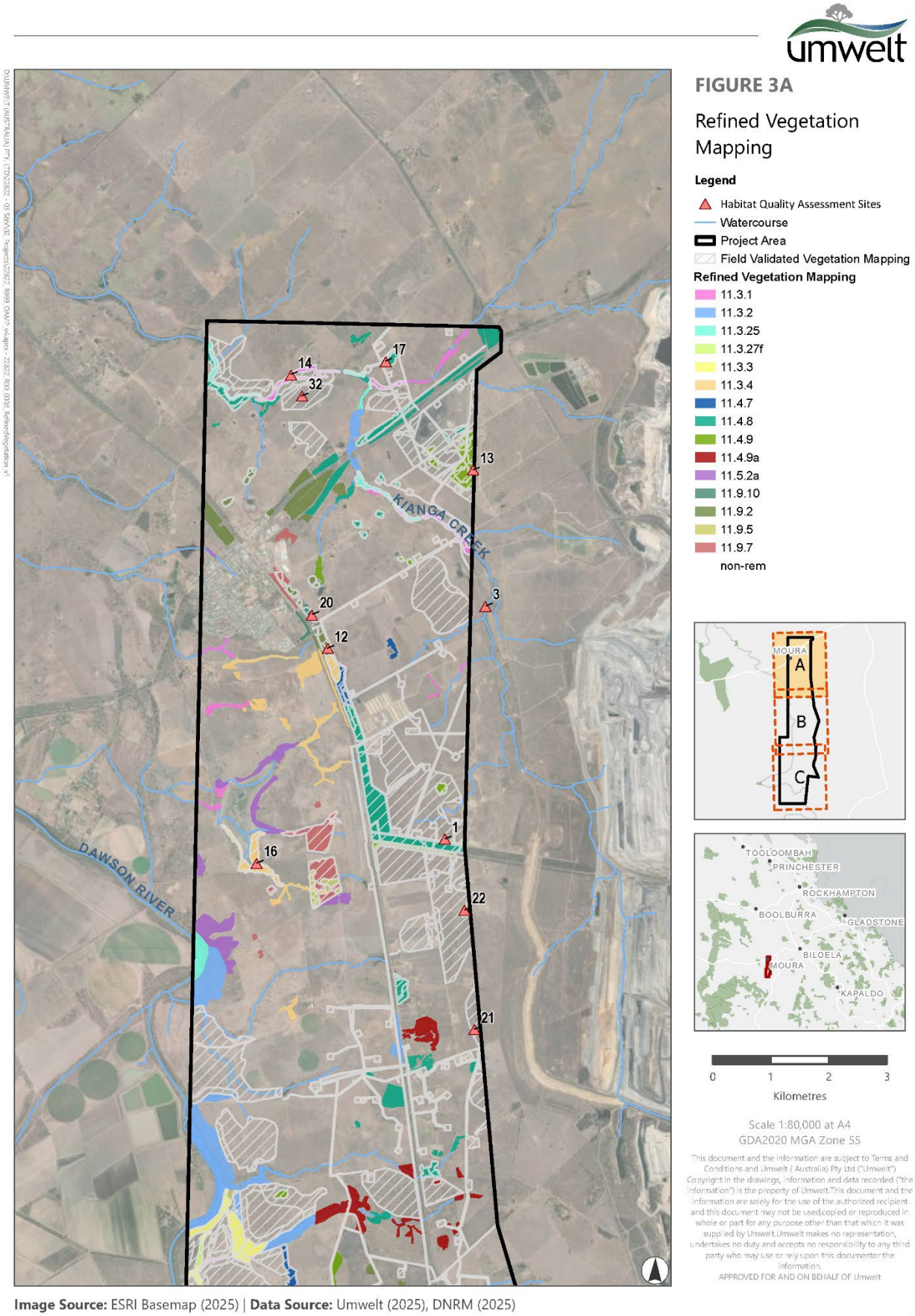


Image Source: ESRI Basemap (2025) | **Data Source:** Umwelt (2025), DNRM (2025)

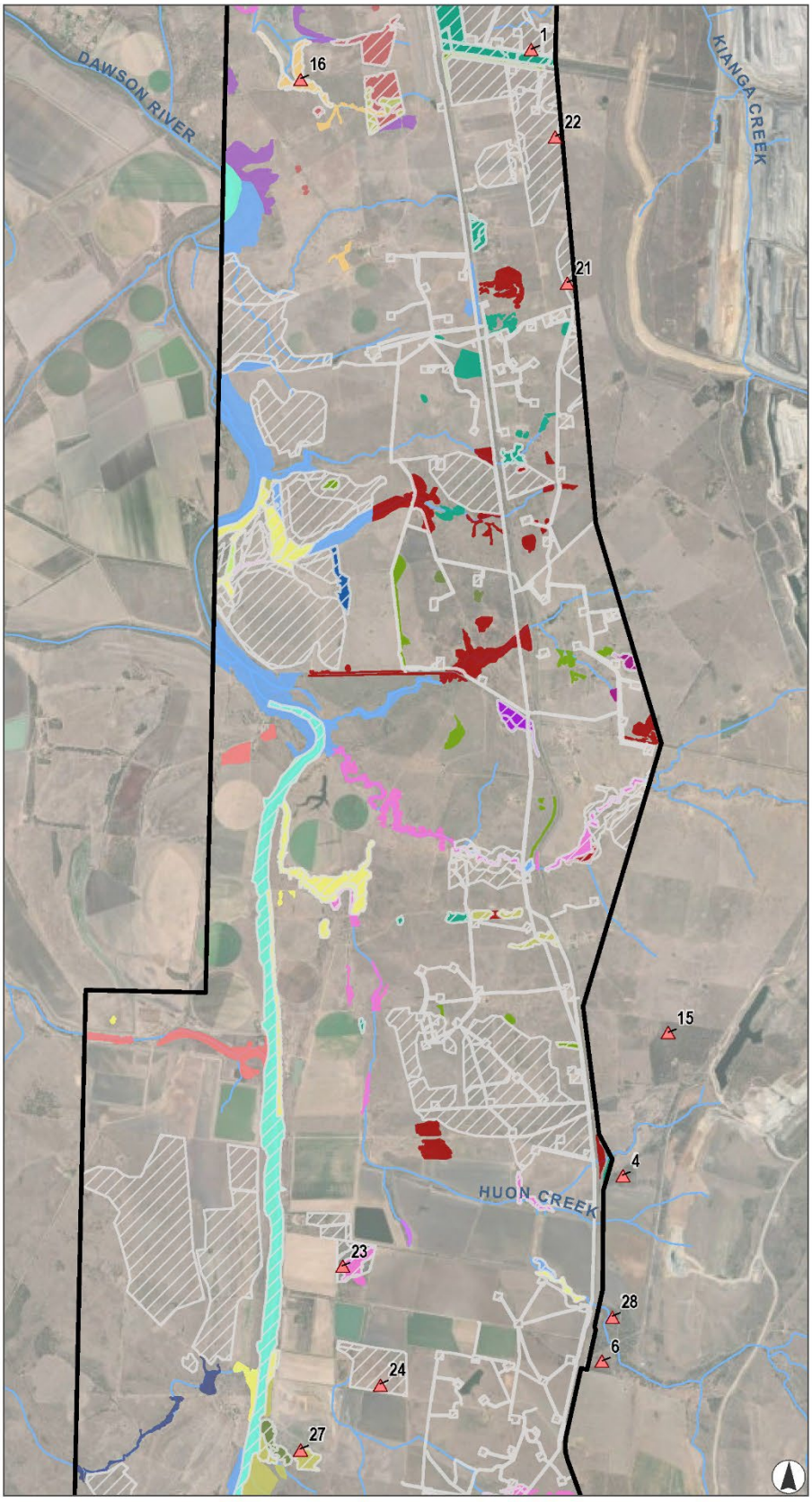


FIGURE 3B

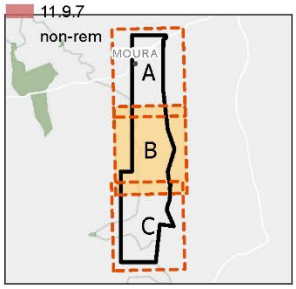
Refined Vegetation Mapping

Legend

- Habitat Quality Assessment Sites
- Watercourse
- Project Area
- Field Validated Vegetation Mapping

Refined Vegetation Mapping

- 11.3.1
- 11.3.17
- 11.3.2
- 11.3.25
- 11.3.27f
- 11.3.3
- 11.3.4
- 11.3.6
- 11.4.12
- 11.4.3
- 11.4.7
- 11.4.8
- 11.4.9
- 11.4.9a
- 11.5.2a
- 11.9.1
- 11.9.2
- 11.9.5
- 11.9.7
- non-rem





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Kilometres

Scale 1:80,000 at A4
GDA2020 MGA Zone 55

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Image Source: ESRI Basemap (2025) | **Data Source:** Umwelt (2025), DNRM (2025)

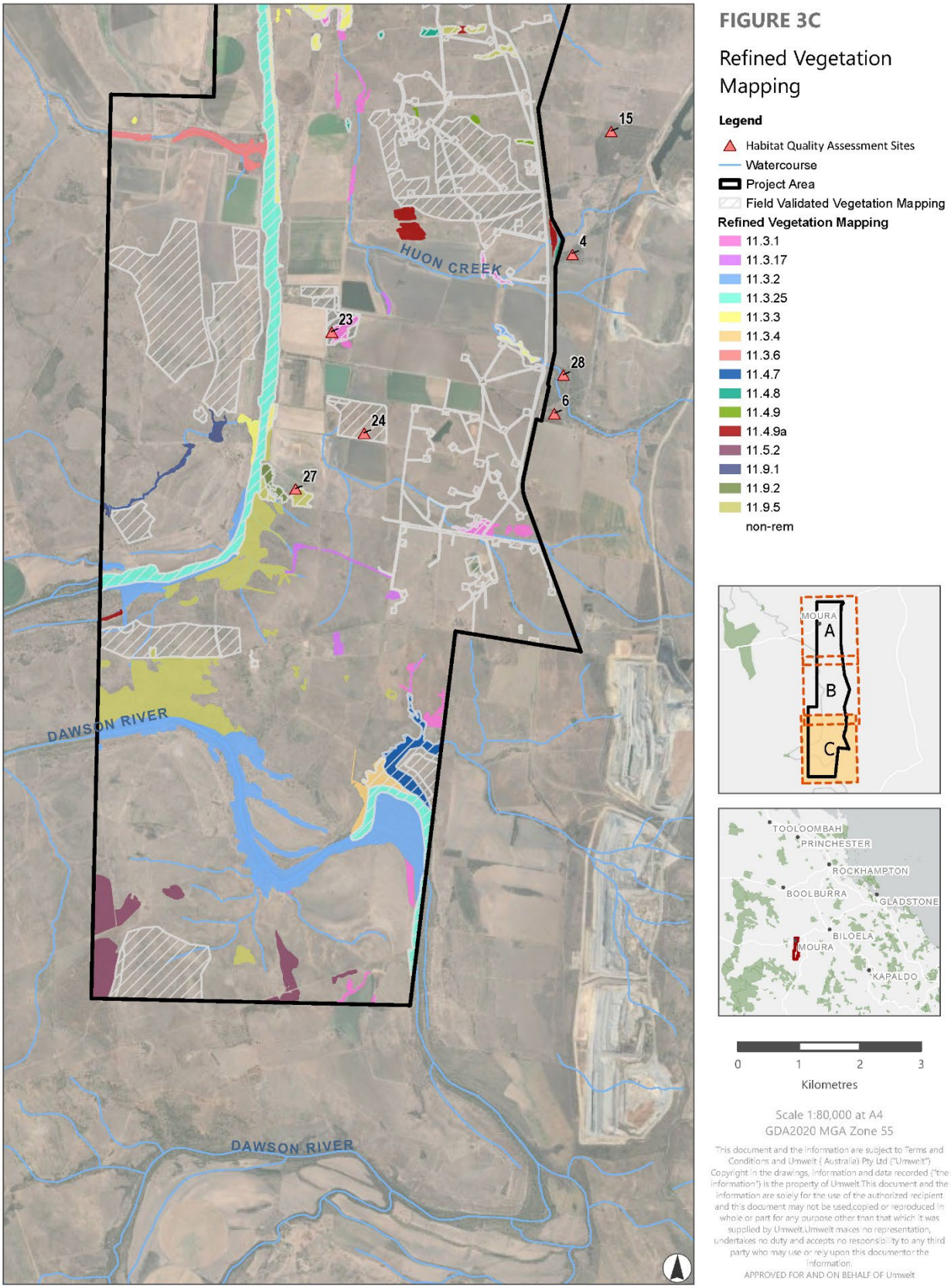


Image Source: ESRI Basemap (2025) | **Data Source:** Umwelt (2025), DNRM (2025)

Table 5: Vegetation descriptions for Site 12 and Site 15

Site ID / RE	Broad Community Description	Photos north (top) and south (bottom)	Photos east (top) and west (bottom)
Site 12 RE 11.9.2	Open forest dominated by *Eucalyptus melanophloia* (average height of 15 m) with other eucalypts also in the canopy including *Eucalyptus populnea and Corymbia* spp.. Canopy occurs over a cluttered understorey comprised of a mid-dense low tree layer (*Alphitonia excelsa, Hakea lorea* and canopy species) and a sparse shrub dominated by *Carissa ovata*. The ground-layer is dense and grassy, with exotic species such as *Megathyrsus maximus** and *Cenchrus ciliaris** dominant. Despite this, a relatively high diversity of native grasses and forbs are also present, although rare, including, but not limited to, *Heteropogon contortus*, *Brunoniella australis*, *Cyperus gracilis*, *Desmodium macrocarpum*, *Dianella sp.*, *Eremophila debilis*, *Eustrephus latifolius* and *Rostellularia adscendens*. Community occurs on level plain of fine-grained sedimentary rocks.	 	 

Site ID / RE	Broad Community Description	Photos North (Top) and South (Bottom)	Photos East (Top) and West (Bottom)
Site 15 RE 11.4.9	*Acacia harpophylla* (brigalow) regrowth low open forest (average height of 5 m) over very sparse shrub of brigalow, *Alectryon diversifolius*, *Eremophila mitchellii* and *Citrus glauca*. The ground is highly variable with a diversity of both native and exotic grasses, as well as native forbs, such as *Alternanthera* sp., *Cheilanthes sieberi*, *Cullen tenax*, *Fimbristylis* sp., *Salsola australis*, *Solanum ellipticum*. Native grasses include, but are not limited to, *Heteropogon contortus, Panicum sp., Aristida sp.* and *Sporobolus creber*. Community occurs on gently undulating plains that support deep cracking clays and gilgai.	 	 

EPBC Act-listed threatened ecological communities

Listed threatened ecological communities (**TEC**s) under the EPBC Act were validated in the field where analogous REs were identified. Vegetation was evaluated against applicable TEC diagnostic characteristics and condition thresholds as per the approved conservation advice or listing advice relevant for each TEC.

Threatened flora

Across the field survey program, targeted searches have been undertaken opportunistically by Umwelt and Eco Logical Australia for threatened flora species within areas of suitable habitat. If threatened flora species were found, their location and spatial extent were recorded, notes regarding population size and photographs were also collected.

Three surveys have also been completed by Otto Agribusiness (2019-2020) within the Project area specifically targeted the presence of threatened flora species. On these surveys, the Botanical Systematic Transect Search method was employed, which involved recording and identifying every plant within a 100 m x 10 m plot. Photographs along with the global positioning system (**GPS**) coordinates are taken at either end of transect. Across the three surveys, a total of 79 threatened flora transects were conducted.

Terrestrial fauna

Habitat assessments which characterise fauna habitat values were undertaken within all representative vegetation types supported by the Project area. The habitat assessments followed guidance outlined by Eyre et al. (2018), recording information on the location, landform, vegetation structure, regional ecosystem, and disturbance characteristics of sites in a standardised manner. Microhabitat features such as coarse woody debris, tree hollows, mistletoe, soil cracking and leaf litter were also documented.

Targeted habitat assessments were undertaken to identify the extent, condition and value of habitat within the Project area, and as such, the likely occupancy/useability of these habitats by target threatened fauna species, in terms of breeding, shelter, roosting, foraging and dispersal. These assessments informed site selection, informing suitable areas for targeted field surveys (i.e. active searches or spotlighting). They were conducted for potentially occurring threatened species, as identified during the desktop assessment, focussing on specialist habitat requirements collecting information derived from available literature (including the SPRAT Database, relevant government documents and published research papers) and vegetation assessments conducted in the field. A total of 223 habitat assessments have been completed.

Targeted threatened fauna surveys

A nocturnal fauna field survey was undertaken within the Project area by two suitably qualified ecologists over 5 days from 23 to 27 March 2020, targeting ornamental snake as well as koala (*Phascolarctos cinereus*) and greater glider (southern and central) (*Petauroides volans*). The survey was undertaken following heavy rainfall to coincide with a peak in prey activity resulting in likely higher detectability of ornamental snakes. The field survey was focused to 13 monitoring sites located across 10 properties, known or likely to support suitable habitat for the target species as identified from desktop assessment.

The field survey was undertaken in accordance with the *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* (DCCEEW, 2023), and the *Survey Guidelines for Australia's Threatened Reptiles* (DSEWPAC, 2011b). These guidelines recommend:

- Targeting water-inundated gilgais, wetlands, riparian habitats, and the surrounding environment (e.g., roads) and large logs between dusk and early morning hours
- Surveying over a minimum of 1.5 person hours per hectare for habitats of average complexity per targeted species. Surveys should be conducted over a minimum of 3 nights.

For the koala, no specific methodology or effort standards are prescribed for koala surveys. A total of 223 habitat assessments, which included searches for koalas and/or signs of their presence, have been undertaken across the Project area between 2019 and 2024. Spotlighting searches were also conducted across five nights during the March 2020 field surveys. It is acknowledged that spotlighting targeted a variety of habitat types and thus approximately half of the total spotlighting effort is considered relevant to this species (10.4 person-hours of spotlighting) (Umwelt 2024).

At each site, species-specific habitat assessments were also recorded to characterise the habitat and understand the presence and abundance of key habitat resources and likely habitat utilisation. Outside of these monitoring sites, several additional habitat assessments were undertaken to assess the quality and suitability of other habitats across the Project area. These sites were selected to represent the variability in habitat quality identified during the field survey.

Table 6 provides details of the 2020 field survey effort for targeted fauna species, and compares it to the DCCEEW survey guideline requirements.

Table 6: Targeted fauna species survey effort

Target species	Monitoring sites	Survey effort required	Survey effort: diurnal (hours)	Survey effort: nocturnal (hours)	Comments
Ornamental snake and koala	OS01	1.5 person hours per hectare (impact area 16.0 ha) (DSEWPAC 2010; DCCEEW 2023)	1.00	1.00	Survey effort exceeds minimum guidelines of 1.5 person hours per hectare
	OS02		1.00	2.25	
	OS03		1.00	2.25	
	OS04		0.50	0.75	
	OS05		1.00	2.00	
	OS06		1.25	1.50	
	OS07		0.75	2.25	
	OS08		1.00	1.25	
	OS09		0.75	2.50	
	OS10		0.75	2.00	
	OS11		1.00	1.00	
	OS12		0.75	1.00	
	OS13		1.00	1.00	
	Totals:	**24.0**	**11.75**	**20.75**	
			32.50		

Habitat quality assessments

Habitat quality assessments were undertaken in accordance with the *Guide to Determining Terrestrial Habitat Quality (version 1.2)* (DEHP, 2017). A total of 18 habitat quality assessments were conducted in representative areas of ornamental snake and koala habitat (*Figure 2*) and included the following assessments:

- Landscape-scale attributes – describes the surrounding landscape of the subject area, and the influence this has on the vegetation quality
- Site-based attributes – provide an indication of the general vegetation condition of an area
- Species habitat attributes – determine the ability of an area to support a particular fauna species based on that species' specific habitat requirements.

Landscape-scale attributes

The assessment of landscape-scale attributes was undertaken in a desktop setting as per the *Guide to Determining Terrestrial Habitat Quality*, which refers to the methodology described in the *BioCondition Assessment Manual* (Eyre et al., 2015). A landscape-scale attribute numerical score out of 20 was generated.

As the Project Area is located within a 'fragmented landscape', the landscape surrounding the Project Area and its influence on the site's vegetation quality is measured via assessment of the following 4 attributes, when using version 1.2 of the *Guide to Determining Terrestrial Habitat Quality*:

- size of patch
- context
- connectivity
- ecological corridors.

In version 1.3 of the *Guide to Determining Terrestrial Habitat Quality* (DES, 2020) (see section 1.2.1), ecological corridors in fragmented subregions have been removed from scoring, and are considered as part of the size of patch score. Section 6 of the *BioCondition Assessment Manual* (Eyre et al 2015) is used to determine whether the subregion is fragmented or intact. As the offset site was assessed based on version 1.3 of the *Guide to Determining Terrestrial Habitat Quality* (DES, 2020), and the offset site is located in a fragmented landscape, ecological corridors are not scored. However, the modified habitat quality assessment (**MHQA**) guidelines from DCCEEW scores ecological corridors in alignment with version 1.2 (see Step 6 in section 6, Table 3 (DEHP 2017).

Site-based attributes

Site-based attribute assessment was undertaken as per the *Guide to Determining Terrestrial Habitat Quality* (DES, 2020), which refers to the methodology described in the *BioCondition Assessment Manual* (Eyre et al., 2015). A total of 18 BioCondition assessments involved the collection of the following 13 site-based attributes within a 100 m x 50 m nested sampling plot:

- recruitment of species in the ecologically dominant layer
- native tree species richness
- native shrub species richness
- native grass species richness
- native forb species richness
- tree canopy height
- tree canopy cover
- shrub canopy cover
- native perennial grass cover
- organic litter cover
- number of large trees
- coarse woody debris abundance
- non-native plant cover.

Species habitat attributes

Species habitat quality attributes are designed to assess the capacity of a habitat area to support a species for all or part of its life. Species specific habitat requirements were researched using available literature and the knowledge of experienced, suitably qualified ecologists for each potentially occurring threatened species, as determined by the previously undertaken desktop assessment. Terrestrial habitat quality assessments were conducted concurrently at each site-based attribute assessment site for ornamental snake and koala.

Three measurable habitat attributes are assessed against a series of species-specific environmental indicators. Each environmental indicator is assigned a score from 0-25, where 0 represents the lowest quality and/or availability, and 25 represents the highest quality and/or availability.

Measured habitat attributes include:

- Quality and availability of food and habitat required for foraging
- Quality and availability of habitat required for shelter and breeding
- Quality and availability of habitat required for mobility.

In addition to the above, habitat is assessed for the absence of threats. Each identified threat is assessed according to scope and severity against the threat matrix, provided in the *Guide to determining terrestrial habitat quality* (DES, 2020). Threats were assessed on the following principles:

- Scope of threats regarding what percentage of the population or habitat within the matter area will be affected over the next 10 years or 3 generations:
    - Low scores reflect higher percentage (80-100%) of population or habitat being destroyed while high scores are assigned where a smaller portion (1-19%) of habitat or population is slightly degraded or negligibly affected.
- Severity of threat assesses what percentage for the population, or its habitat will be affected by the threat:
    - Low scores being allocated when 80-100% of the population or its habitat will be affected, and high scores being allocated when the threat is negligible and will affect only a small proportion (1-5%) of a species habitat or population.

The habitat indicators assessed for the ornamental snake are shown in *Table 7*. The habitat indicators for the koala are shown in *Table 8*.

Table 7: Habitat attribute indicators for ornamental snake

Habitat attribute	Indicator	Maximum score	Justification
Foraging habitat	**Presence and extent of gilgais and other water sources**: • **0** = Gilgai and other water sources are absent • **4** = Gilgai and other water sources are rare • **8** = Gilgai and other water sources are occasional but <50% have edges entirely covered by fringing vegetation (i.e. ferns, grasses, forbs and shrubs <2m). • **12** = Gilgai and other water sources are occasional and >50% have edges entirely covered by fringing vegetation (i.e. ferns, grasses, forbs and shrubs <2m). • **16** = Gilgai and other water sources are common or abundant but <50% have edges entirely covered by fringing vegetation (i.e. ferns, grasses, forbs and shrubs <2m). • **20** = Gilgai and other water sources are common or abundant and >50% have edges entirely covered by fringing vegetation (i.e. ferns, grasses, forbs and shrubs <2m). **Presence and diversity of aquatic vegetation (macrophytes):** • **0** = Aquatic vegetation is absent • **2.5** = One type of aquatic vegetation present. • **5** = ≥2 types of aquatic vegetation present. Aquatic vegetation types include free floating, submerged, low growing, emergent (short) and emergent (tall), as used by Turner, Wassens and McNeil in their 2020 frog study. A macrophyte field guide (i.e. Sainty and Jacobs, 1994) can be used to aid identification.	Total score out of 25	The ornamental snake feeds almost exclusively on frogs, and so is found on floodplains, undulating clay pans and along the margins of swamps, lakes and watercourses (DoE 2014). Of these habitats, the ornamental snake is most typically associated with gilgai (SPRAT, 2025). Gilgai are repeated mounds and depressions formed on shrink-swell and cracking clay soils (or vertosols); water can accumulate seasonally in the depressions to form gilgai wetlands. Ornamental snakes require specific habitat features such as surface water and aquatic vegetation to hunt frogs (DCCEEW 2023). While gilgai may be preferred by the ornamental snake, frogs will inhabit a variety of water sources to complete life cycle requirements. Fringing vegetation around water sources is likely to be an important habitat feature for both ornamental snakes and their prey (including frogs and invertebrates) as it provides cover. The presence and diversity of aquatic vegetation is also likely to be an important habitat feature for frog species, providing a structure for eggs to be deposited, a foraging resource for tadpoles and adults and additional shelter (Turner, Wassens and McNeil, 2020). As different frog species have different lifecycle requirements, habitats with a variety of vegetation groups, from free floating to tall emergent, will support a greater abundance and diversity of species.

Habitat attribute	Indicator	Maximum score	Justification
Shelter, breeding and mobility	**Extent of suitable soil cracks:** • **0** = No cracking clay soil • **8** = Area is characterised as supporting a soil type that contains clay but is not dominant or heavy. Soil cracks may occur but are rare and/or shallow. • **16**= Area is characterised as supporting a clay soil type. Deep soil cracks suitable for the ornamental snake are present but rare. • **24** = Area is characterised as supporting a clay soil type. Deep soil cracks suitable for the ornamental snake are occasionally present. • **32**= Area is characterised as supporting a clay soil type. Deep soil cracks suitable for the ornamental snake are common or abundant, but there is evidence of cattle pugging indicating cattle may have accessed during the most recent wet season. • **40** = Area is characterised as supporting a cracking clay soil type. Deep soil cracks suitable for the ornamental snake are common or abundant, and there is no cattle pugging. **Coarse woody debris:** • **0** = < 100m/ha • **2** = 100 - 200 m/ha • **4** = 200 - 300 m/ha • **6** = 300 - 400 m/ha • **8** = 400 - 500 m/ha • **10** = >500 m/ha.	Total score out of 50	The ornamental snake shelters during the day under fallen timber, rocks, bark and in deep soil cracks. It is thought to be probably active year round with the exception of the cooler months, with peak activity likely to be early summer through to the wet season. During dry times the snake can remain inactive in its shelter sites for long periods (months) (DSEWPAC 2011). Little is known about the species in regard to its mobility and home range (DoE 2014; Cogger 1993). Due to the species' cryptic nature, it is likely to be heavily reliant on shelter opportunities and may not move to/consistently occupy areas without it. Therefore the presence/abundance of soil cracks and coarse woody debris has also been used to score mobility. Ornamental snake habitat often occurs in areas associated with agricultural development including grazing. Cattle are hard hooved ungulates. The continued use of potential ornamental snake habitat by cattle during the wet season can compact the soils reducing the availability of suitable cracks. Cattle access during this period may also impact on the availability of fringing vegetation and microhabitat and reduce water quality in the gilgai and other water sources by increasing turbidity and nutrient loads.
Threats	Key threats to the ornamental snake and ornamental snake habitat, listed by the conservation advice include: (DoE 2014) • Past broad scale land clearing and habitat degradation • Current habitat clearing	Total score out of 25	The destruction of wetland habitat by feral pigs also contributes to degradation of frog habitat and direct competition for their food source, frogs.

Habitat attribute	Indicator	Maximum score	Justification
	• Habitat destruction caused by cattle and pigs by the trampling and pugging of gilgai and cracking clays • Poisoning by the ingestion of cane toads. All of the above threatening processes are considered to be impacting the Project area and surrounds. At the offset area, past broadscale land clearing and habitat degradation was not assessed as a current threat, as this is a legacy threat. While the Conservation Advice lists cane toads as a threat to the ornamental snake, there appears to be no correlation between these 2 species in relation to relative abundance (Veary, 2011). Subsequently, ingestion by cane toads was not used in the assessment of threats. At the offset area, the following threats were assessed for this project: • Logging and/or the removal of fallen woody debris resulting in loss and fragmentation of habitat • Habitat destruction caused by cattle and pigs by the trampling and pugging of gilgai and cracking clays when soil is wet. **Loss and fragmentation of habitat** • **1** = Area is planned to be logged or is entirely cleared, with 80–100% of the area likely to be entirely cleared or entirely modified within 10 years • **2** = Area is isolated with gaps from other suitable habitat greater than 1km with 40–79 % of the area likely to be entirely cleared or entirely modified within 10 years • **3** = Area is fragmented with gaps from other suitable habitat less than 1 km with 11–39 % of the area likely to be entirely cleared or entirely • modified within 10 years • **4** = Area is contiguous with privately owned land with no protections, or area is fragmented and less than 500m from protected land, and land clearing is not expected to occur within the next 10 years, with 6-10% of the area likely to undergo minor impact land clearing (fencing, cattle yard etc) within 10 years • **5** =Area is contiguous with protected land. Land clearing is not expected to occur within the next 10 years, so there is no scope for land clearing to occur with 10 years. **Degradation of habitat by domesticated herbivores** • **1** = Feral pigs and or cattle are actively destroying large areas (>100m^2) of the habitat that will result in significantly reduced remaining Ornamental snake habitat and frog populations within 10 years		Habitat degradation is often caused by overgrazing by stock, especially cattle, or grazing of gilgais during the wet season which leads to soil compaction and compromising of soil structure.

Habitat attribute	Indicator	Maximum score	Justification
	• **2** = Feral pigs and or cattle are actively destroying moderate sized areas (<100m2) + of the habitat, that will result in significantly reduced remaining ornamental snake habitat and frog populations within 10 years. • **3** = Moderate signs of pigs or cattle within the area - wallows, greater than 5 scat piles of cattle dung identified within 20 mins or fresh footprints resulting in modifications to cracking clay due it its isolation from other suitable habitat. • **4** = Minor signs of pigs or cattle within the area, no wallows, less than 5 scat piles of pig/cattle dung identified withing 20 mins, fresh footprints resulting in minor impacts on the area within 10 years. • **5** = Limited signs of pigs or cattle, no wallows, one scat piles of pig/cattle dung identified within 20 mins and no fresh footprints, resulting in limited to no impacts on the area within 10 years.		

Table 8: Habitat attribute indicators for koala

Habitat attribute	Indicator	Maximum Score	Justification
Quality and availability of food and habitat required for foraging	**Presence of preferred food tree species:** • **0** – Does not contain a locally important koala tree species • **7.5** – Contains one locally important koala tree species • **12.5** – Contains 2 or more locally important koala tree species, or one locally important koala tree species that alone accounts for >50 % of the canopy **Size of habitat patch:** • **0** = <1 ha patch • **2.5** = 1 - 5 ha patch • **5** = 6 - 10 ha patch • **7.5** = 11 - 40 ha patch • **10** = 41 - 100 ha patch • **12.5** = >100 ha patch	Total score out of 25	The presence and density of preferred food tree species are key factors that influence the quality of habitat for koalas (DAWE 2022a). The required density of food trees for koalas is poorly known and highly variable across the species' range, therefore density of preferred food tree species has not been included as an indicator. The nutritional quality of available trees, not the diversity of trees, primarily drives foraging decisions and subsequently population density (DAWE 2022a). A locally important koala tree is defined as a tree from a species that is regularly browsed by koalas in a particular area, such that it could be considered a substantial portion of the koala's diet (DAWE 2022a). Locally important koala trees in the Brigalow Belt bioregion are listed in Table 3 of Youngentob et al. (2021) and include species from the *Corymbia*, *Eucalyptus*, *Acacia* and *Melaleuca* genera. Habitat within the Project area includes forest and woodland, with field surveys confirming the presence of food tree species, at some sites including *Eucalyptus melanophloia*, *Eucalyptus populnea* and *Eucalyptus tereticornis* (Umwelt, 2025). The amount of habitat required to support a population is poorly understood, and definitionally difficult (Youngentob et al. 2021). It is influenced by factors such as habitat quality, spacing of trees in the landscape and the availability and use of climate refugia (DAWE 2022a). Koalas have a highly variable home range, but in general are substantially larger in inland semi-arid woodlands (DAWE 2022a). A study undertaken at Blair Athol, approximately 330 km northwest of the Study Area, found a mean home range size of 116 ha (range 5.4 - 296 ha) (Ellis et al. 2002). A study undertaken at Springsure, approximately 250 km west of the Study Area, found a mean home range size of 80 ha for males (range 30 - 150 ha) and 38 ha for females (range 6 - 90 ha).

Habitat attribute	Indicator	Maximum Score	Justification
Quality and availability of habitat required for shelter and breeding	**Presence of shelter trees i.e. large trees (BioCondition):** • **0** = No large trees • **2.5** = 1 - 25 % of large tree benchmark • **5** = 26 - 50 % of large tree benchmark • **7.5** = 51 - 75 % large tree benchmark • **10** = 76 - 99 % of large tree benchmark • **12.5** = ≥100 % of large tree benchmark **Presence of refugia (e.g., suitable drainage lines, riparian zones, patches with favourable hydrological systems):** • **0** = Patch does not contain refugia • **7.5** = Refugia occurs in proximity to patch (within 1 km) • **12.5** = Refugia present within patch	Total score out of 25	Koalas use a wide range of tree species for shelter, preferring larger and more shady trees (DAWE 2022a). DAWE (2022) identifies climate refugia as a crucial habitat element that provides important shelter for koalas during times of heat and water stress.
Quality and availability of habitat required for mobility	**Size of habitat patch:** • **0** = <1 ha patch • **3.75** = 1 - <50 ha patch • **7.5** = 50 - <250 ha patch • **11.25** = 250 - >500 ha patch • **15** = 500 - <1000 ha patch • **18.75** = ≥1000 ha patch **Presence of nearby vegetated watercourses:** • **0** = >3 km from suitable vegetated water source • **3.75** = 1 - 3 km from suitable vegetated water source • **5** = <1 km from suitable vegetated water source • **6.25** = <500 m from suitable vegetated water source	Total score out of 25	The amount of habitat required to support a population is poorly understood, and definitionally difficult (Youngentob et al. 2021). It is influenced by factors such as habitat quality, spacing of trees in the landscape and the availability and use of climate refugia (DAWE 2022a). The scoring is based on guidelines from the superseded *EPBC Act Referral Guidelines for the Vulnerable Koala* (Department of the Environment 2014), which assigns the highest habitat value score to inland habitat that is part of a contiguous landscape ≥ 1,000 ha, and the second highest to contiguous vegetation < 1000 ha but > 500 ha. A threshold patch size of 1 ha has been adopted in accordance with the New South Wales Government State Environmental Planning Policy (Koala Habitat Protection) 2021. Riparian vegetation facilitates local movement (Davies et al. 2013) and is important in long-distance dispersal (McAlpine et al. 2006a and Norman et al. 2019, cited in DAWE 2022a). Further, Melzer (2014) observed koala activity as being based around stream-fringing communities, particularly in drier western parts of the study area.

Habitat attribute	Indicator	Maximum Score	Justification
Absence of threats	• Habitat clearing • Predation by dogs • Mortality from vehicle strike • Disease including koala retrovirus and chlamydia (*Chlamydia percorum*) • Inappropriate fire regimes *Table 8* shows the matrix and scoring for the scope and severity for each threat.	Total score out of 25	These threats have been identified in the conservation advice and recovery plan for koala and are considered relevant to the Project. ***Scope*** refers to the proportion of the species' habitat or local population within the matter area that can reasonably be expected to be affected by the threat within ten years given the continuation of current circumstances and trends. The scope scoring metrics are provided in table below and follow the guide (DES, 2020). ***Severity*** refers to the level of damage from the threat to the species' habitat/local population that can reasonably be expected given the continuation of current circumstances and trends. The severity scoring metrics are provided in detail table and follow the guide (DES, 2020).

Table 9: Matrix and scoring for threats to koala

Threat	Score	Scope	Severity
Habitat clearing and fragmentation	1	The site is located within mapped habitat subjected to selective logging, thinning or other tree-loss related practice.	The monitoring site is within breeding/climate refuge habitat (if relevant) AND within 100 m to a mapped watercourse AND ground-truthed as remnant status
	2	The site is within a mapped habitat patch AND mapped as Category X/ non-remnant vegetation.	The monitoring site is within breeding or foraging habitat AND ground-truthed as non-remnant vegetation
	3	The site is within a habitat patch AND mapped as Category C/ high-value regrowth vegetation or Category R.	The monitoring site is within breeding or foraging habitat AND ground-truthed as regrowth vegetation
	4	The site is within a habitat patch AND mapped as Category B/ remnant vegetation.	The monitoring site is outside but adjacent (within 100 m) of mapped breeding or foraging habitat AND ground-truthed as regrowth or remnant vegetation (clearing this vegetation would increase edge effect or possibly connectivity of adjacent habitat)
	5	Mapped as Category A vegetation	Mapped as Category A vegetation OR the monitoring site is outside of mapped habitat AND within an area ground-truthed as non-remnant, OR the monitoring site is outside of mapped breeding or foraging habitat AND not adjacent (>100 m away from mapped habitat) AND ground-truthed as regrowth or remnant vegetation.
Predation by feral carnivores	1	Feral dogs, cats or foxes present on site, no active management actions to monitor AND no active management actions in place to reduce/ prevent the increase of feral animal numbers AND the species is commonly preyed upon by the feral animals (EPBC recovery plan) to a point where it can remove a population in absence of other threats.	The species has been preyed upon by the feral animals (EPBC recovery plan) to a point where sightings of the animal are very rare and the local population may have been decimated (in absence of other threats).
	2	Feral dogs, cats or foxes present on site, no active management actions to monitor AND no active management actions in place to reduce/ prevent the increase of feral animal numbers.	The species has been preyed upon by the feral animals on site (EPBC advice) within the last 12 months (mortality recorded).
	3	Feral dogs, cats or foxes present on site. There are active management actions to monitor AND reduce/prevent all known species and increase of feral animal numbers anywhere on the site.	The species has been preyed upon by the feral animals on site (EPBC advice) within the last 12 months (only injury recorded).
	4	Feral dogs, cats or foxes present on site, active management actions to monitor and reduce/ prevent the increase of feral animal numbers within 3 km of the monitoring site.	There is no evidence to suggest the species has been preyed upon by the feral animals on site (EPBC advice) AND the habitat patch has

Threat	Score	Scope	Severity
			been burnt within the past 2 years AND it is expected that feral animals are common.
	5	Feral dogs, cats or foxes present on site, active management to monitor and reduce/ prevent the increase of feral animal numbers within 3 km of the monitoring site for a minimum of 5 years.	There is no evidence to suggest the species has been preyed upon by the feral animals on site (EPBC advice) AND the habitat has not been burnt within the past 2 years AND there are no active feral animal management actions within 250 m of the site OR the habitat has been burnt within the past 2 years AND there are active feral animal management actions within 250 m of the site.
Inappropriate fire regimes Refer to the Bushfire resilience Communities Technical Reference Guide to determine vegetation hazard class (**VHC**) fuel load. (QFES, 2019)	1	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, recovery plan) AND The patch has a VHC-fuel load greater than 25 t/ha AND fire regime not consistent with RE fire management guidelines AND no fire breaks/non-remnant grassland which provides access for fire response within 100 m of the site	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, recovery plan) AND The patch is one contiguous area (insignificant gaps) greater than 1000ha and the site is within vegetation classified a VHC of at least 15t/ha
	2	The habitat patch has a VHC-fuel load greater than 25 t/ha AND fire regime not consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response OR the habitat patch has a VHC fuel load =>15 t/ha and <25 t/ha AND neither of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100 m of the site.	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, recovery plan) AND the patch is one contiguous area (insignificant gaps) greater than 500 ha and the site is within vegetation classified a VHC of at least 15 t/ha OR the matter species is not arboreal, fire is considered a severe threat AND the patch is one contiguous area (insignificant gaps) greater than 1000 ha and the site is within vegetation classified a VHC of at least 15 t/ha.
	3	The habitat patch has a VHC-fuel load =>15 t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines OR there are fire breaks/ non-remnant grassland/ access for fire response within 100 m of the site OR the habitat patch has a VHC-fuel load greater than 25 t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100 m of the site OR the habitat patch has a VHC-fuel load less than 15 t/ha AND fire regime not consistent with RE fire management guidelines AND no fire breaks/ non-remnant grassland/ access for fire response within 100 m of the site.	The patch is one contiguous area (insignificant gaps) between 250 ha and <500 ha and the site is within vegetation classified a VHC of at least 15 t/ha OR the patch is one contiguous area greater than 500 ha and the site is within vegetation classified a VHC of at least 10 t/ha OR the matter species is not arboreal, fire is not considered a severe threat AND The patch is one contiguous area (insignificant gaps) greater than 1,000 ha and the site is within vegetation classified a VHC of at least 15 t/ha OR the matter species is not arboreal, fire is not considered a severe threat AND the patch is one contiguous area (insignificant gaps) greater than 500 ha and the site is within vegetation classified a VHC of ≥15 t/ha.

Threat	Score	Scope	Severity
	4	The habitat patch has a VHC-fuel load between 15 t/ha and <25 t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/access for fire response within 100m of the site OR the habitat patch has a VHC-fuel load less than 15 t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines OR there are fire breaks/non-remnant grassland/ access for fire response within 100 of the site OR the habitat patch has a VHC-fuel load less than 10 t/ha AND neither of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100 m of the site.	The patch is one contiguous area (insignificant gaps) between 100 and <250 ha and the site is within vegetation classified a VHC of at least 15 t/ha OR the patch is one contiguous area between 250 t/ha and <500 t/ha and the site is within vegetation classified a VHC of at least 10t/ha OR the patch has a fuel load ≤10 t/ha within one contiguous patch ≥250 ha OR the matter species is not arboreal, fire is not considered a severe threat AND the patch is one contiguous area (insignificant gaps) greater than 500 ha and the site is within vegetation classified a VHC of ≥ 15 t/ha OR the matter species is not arboreal, fire is not considered a severe threat AND the site is within vegetation classified a VHC of <15 t/ha.
	5	The habitat patch has a VHC-fuel load less than 15 t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR the habitat patch has a VHC-fuel load less than 10 t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/non-remnant grassland/access for fire response within 100 m of the site.	The patch is one contiguous area (insignificant gaps) less than 100 ha and the site is within vegetation classified a VHC of at least 15 t/ha OR the patch is one contiguous area less than 250 ha and the site is within vegetation classified a VHC of ≤10 t/ha OR the matter species is not arboreal, fire is not considered a severe threat AND the site is within vegetation classified a VHC of <15 t/ha.

3.1.4 Application of habitat quality assessment scores to offset scores

In accordance with the EPBC Act Environmental Offsets Policy (DSEWPAC 2012) there are three key components that contribute to the calculation of habitat quality:

- Site condition
- Site context
- Species stocking rate.

A description of each of these components and the weightings given to each component were determined by Earthtrade based on the ecological requirements of the impacted species or ecological community and are shown in *Table 10*.

The site-based habitat quality data that was collected at the impact site is based on the *Queensland BioCondition Assessment Manual Version 2.2* (Eyre et al 2015) and the *Guide to Determining Terrestrial Habitat Quality Version 1.2* (DEHP 2017).

The site-based habitat quality data that was collected at the offset site is based on the *Queensland BioCondition Assessment Manual Version 2.2* (Eyre et al 2015) and the *Guide to Determining Terrestrial Habitat Quality Version 1.3* (DES 2020).

When data is collected using version 1.3 of the *Guide to Determining Terrestrial Habitat Quality* the scoring is standardised to align with version 1.2, which meets the draft guidance provided by DCCEEW on using MHQA to better reflect the requirements of the EPBC Act Environmental Offsets Policy.

The method for calculating these landscape attributes for each transect site is described in the sections below.

Table 10: Habitat quality components description and weightings

Habitat quality component	Description	Weighting Fauna species
Site condition	The condition of the site in relation to the ecological requirements of the threatened species or ecological community, including considerations such as vegetation condition and structure, habitat species diversity and number of relevant habitat features;	30%
Site context	The relative importance of a site in terms of its position in the landscape, taking into consideration the connectivity needs of the threatened species or ecological community and including considerations such as movement patterns of the species, proximity of the site in relation to other areas of suitable habitat, and the role of the site in relation to the overall population or extent of a species or community.	30%
Species stocking rate	The usage or density of a species at a particular site, including considerations such as survey data for a site in regard to a particular species population or ecological community, the role of the site population in regard to the overall species population viability or community extent.	40%

Site condition

The site condition score for each transect site was based on the results of the site-based attributes assessment (vegetation BioCondition scores) and species habitat attributes assessment (see above). For both the ornamental snake and the koala, the species habitat attributes scores for availability of habitat for foraging, and shelter and breeding (see above) were also incorporated into the site condition score, where they contributed approximately 20% of the site condition score.

Site context

For both the ornamental snake and the koala, the site context score for each transect site also incorporated the results of the species habitat attributes scores for mobility and threats (see above), with weightings of approximately 33% for each of these factors, with the remaining score based on patch size, connectedness and proximity to corridors.

As the Project Area is located within a 'fragmented landscape', the landscape surrounding the Project Area and its influence on the site's vegetation quality is measured via assessment of the following 4 attributes, when using version 1.2 of the *Guide to Determining Terrestrial Habitat Quality*:

- size of patch
- context
- connectivity
- ecological corridors.

In version 1.3 of the *Guide to Determining Terrestrial Habitat Quality* (DES, 2020) (see section 1.2.1), ecological corridors in fragmented subregions have been removed from scoring, and are considered as part of the size of patch score. Section 6 of the *BioCondition Assessment Manual* (Eyre et al 2015) is used to determine whether the subregion is fragmented or intact. As the offset site was assessed based on version 1.3 of the *Guide to Determining Terrestrial Habitat Quality* (DES, 2020), and the offset site is located in a fragmented landscape, ecological corridors are not scored. However, the MHQA guidelines from DCCEEW scores ecological corridors in alignment with version 1.2 (see Step 6 in section 6, Table 3 (DEHP 2017).

Species stocking rate

Ornamental snake species stocking rate: presence detected within impact site

Based on the results of Umwelt (2025), ornamental snake presence was detected within the impact site and was therefore given the greatest score (10).

Ornamental snake species stocking rate: species usage within impact site (habitat type)

Ornamental snake usage within the impact site was given the greatest score (15) as core gilgai habitat is supported.

Ornamental snake species stocking rate: density within offset

A nocturnal fauna field survey was undertaken within the Project Area by 2 suitably qualified Umwelt ecologists over 5 days from 23 to 27 March 2020, targeting ornamental snake as well as other nocturnal fauna. The survey was undertaken following heavy rainfall to coincide with a peak in prey activity resulting in likely higher detectability of ornamental snakes. The field survey was focused to thirteen monitoring sites located across 10 properties, known or likely to support suitable habitat for the species.

Four ornamental snakes were confirmed via spotlighting conducted on the night of 24 April 2020, all from the one habitat patch situated within the northern impact site. As the species was recorded, no further targeted assessments were deemed necessary at the time. Therefore, an accurate estimation of density is not possible and can only be inferred based on existing data. As the species was only recorded at one location within the impact site and there are no recent public records in the region, a score of 10 out of 30 for approximate density has been assigned.

Ornamental snake species stocking rate: species importance within impact

The importance of species population on site has been given a score of 0 out of 15, due to the following:

- The ornamental snake has a large geographic range in Queensland and is known to occur at many different sites. Therefore. it is highly unlikely that a single site will be important or critical to the species survival.
- The species is not highly mobile and would not be expected to disperse across the landscape.
- It is likely that the population within the impact area is not necessary for maintaining genetic diversity within the landscape nor a key source breeding population due to the extensive habitat available across Central Queensland.
- The population within the impact area is not near the limit of the species range, with the 'likely to occur' extent of its distribution extending approximately 100 km further south near Cracow.

Koala species stocking rate: presence detected within impact site

Based on the results of Umwelt (2025), koala presence has not been detected within the impact site and was therefore given the lowest score (0). There are no recent records of the species in the wider area of the impact site; the most recent record in proximity is dated 1997 and occurs west along the Dawson River.

Koala species stocking rate: species usage within impact site (habitat type)

Koala usage within the impact site has conservatively been assigned a score of 10 for RE 11.9.2 and a score of 5 for RE 11.4.9. This reflects the nature of the habitat that may be impacted, including areas suitable for breeding and foraging as well as shelter. Although some habitat is conservatively suitable for breeding, the species does not have specific breeding requirements and no evidence of breeding (i.e. the presence of joeys) has been recorded to date. Koalas are likely to be rare in the wider area with the most recent record dated 1997.

Koala species stocking rate: density within impact

Koalas are potentially absent from the impact site and therefore a density score of 0 has been assigned.

Koala species stocking rate: species importance within impact

The importance of species population on site has been given a score of 0 out of 15, due to the following:

- The koala has a large geographic range in Queensland and is known to occur at many different sites. If present within the impact site, it is likely to occur at a very low density. A brownfield site dominated by agriculture that supports a low-density population is highly unlikely to be important or critical to the species survival.
- It is likely that the population within the impact area is not necessary for maintaining genetic diversity within the landscape nor a key source breeding population due to the extensive habitat available across Central Queensland.

- The population within the impact area is not near the limit of the species range, with the 'likely to occur' extent of its distribution extending in all directions, as well as beyond Queensland.

The metrics for the criteria listed above used to assess the species stocking rate for each MNES within the ecology reports (LEC, 2024) is detailed in *Table 11*. Further details on the scoring for role/importance of species within the species stocking rate is provided in *Table 12.*

Table 11: Species stocking rate metrics

Species stocking rate	Score and range			
Ornamental snake: Presence detected on or adjacent to site (neighbouring property or connecting habitat)	**No**	**Yes – adjacent**	**Yes – on site**	
	0	5	10	
Koala: Presence detected on or adjacent to site (neighbouring property or connecting habitat)	**No**	**Yes – adjacent**	**Yes – on site**	
	0	5	10	
Ornamental snake: species usage of the site (habitat type)^	**Not habitat**	**Dispersal**	**Foraging**	**Breeding**
	0	5	10	15
Koala: species usage of the site (habitat type and evidence of usage)	**No habitat**	**Dispersal**	**Foraging**	**Breeding**
	0	5	10	15
Approximate density (per ha) **Ornamental snake***	**0**	**1-2**	**3-4**	**≥5**
Koala#	**0**	**0.0005**	**>0.0005 – 0.0019**	**0.002**
	0	10	20	30
Ornamental snake: Role/importance of species population on site – range-edge population (may occur)	**Within 30 km of range edge**			
	0	**5-15**	**16-20**	**21-30**
	0	5	10	15
Koala: Role/importance of species population on site – refer to supplementary table scores (refer to *Table 12*)	**0**	**5-15**	**16-20**	**21-30**
	0	5	10	15

^ *As per Lyngco 2025 (see Appendix E).* * *Ornamental snake density – based on draft species stocking rate guidance received from DCCEEW on 19 May 2025.* # *Koala density – based on the range of densities across Queensland as described in the koala conservation advice (DCCEEW 2022).*

Table 12: Koala – scoring for role/importance of species within species stocking rate

Supplementary SSR	Score range and criteria	
	No	**Yes/possibly**
Key source population for breeding	0	10
Key source population for dispersal	0	5
Necessary for maintaining genetic diversity	0	15
Near the limit of species range	0	15

Note: In the case of the koala, due to its status as endangered, any population is considered important. Species ranges were obtained from the respective conservation advices.

3.2 Significant residual impacts to MNES requiring offsets

A summary of the MNES requiring offsetting following the SRI assessment undertaken by Umwelt (2024) is shown in *Table 13*.

Table 13: Summary of MNES requiring offsets

MNES value	Impact area (ha)	Offset area (ha)	Total % of impact offset
Habitat for ornamental snake (*Denisonia maculata*)	16.0	104.77	163.58%
Habitat for koala (*Phascolarctos cinereus*)	8.9	104.77	401.85%

3.2.1 Ornamental snake habitat

Distribution and status

The ornamental snake is known only from within the drainage system of the Fitzroy and Dawson Rivers in Queensland (McDonald et al., 1991; Cogger et al., 1993). This species is sparsely distributed across its geographic range and the population size is unknown. However, it is not thought to have experienced range declines, although the extent of habitat clearance in the region suggests that its long-term survival is threatened (DERM, 2007).

The ornamental snake can be found on floodplains, undulating clay pans and along the margins of swamps, lakes and watercourses. It also occurs on adjoining areas of elevated ground and has been recorded in woodlands and open woodlands of coolabah, poplar box, and brigalow, and in fringing vegetation along watercourses (WWF-Australia/QMDC, 2008). The ornamental snake feeds almost exclusively on frogs. The ornamental snake occurs within the Brigalow Belt Bioregion and the Burdekin and Fitzroy Natural Resource Management Regions. The distribution of this species is associated with the brigalow TEC.

Impact survey results

As discussed, the ornamental snake is found in close association with frogs, which form the majority of its prey. It is known to prefer woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions with clay soils but is also known from lake margins, wetlands and waterways. The ornamental snake requires microhabitat features such as cracking clay soils, rotting logs or stumps, coarse woody debris, leaf litter or surface rock. These features are required because they either support the prey food of this species or provide refuge habitat.

The ornamental snake is known to the Project area, with both desktop and field records of the species available. The assessment of ALA records during the desktop assessment phase of the ecological assessment identified several records from the Project region of ornamental snakes in associated gilgai habitat. One record (date of 1983) was found on the eastern edge of the Project area, 200 m south of Gibihi Road (10 km spatial uncertainty). The location of this historic record features gilgai formation as well as proximity to a continuous stand of brigalow (*Acacia harpophylla*).

Targeted surveys for the species have been conducted twice across the Project Area by Umwelt: March 2020 and June 2023. The March 2020 survey was undertaken in accordance with the *Draft Referral guidelines for the Brigalow belt reptiles*. During this survey, 4 individuals were confirmed during a spotlight search on 24 March 2020, all recorded in the same area of non-remnant gilgai habitat in the northeast corner of the Project area. Three of the 4 individuals were found on bare

ground with minimal ground coverage between gilgai water bodies. The fourth individual was found semi-submerged and preying on a green-striped burrowing frog (*Cyclorana alboguttata*). The habitat in this particular location comprised cleared pasture with abundant gilgai and sparse brigalow and sandalwood (*Santalum lanceolatum*) regrowth and is considered suitable for breeding and foraging. Disturbance within the area included presence of weeds and evidence of low intensity cattle grazing.

Throughout the March 2020 field survey, nine frog species were identified. All species are likely to comprise potential prey species of the snake. Field assessment sites with the highest diversity of prey species for the ornamental snake tended to associate with habitat which supported a mosaic of suitable microhabitat features such as gilgai and surface water. One introduced species, cane toad (*Rhinella marina*), was identified in abundance throughout all habitat types within the Project area, including in the gilgai formations.

The June 2023 survey did not record any ornamental snakes or native frogs; however, this was expected given the prevailing season (winter), lack of recent rainfall and completion of only daytime habitat assessment surveys. The purpose of the survey was to further validate areas of mapped ornamental snake habitat. The properties surveyed were those considered preferred for the Project.

Figure 4 shows the ornamental snake habitat and records across the Project area, noting that some HQA sites fall into the area that is outside of the Project area; however, have been provided as they are located within the same habitat patch. The Umwelt impact ecology report found that the Project may potentially result in a significant impact on the species (Umwelt, 2025).

Over the life of the Project, Westside have committed to a cumulative maximum disturbance of 16.0 ha of suitable habitat, resulting in a possible SRI to habitat of 16 ha. *Table 14* summarises the habitat quality assessment results of the field survey work for this species. The detailed habitat quality assessment scores for each survey site are shown in *Appendix B1*, and the field survey data sheets are provided in *Appendix C1*.

Table 14: Impact assessment table for ornamental snake habitat

Assessment unit and RE Habitat quality scores (weighted)	AU: OS RE 11.4.9	Total
Site condition score (-/3)	1.68	
Site context score (-/3)	1.29	
Species stocking rate score (-/4)	2.00	
Habitat quality score (-/10):	**4.97**	
AU area within impact area (ha)	16.00	
Total impact area for this MNES (ha)	16.00	
Area weighting	1.00	
Weighted habitat quality score:	**4.97**	**4.97**

Note: refer to Appendix B1 for fully detailed scoring of all HQS attributes for each survey site.

Figure 4: Ornamental snake habitat and records within the impact area

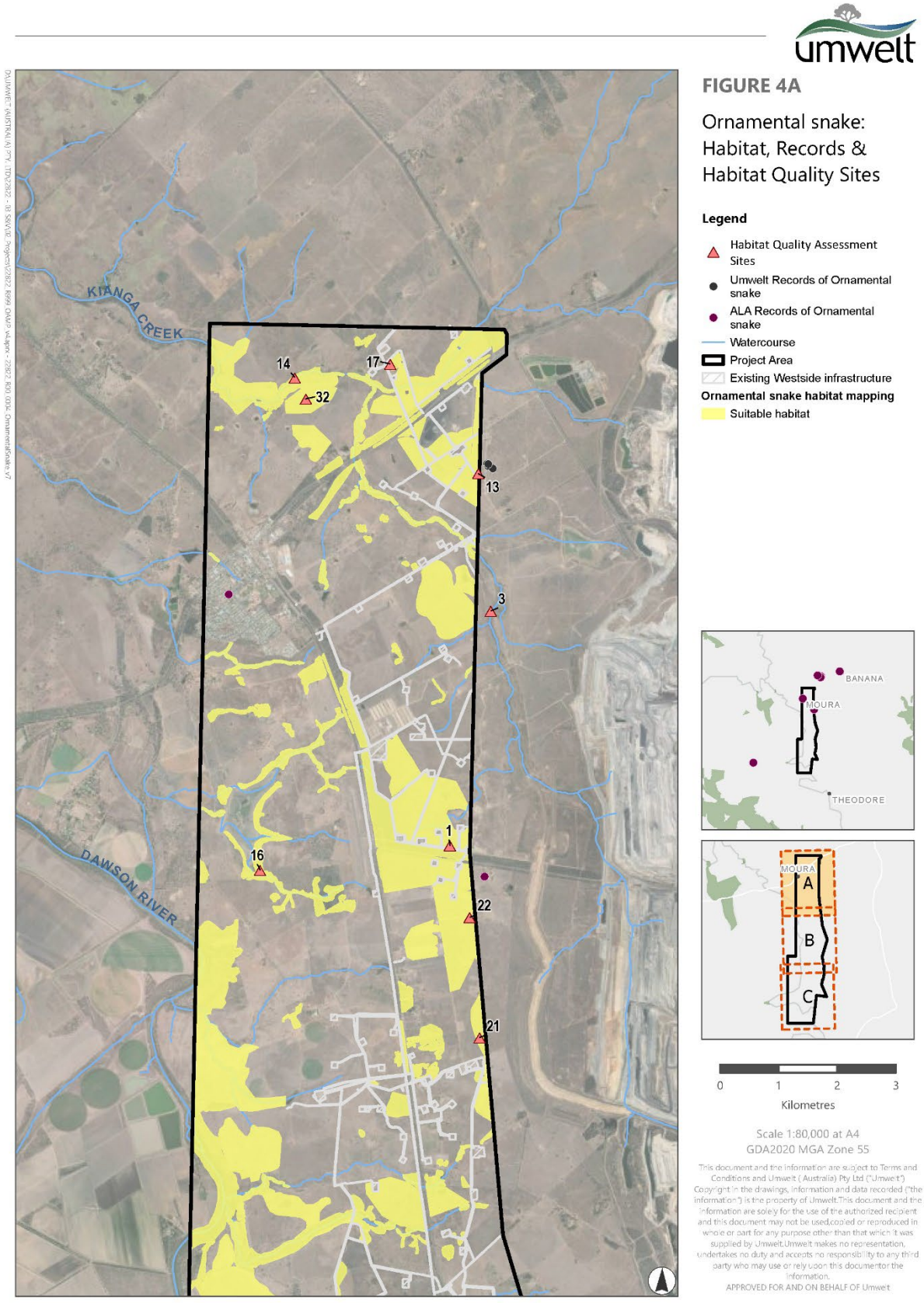


Image Source: ESRI Basemap (2023) | **Data Source:** Umwelt (2024), DNRM (2023)

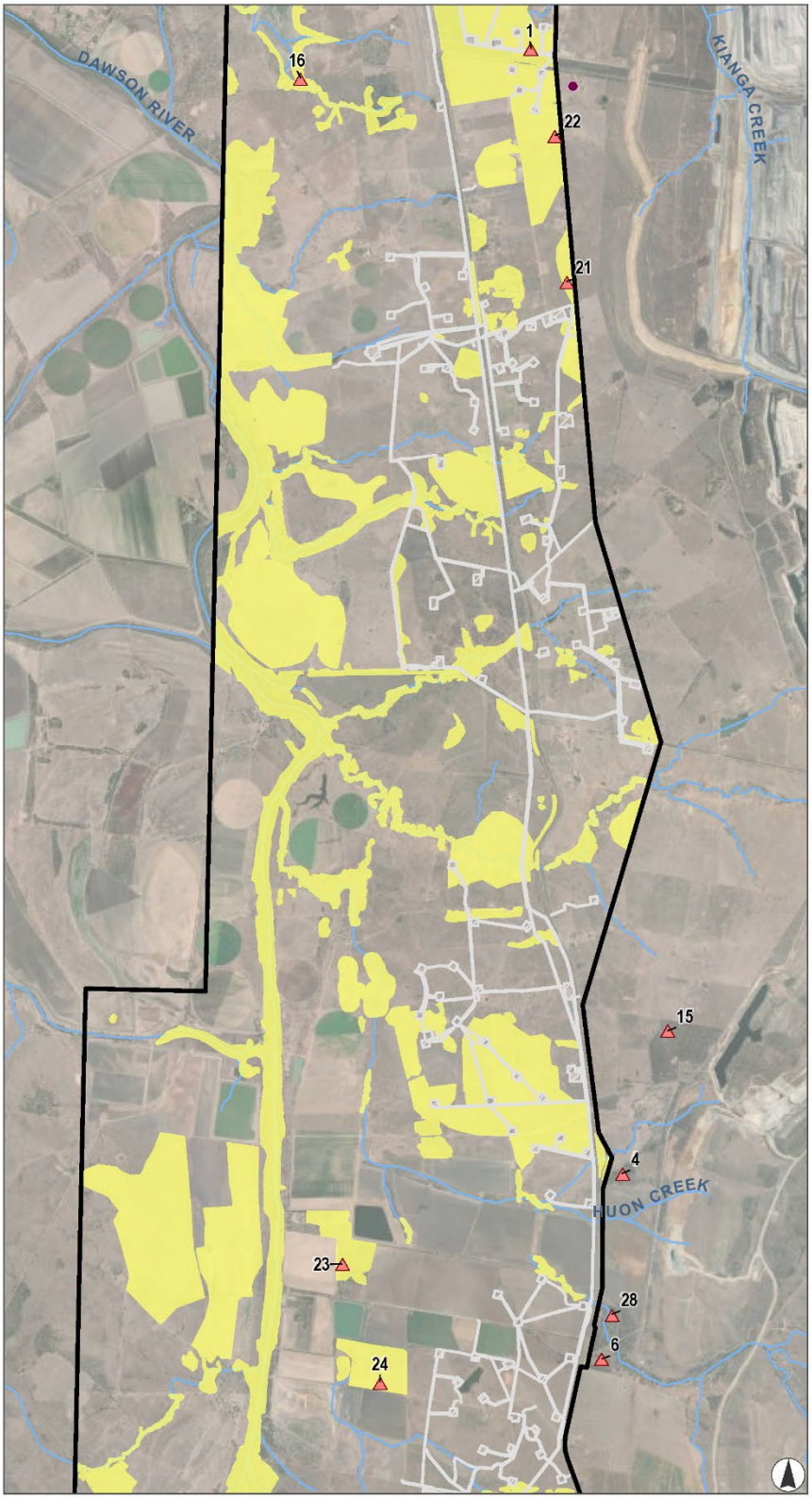


FIGURE 4B

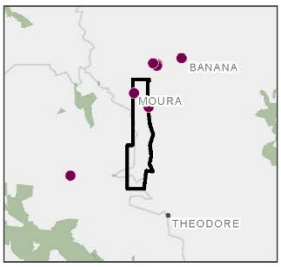
Ornamental snake: Habitat, Records & Habitat Quality Sites

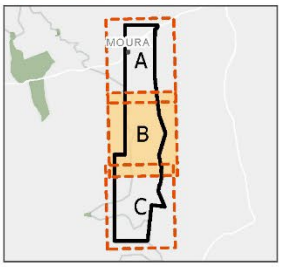
Legend

- Habitat Quality Assessment Sites
- Umwelt Records of Ornamental snake
- ALA Records of Ornamental snake
- Watercourse
- Project Area
- Existing Westside infrastructure

Ornamental snake habitat mapping

- Suitable habitat





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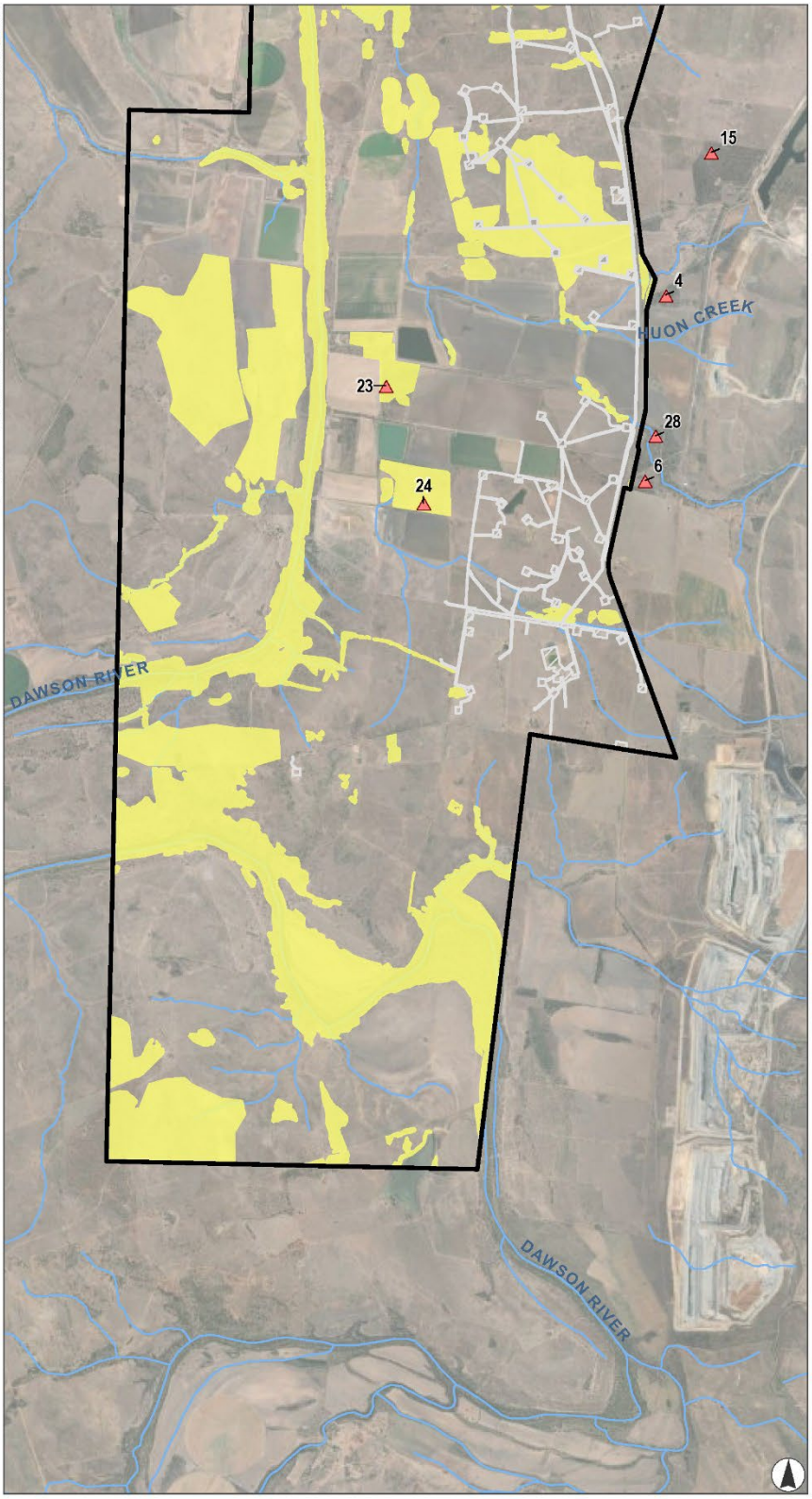


FIGURE 4C

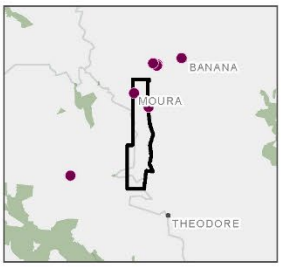
Ornamental snake: Habitat, Records & Habitat Quality Sites

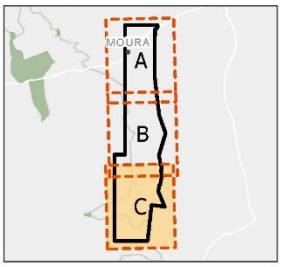
Legend

- Habitat Quality Assessment Sites
- Umwelt Records of Ornamental snake
- Watercourse
- Project Area
- Existing Westside infrastructure

Ornamental snake habitat mapping

- Suitable habitat





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3.2.2 Koala habitat

Distribution and status

Endemic to eastern Australia, the koala is a solitary species which is widespread across coastal and inland areas from Cooktown, Queensland to the Mount Lofty Ranges, South Australia (Baker and Gynther 2023). Restricted to altitudes below 800 m ASL (Munks et al. 1996), koalas occur in a diversity of habitats including temperate, sub-tropical and tropical forest, woodland and semi-arid communities, and sclerophyll forest, on foothills, plains and in coastal areas (Martin et al. 1999; Baker and Gynther, 2023). Closer to the western extent of their distribution they are often associated with watercourses though are not restricted to them (Melzer et al., 2000; Sullivan et al., 2004; Davies et al., 2013).

Koalas are not strongly territorial, and home ranges will overlap. Home ranges vary in size from 1-2 ha in optimum habitat up to 135 ha in semi-arid regions (Ellis et al., 2002; Baker and Gynther, 2023). Movements are often as short as the distance between feed trees; however dispersing individuals will move over larger distances. Established individuals have been known to make exploratory movements over larger distances before returning to home ranges (Dique et al., 2004).

The breeding season occurs between October and May with females producing up to one offspring per year (Baker and Gynther, 2023). Juveniles become independent from one year of age with males living for over 12 years and females living for over 15 years (Martin et al., 1999). Breeding occurs from 2 years of age, and is often determined by the establishment of a male hierarchy as males become vocal and fiercely fight for females (Baker and Gynther, 2023).

Impact survey results

No koalas or evidence of koala presence was identified during the field surveys and the most recent publicly available record in the area is from 1997. Although presence of the species cannot be definitively ruled out, if koalas were to utilise the Project area, it is likely that this would be limited to a small number of transient individuals, such as males dispersing during the breeding season.

Breeding and foraging habitat is present throughout the Project area, primarily in disjunct patches in a highly fragmented landscape. Habitat within PL94 includes forest and woodland, with field surveys confirming the presence of food tree species, including those from the genera *Corymbia*, *Eucalyptus* and *Melaleuca*. This habitat will be avoided as a priority, however a cumulative maximum of 2.0 ha of breeding and foraging habitat would be directly impacted as a result of the Project.

Shelter habitat exists primarily as fragmented patches of vegetation surrounded by highly modified paddocks (dispersal habitat). This habitat is not considered to be of high value as it does not contain preferred foraging species but may provide ancillary habitat functions such as thermoregulation and temporary refuge from predators for dispersing animals. A cumulative maximum of 6.9 ha of this habitat would be impacted by the Project.

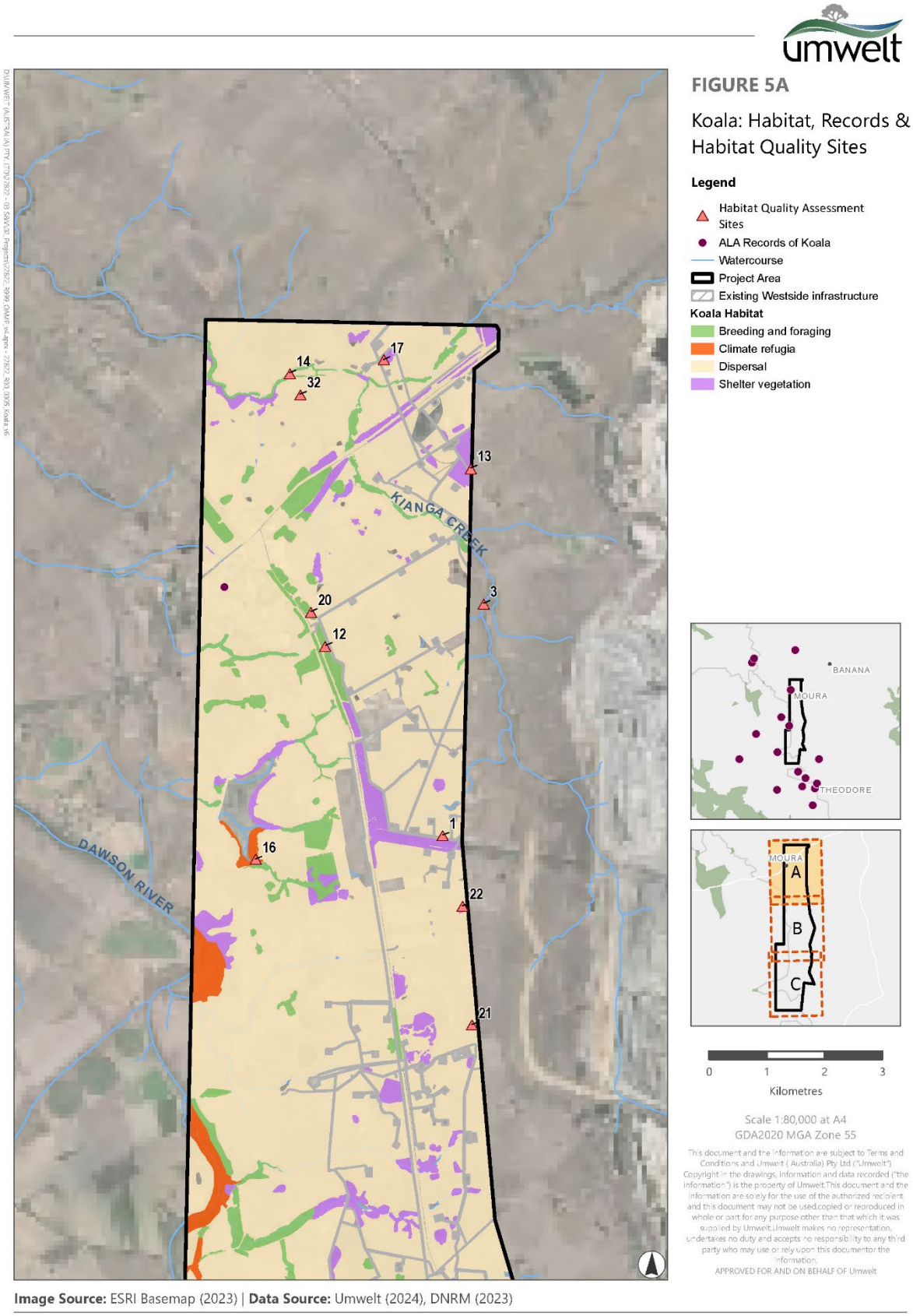
Figure 5 shows the koala habitat across the Project area, noting that some HQA sites fall into the area that is outside of the Project area; however, have been provided as they are located within the same habitat patch. *Table 15* summarises the habitat quality assessment results of the field survey work for this species. The detailed habitat quality assessment scores for each survey site are shown in *Appendix B5*, and the field survey data sheets are provided in *Appendix C2*.

Table 15: Impact assessment table for koala habitat

Assessment unit and RE Habitat quality scores (weighted)	AU: 12 RE 11.9.2 (breeding and foraging habitat)	AU: 13 RE 11.4.9 (shelter habitat)	Total
Site condition score (-/3)	1.95	1.43	
Site context score (-/3)	0.90	0.89	
Species stocking rate score (-/4)	0.57	0.29	
Habitat quality score (-/10):	**3.42**	**2.60**	
AU area within impact area (ha)	2.00	16.00	
Total impact area for this MNES (ha)	18.00	18.00	
Area weighting	0.11	0.89	
Weighted habitat quality score:	**0.38**	**2.31**	**2.69**

Note: refer to Appendix B1 for fully detailed scoring of all HQS attributes for each survey site.

Figure 5: Koala habitat within the impact area



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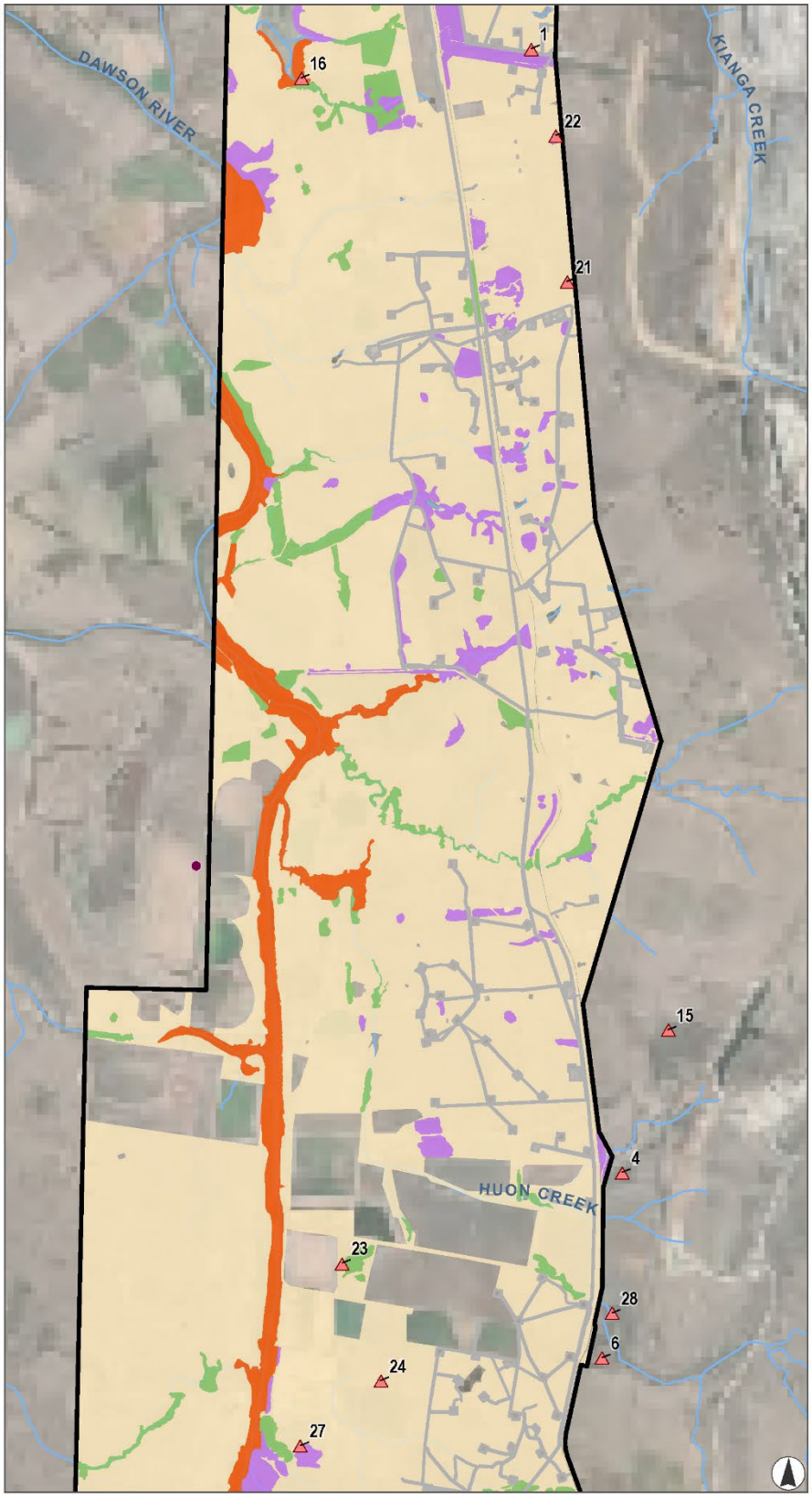


FIGURE 5B

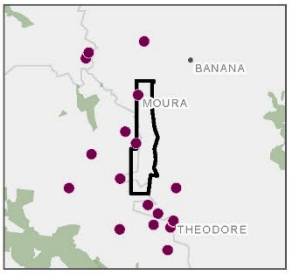
Koala: Habitat, Records & Habitat Quality Sites

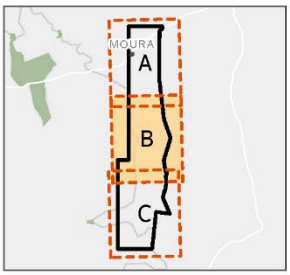
Legend

- Habitat Quality Assessment Sites
- ALA Records of Koala
- Watercourse
- Project Area
- Existing Westside infrastructure

Koala Habitat

- Breeding and foraging
- Climate refugia
- Dispersal
- Shelter vegetation





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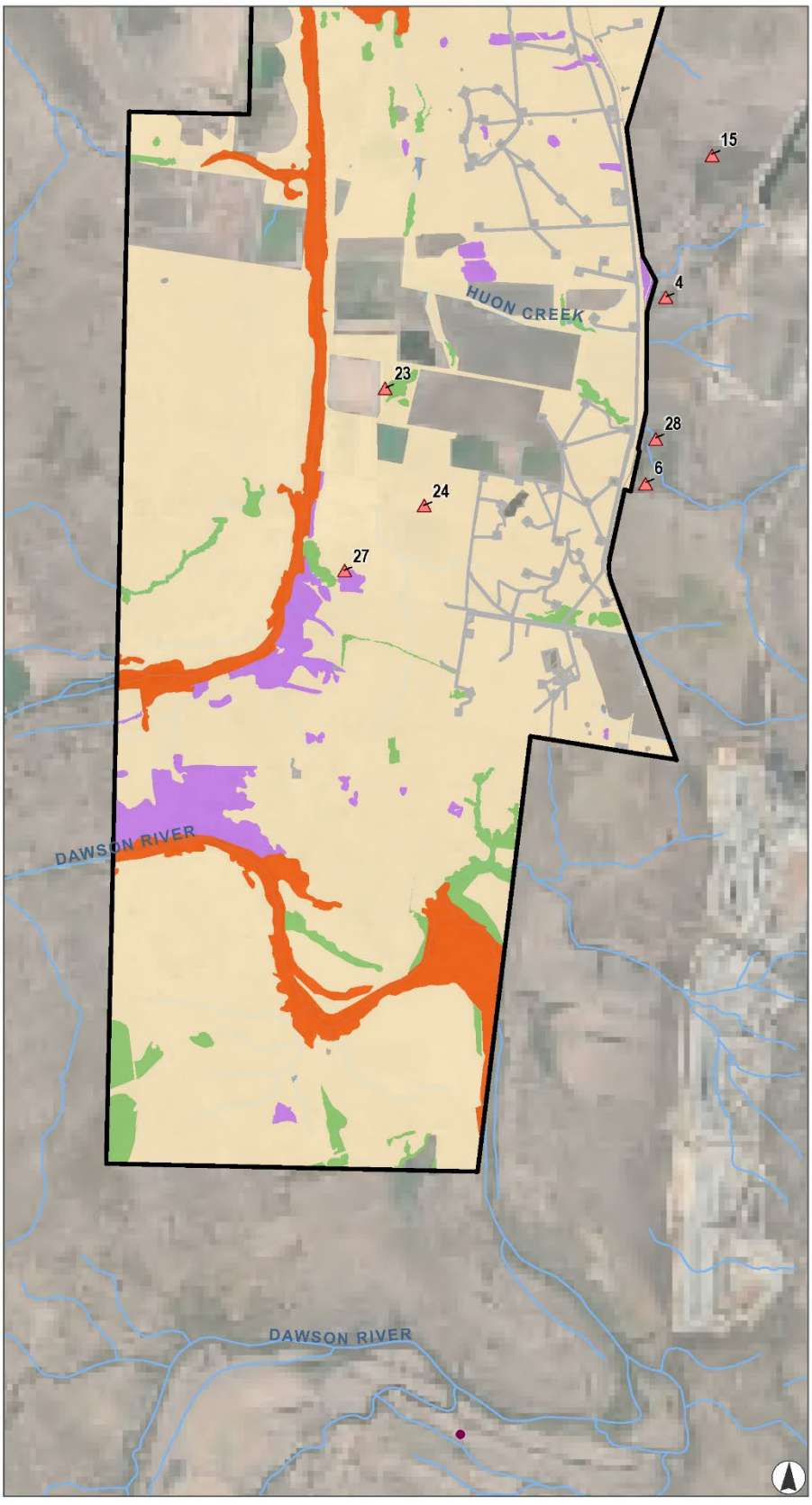


FIGURE 5C

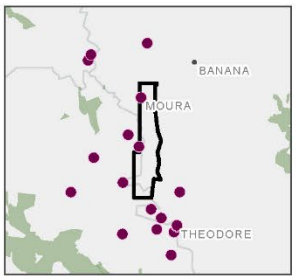
Koala: Habitat, Records & Habitat Quality Sites

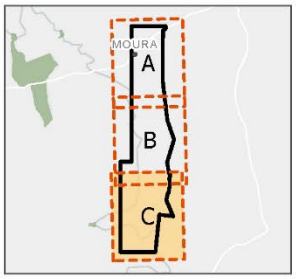
Legend

- Habitat Quality Assessment Sites
- ALA Records of Koala
- Watercourse
- Project Area
- Existing Westside infrastructure

Koala Habitat

- Breeding and foraging
- Climate refugia
- Dispersal
- Shelter vegetation





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4 Offset property

4.1 Clements Creek - overview

The Clements Creek property (Lot 17 RP 848822) is located approximately 60km west of Marlborough and 135 km north-north-west of Rockhampton. Lot 17 RP848822 is some 220 km north of the Project and has a total area of approximately 3,680 ha.

The property has been the subject of field verification studies to assess its suitability as an offset for the Project. The results of these desktop and field assessments are detailed in the reports titled *Ecological Assessment Report - Clements Creek (Lot 17 on RP848822) – Queensland* (Lyngco, 2025); *Clements Creek Property (Lot 17 RP848822) Targeted Ornamental Snake Survey – December 2023* (Lyngco, 2024); and *Clements Creek Offset Area: Supplementary survey for ornamental snake 2024* (Earthtrade, 2024). Further ecological survey work was conducted in November 2024 which is detailed in the report titled *Westside Petroleum Project – Ecological Assessment Report - Clements Creek (Lot 17 on RP848822) Queensland* (Lyngco, 2025).

The sections below provide details on the survey methodologies, survey results, and habitat quality assessments for the proposed offset.

The offset investigation area (**OIA**) on Clements Creek is located on the alluvial floodplains on the western portion of the property and is approximately 1,360 ha in area, supporting large tracts of remnant and non-remnant areas of vegetation. The remnant vegetation is dominated by open coolibah (*Eucalyptus coolabah*) woodlands and brigalow (*Acacia harpophylla*) forest on alluvium. The OIA is bordered to the west by the Isaac River (stream order (**SO**) 8) and associated tributaries and is dissected east to west by Clive Creek (SO 3) and Clements Creek (SO 8) which flow into the Isaac River. The rivers and tributaries support narrow riparian forests dominated by river red gum (*E. camaldulensis*) with *Melaleuca* species. Palustrine freshwater wetlands occur within depressions in the coolibah and brigalow forests and woodlands. Evidence of historical logging, clearing for cattle grazing, wildfire and pest animals (i.e., dogs, deer, pigs) is present at the property.

The OIA was selected due to the presence of brigalow-based REs and associated suitable habitat characteristics for the ornamental snake, and suitable food trees and habitat characteristics for the koala.

4.2 Offset survey methodology

The initial investigation of the OIA on Clements Creek was conducted in September 2023, by Lyngco (Lyngco, 2025). Additional survey work at the OIA was carried out in December 2023 (Lyngco, 2024), and in February-March 2024 (Earthtrade, 2024). Further ecological survey work was conducted in November 2024 (Lyngco, 2025). The survey methodology and species attribute information collected was the same for both the impact and offset sites to enable the direct comparison of data and scores to ensure input to the MHQS and OAG were consistent.

The initial Lyngco 2023 ecological assessment survey was led by Steve Lyngcoln (Principal Ecologist) and Jannico Kelk (Senior Ecologist) over 4 days and 3 nights between 15–18 September 2023.

The September 2023 survey included:

- vegetation ground-truthing
- mapping REs
- BioCondition assessments

- terrestrial habitat assessments
- TEC assessments
- targeted ornamental snake surveys
- ornamental snake habitat assessments
- targeted koala surveys
- fauna spotlighting.

Additional field verification work was undertaken in February and March 2024 later in the wet season following prolonged favourable environmental conditions, in an effort to detect the ornamental snake species. The survey was conducted by Earthtrade's Principal Ecologist Grant Paterson and Senior Ecologist Guy Stevenson. General ground conditions were hot and humid, with light rain falling on 24 February. The survey effort entailed active daytime herpetological searches for 2 hours each day, with 4 hours of spotlight searches each evening, for a total survey effort of 12 hours. The 2024 survey detected 2 individual ornamental snakes, confirming the presence of the snake in and adjacent to the OIA, indicating that the OIA does provide habitat suitable for the species.

The 2024 survey was led by Jannico Kelk (Senior Ecologist) and Laura Harms (Graduate Ecologist) over 5 days and 4 nights between 20–24 November 2024. This survey included:

- vegetation ground-truthing
- mapping REs
- BioCondition assessments
- terrestrial habitat assessments
- TEC assessments
- targeted ornamental snake, koala and greater glider surveys
- ornamental snake, koala, greater glider and squatter pigeon habitat assessments
- fauna spotlighting.

4.2.1 Desktop assessment

An initial desktop assessment of online databases was undertaken, as well as a review of previous ecological assessments of nearby projects, to determine the mapped regional ecosystems and potential habitat and/or historical records for the ornamental snake. These included:

- regulated vegetation and regional ecosystem mapping
- MSES mapping
- EPBC Act Protected Matters Search Tool
- Wildlife Online
- Atlas of Living Australia online portal
- Eagle Downs Coal Mine Project, Ecological Assessment Report, Clements Creek (Lyngco, 2023)
- Clements Creek Offset Area: Supplementary survey for ornamental snake - Memorandum. Earthtrade (Earthtrade, 2024)
- Conservation Advice for *Denisonia maculata* (Ornamental Snake) (DCCEEW, 2024)
- Conservation Advice for *Phascolarctos cinereus* (Koala) (DCCEEW, 2022)
- Conservation Advice for *Petauroides volans* (Greater glider (southern and central) (DCCEEW, 2022)
- Conservation Advice for *Geophaps scripta scripta* (Squatter Pigeon) (DCCEEW, 2024)

- Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (Brigalow TEC) (DCCEEW, 2013)
- Conservation Advice for Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (Brigalow Belt SEVT TEC) (DCCEEW, 2023)
- Conservation Advice for Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box TEC) (DCCEEW, 2017)
- Central Queensland Threatened Species Habitat Descriptions (Kerswell, 2020)
- ACARP Project C15044: Assessment of Seasonal Habitat Characteristics as Predictors of Habitat Suitability for the Threatened Ornamental Snake (*Denisonia maculata*) (Veary, 2011)
- Koala Habitat Scoring Methodology V2 (Umwelt, 2024).

The desktop resources were used to develop a likelihood of occurrence assessment. This assessment is used to determine the likely potential of threatened flora and fauna to occur within the OIA. The criteria for the likelihood of occurrence assessment are:

- **Unlikely to occur**: The OIA and surrounds does not comprise of suitable habitat for the species, is outside of the species known distribution or the species is extinct in the wild.
- **Potential to occur**: The OIA is within the species known distribution and suitable habitat to support the species is present; however, the species has not previously been recorded within the desktop search extent and/or suitable habitat is degraded or of limited extent, thereby reducing the likelihood of the species occurrence.
- **Likely to occur**: Suitable habitat to support the species is present and the species has previously been recorded within desktop search extent distance of the OIA.
- **Known to occur**: Has been recorded within the OIA previously.

4.2.2 Field assessments

RE field survey and mapping

The remnant status and extent of the REs within the OIA was verified and mapped based on the results of the Quaternary and Tertiary level assessments following the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland Version 6.0* (Neldner et al 2022). Tertiary level sites assessments were conducted at all BioCondition sites. The locations of vegetation survey sites are illustrated in *Figure 6*.

The REs within the OIA were mapped as remnant, if the areas met the definition under the VM Act, which is:

- ‘vegetation, part of which forms the predominant canopy of the vegetation —
    (a) covering more than 50% of the undisturbed predominant canopy; and
    (b) averaging more than 70% of the vegetation’s undisturbed height; and
    (c) composed of species characteristic of the vegetation’s undisturbed predominant canopy.’

Habitat quality assessments

BioCondition assessments were undertaken in field-verified vegetation communities and regional ecosystems. The BioCondition assessment method (Eyre et al 2015) is included as part of the overall assessment of habitat quality.

The method requires delineation of field verified vegetation communities and regional ecosystems into AUs that are relatively homogenous, defined by a distinct RE and isolation from other patches of vegetation. The results of the BioCondition surveys were scored against the relevant or

representative RE benchmark to determine an overall score of habitat quality (Queensland Government, 2023).

The AUs within the OIA are shown in *Figure 6*. Attribute-based habitat assessments were undertaken in the OIA at locations which are also shown in *Figure 6*. The assessments collected attributes included but not limited to the following:

- hollow bearing trees
- exfoliating bark
- shrub density
- ground cover density and height
- organic litter
- coarse woody debris including hollow bearing logs
- termite mounds
- pebbles, rocks, stones and or boulders
- cracking soil
- water bodies.

Habitat quality assessments for the ornamental snake were undertaken and scored in accordance with the *Guide to determining terrestrial habitat quality: Methods for assessing habitat quality under the Queensland Environmental Offsets Policy* (*Version 1.3 – February 2020*). Final habitat quality scores were derived following the *EPBC Act offsets assessment guide* (DSEWPAC, 2012), based on the MHQA guidance provided by DCCEEW.

Fauna survey – ornamental snake

No survey method is known to reliably detect the ornamental snake during dry or cool weather. The species is most likely to be detected by searching suitable gilgai habitat while frogs are active. Driving roads at night, particularly after wet weather when frogs are active, may be necessary if wet weather limits access to suitable gilgai habitat (Veary, 2011).

Suitable habitat was identified though desktop assessment, which was ground-truthed during the survey period. Spotlight surveys were undertaken during the night. Targeted ornamental snake surveys involved slowly traversing gilgais and wetlands with concentrated effort in areas with residual water and active frogs.

The field survey effort for ornamental snake across the 3 survey events (September 2023, December 2023, and February-March 2024) is summarised in *Table 16*.

Table 16: Fauna survey effort in the offset area

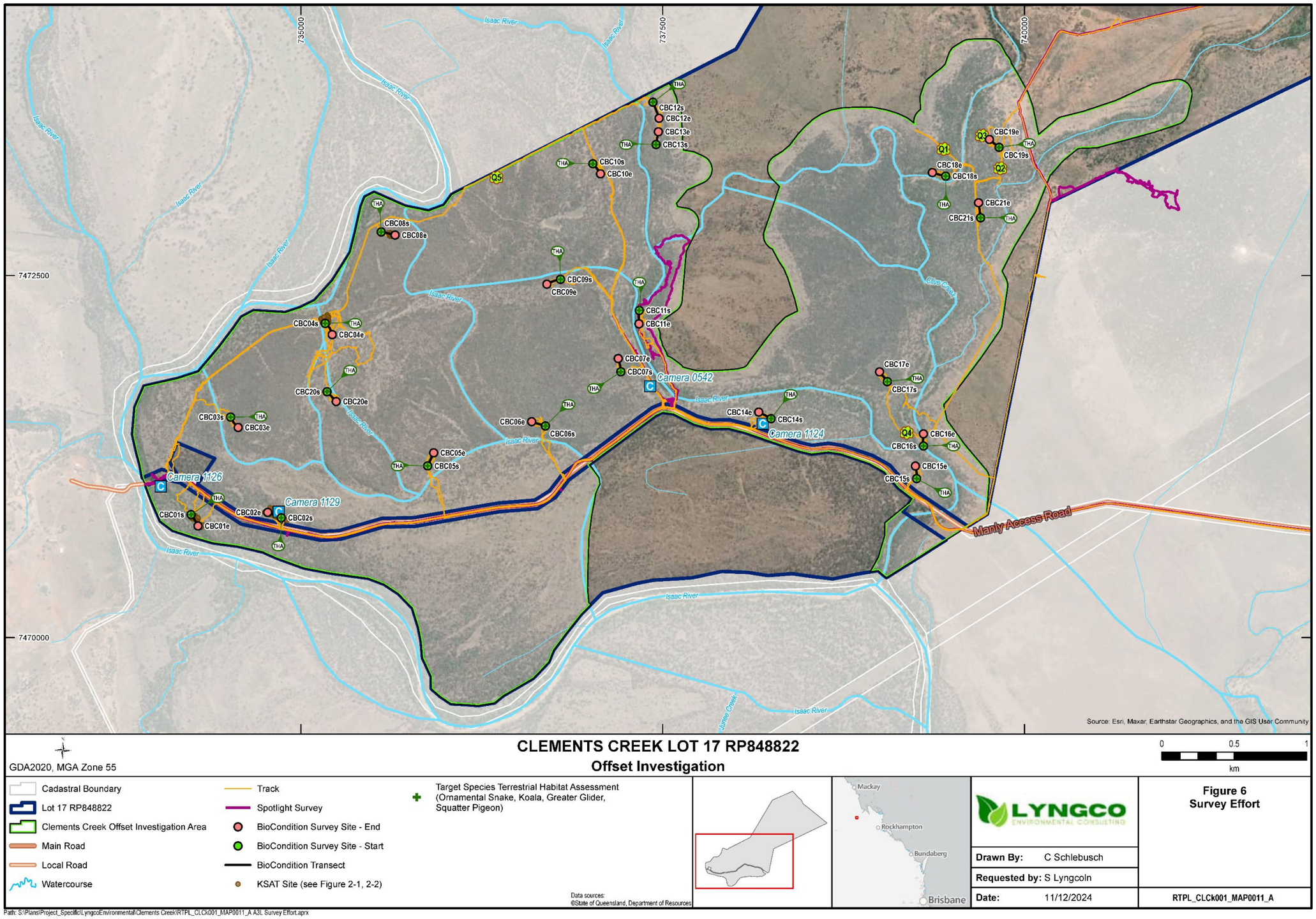
Target species	AU/RE	Monitoring sites	Survey effort: (hours)	Comments
September 2023				
Ornamental snake, koala	AU4 RE 11.3.3	OSHA06	4 days/nights, 2 persons. 2 hrs daytime searches, 4 hrs spotlighting	No sightings of ornamental snake (temperature still too cool). Multiple koala scat samples obtained and sent for confirmation. Numerous koala scratches found in the offset investigation area (Lyngco, 2025)
		OSHA07		
		OSHA09		
		OSHA11		
	Totals:	**48 hours**		

Target species	AU/RE	Monitoring sites	Survey effort: (hours)	Comments
December 2023				
Ornamental snake, koala	AU4 RE 11.3.3		2 days/nights, 2 persons. 2 hrs daytime searches, 4 hrs spotlighting	Koala and greater glider observed in the offset investigation area. (Lyngco, 2025)
	Totals:	**24 hours**		
February-March 2024				
Ornamental snake, koala	AU1 RE 11.3.1		2 days/nights, 2 persons. 2 hrs daytime searches, 4 hrs spotlighting	Sighting of 2 ornamental snakes made (one on the offset area and one on the access road at the edge of AU1 (Earthtrade 2024)
	AU4 RE 11.3.3			Sighting of 1 koala made (Earthtrade 2024)
	Totals:	**24 hours**		
November 2024				
Ornamental snake, koala,	AU1 RE 11.3.1	*See Figure 6*	2 nights (12 hours) for each species. 5 hours (day) koala spot assessment technique.	Sighting of 2 koalas. Additional potential koala scats and scratches identified. Greater glider and squatter pigeon were also observed (Lyngco 2025)
	AU2 RE 11.3.25			
	AU3 RE 11.3.27f			
	AU4 RE 11.3.3			
	AU5 RE 11.3.3			
	AU6 RE 11.3.2			

Fauna survey - koala

Scat searches were undertaken at each habitat assessment and while traversing the OIA to identify evidence of koala. Spotlight surveys for the koala were undertaken during, before and after targeted ornamental snake surveys. Spotlighting surveys involved slowly walking and/or driving through areas of suitable vegetation using spotlights and binoculars to spot and identify species. Spotlighting for koala is an effective census method, particularly at lower density sites.

Figure 6: Survey effort (2024) in the offset investigation area



CLEMENTS CREEK LOT 17 RP848822

Offset Investigation

GDA2020, MGA Zone 55

0 0.5 1 km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse
- Track
- Spotlight Survey
- BioCondition Survey Site - End
- BioCondition Survey Site - Start
- BioCondition Transect
- KSAT Site (see Figure 2-1, 2-2)
- Target Species Terrestrial Habitat Assessment (Ornamental Snake, Koala, Greater Glider, Squatter Pigeon)

Data sources: ©State of Queensland, Department of Resources

LYNGCO ENVIRONMENTAL CONSULTING

Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	11/12/2024

Figure 6
Survey Effort

RTPL_CLCk001_MAP0011_A

Path: S:\Plans\Project_Specific\LyngcoEnvironmental\Clements Creek\RTPL_CLCk001_MAP0011_A A3L Survey Effort.aprx

4.3 Survey results

4.3.1 Flora

A total of 971.39 ha of remnant and 388.9 ha of non-remnant vegetation has been mapped in the OIA. A total of 109 flora species were recorded during the vegetation survey, with no threatened flora species recorded.

Invasive plants listed under the *Biosecurity Act 2014* recorded in the OIA included rubber vine (*Cryptostegia grandiflora*), harrisia cactus (*Harrisia martinii*), tree pears (*Opuntia* spp.), parkinsonia (*Parkinsonia aculeata*), parthenium (*Parthenium hysterophorus*) and passionfruit vine (*Passiflora foetida*).

The extent and type of remnant vegetation communities ground-truthed within the OIA differed slightly to what was mapped by the Queensland Herbarium. The main differences relate to the ability of the ground-truthing survey to map the extent of individual REs, whereas the state mapping is undertaken at a larger scale and contains heterogenous mapping where a number of REs were assigned to an area.

4.3.2 Fauna – ornamental snake

The brigalow forest vegetation had a high level of coarse woody debris and some shallow gilgai formation. Due to its proximity to other habitat types containing deep cracking clay soils, this brigalow habitat has been identified as suitable habitat for the ornamental snake. During wet periods, with the onset of rapid frog breeding behaviour in gilgais, and the inundation of nearby lineal gilgai formations, the brigalow forest vegetation is suitable habitat for foraging and shelter.

Spotlighting and active searches demonstrated a high degree of herpetofauna use in the brigalow forest vegetation. However, no individual ornamental snakes were detected during the September 2023 survey, as the conditions were not ideal, due to lack of recent rainfall and lower evening temperatures.

A follow-up wet season survey was then undertaken by Lyngco over 2 nights in December 2023. The conditions for this survey were better, with the area receiving approximately 80 millimetres of rain over the preceding 2 weeks and evening temperatures being warm and humid. Although numerous frogs and reptiles were detected during the December survey, no individual ornamental snakes were observed. The ornamental snake is known as a cryptic species, and at the time of the survey many gilgai areas were flooded, reducing access across the offset area.

It was determined that additional field verification work would be required, later in the wet season following prolonged favourable environmental conditions, in an effort to detect the species. This additional field verification work was undertaken in February and March 2024. The survey was conducted by Earthtrade's Principal Ecologist Grant Paterson and Senior Ecologist Guy Stevenson. General ground conditions were hot and humid, with light rain falling on 24 February. The survey effort entailed active daytime herpetological searches for 2 hours each day, with 4 hours of spotlight searches each evening, for a total survey effort of 12 hours. The 2024 survey detected 2 individual ornamental snakes, confirming the presence of the snake in and adjacent to the OIA, indicating that the OIA does provide habitat suitable for the species.

Species stocking rate: ornamental snake within offset

The species stocking rate for the ornamental snake was given a score of 1.71 (out of 4) within the offset area. This was determined as per the scoring criteria, detailed in *Table 17*.

Table 17: Scoring criteria – ornamental snake species stocking rate

Species stocking rate	Score and range				Average weighted score
Presence detected on or adjacent to site (neighbouring property or connecting habitat)	**No**	**Yes – adjacent**	**Yes – on site**		
	0	5	10		10
Species usage of the site (habitat type)	**Not habitat**	**Dispersal**	**Foraging**	**Breeding**	
	0	5	10	15	5
Approximate density (per ha)*	**0**	**1-2**	**3-4**	**≥5**	
	0	10	20	30	10
Role/importance of species population on site – range-edge population (may occur)	**Within 30 km of range edge**				
	0	**5-15**	**16-20**	**21-30**	
	0	10	20	30	0
Table SRR Score (out of 70)					25
SRR Score (out of 4)					**1.43**

** Ornamental snake density – based on draft species stocking rate guidance received from DCCEEW on 19 May 2025.*

Ornamental snake species stocking rate: presence detected within offset

Based on the results of Earthtrade (2024), ornamental snake presence was detected within the offset site and was therefore given the greatest score (10). As the offset area has been given the greatest score possible for presence detected, this attribute provides limited opportunities for gain through the lifespan of the offset.

Ornamental snake species stocking rate: species usage within offset (habitat type)

Ornamental snake usage within the offset was given a of score 5 out of 15. The offset site is adjacent to areas containing gilgai.

Ornamental snake species stocking rate: density within offset

Targeted surveys have detected and therefore confirmed the presence of the species in the offset area, and relative abundance will require surveys over multiple years to provide an accurate density. As such, a conservative approach has been taken and the population within the OIA has been given a score (10 out of 30) for approximate density.

This attribute will provide potential gain for the offset area throughout its lifespan. Five-yearly targeted fauna surveys will provide a reliable relative abundance. Monitoring will allow land managers to assess the effectiveness of controls and or measure the impacts of environmental events including but not limited to wildfire and drought.

Ornamental snake species stocking rate: species importance within offset

The importance of species population on site has been given a score of 0 out of 15, due to the following:

- The population has not yet been determined as a key source breeding population due to the extensive habitat available across Central Queensland.
- The species is not highly mobile and would not be expected to disperse across the landscape.
- It is likely that the population within the offset area is not necessary for maintaining genetic diversity within the landscape, due to the extensive habitat available across Central Queensland.
- The population within the offset area is not near the limit of the species range, with records north, east, south and west of the offset area.

4.3.3 Fauna – koala

Across the OIA, numerous koala scratches were found. In mainly the coolibah woodland areas (RE 11.3.3), multiple scat samples were detected. Those determined to be koala scat were sampled and sent to Central Queensland University koala specialists for confirmation.

The coolibah woodland habitat within the OIA is consistent with RE 11.3.3 and is generally situated adjacent to water courses and brigalow forest. The mixed ages of widespread *Eucalyptus coolabah* and sparse *Eucalyptus camaldulensis* provide ample foraging and sheltering habitat for the koala, as was evidenced by the numerous scratches observed and multiple scat specimens. Additionally, the brigalow forest areas at Clements Creek contained some large eucalyptus species.

During the post-wet survey effort in December 2023 one koala was observed and photographed within the coolibah woodland. Two further individuals were also observed within the OIA during the February/March 2024 field survey. An additional 2 individuals were observed during the November 2024 field survey, along with additional koala scats and scratches.

Detailed habitat quality assessment tables for the offset areas are provided in *Appendix B2* and *Appendix B6*. Field survey data sheets are provided in *Appendix C2*.

Species stocking rate: koala within offset

The overall species stocking rate for the koala was given a score of 2.14 (out of 4) within the offset area, and was determined as per the scoring criteria, detailed in *Table 18* and *Table 19*.

Table 18: Scoring criteria – koala species stocking rate

Species Stocking Rate	Score and Range				Average weighted score
Presence detected on or adjacent to site (neighbouring property or connecting habitat)	**No**	**Yes – adjacent**	**Yes – on site**		10
	0	5	10		
Species usage of the site (habitat type and evidence of usage)	**No habitat**	**Dispersal**	**Foraging**	**Breeding**	5
	0	5	10	15	
Approximate density (per ha)	**0**	**0.0005**	**>0.0005 – 0.0019**	**0.002**	10
	0	10	20	30	
Role/importance of species population on site – refer to supplementary table scores (refer to *Table 19*)	**0**	**5-15**	**16-20**	**21-30**	12.5
	0	5	10	15	
Table SSR Score (out of 70)					**37.5**
SSR Score (out of 4)					**2.14**

Table 19: Supplementary scoring criteria for role/importance of species on site

Supplementary SRR	Score Range and Criteria		Score
Key source population for breeding	**No**	**Yes/Possibly**	10
	0	10	
Key source population for dispersal	**No**	**Yes/Possibly**	5
	0	5	
Necessary for maintaining genetic diversity	**No**	**Yes/Possibly**	15
	0	15	
Near the limit of species range	**No**	**Yes/Possibly**	0
	0	15	
Total			**30**

Koala species stocking rate: presence detected within offset

Koala presence within the offset was given the greatest score (10). The species was detected numerous times within multiple assessment units throughout the offset area. Detections within the offset area consist of:

- 4 individual records of the koala
  - 2 identified by Lyngco in 2024 (refer to *Photo 1*) in AU2 RE 11.3.25 on the central and western side of the OIA
  - one identified by LEC 2023 in AU5 RE 11.3.3 (refer to *Photo 2*)
  - one identified by Earthtrade 2024 in AU5 RE 11.3.3
- Evidence of the koala consisting of koala scratches and scats by LEC 2024 and 2023.



Photo 1: Koala detected in riparian forest



Photo 2: Koala detected along Manly Rd

Koala species stocking rate: species usage within offset

Species usage within the offset was given a score of 5 for the koala. As discussed above, the species was detected numerous times within multiple assessment units throughout the offset area, by multiple ecologists. Detections within the offset area consist of individual sightings, scat and potential scratch marks. No juveniles were sighted; therefore it is not known at this stage whether it is being utilised as breeding habitat. Five-yearly targeted fauna surveys and opportunistic sightings will provide evidence over time of the usage of the site.

Koala species stocking rate: density within offset

Two koalas were sighted within the OIA (1,360 ha) resulting in a calculated density of 0.0014 koalas per hectare, which falls within the scoring range of 10.

While presence detected and species usage within the offset area has been determined, koala density within the offset area will be monitored via five-yearly targeted fauna surveys and opportunistic sightings. This will be undertaken over the term of the offset, as detailed in *Section 10*.

As the offset area has been given this score for koala density, this attribute will provide potential gain for the offset area throughout its lifespan.

Koala species stocking rate – species importance within offset

As the koala is listed as endangered, all subpopulations are considered important (DCCEEW 2022). The importance of the koala population on site scored an average of 12.5 across the 4 AUs due to the following:

- The population is likely a key source breeding population – the OIA contains climate refugia that allows the population to persist in periods of drought and bushfire. Additionally, the OIA contains mapped koala breeding habitat.
- The population is likely a key source for dispersal – the OIA contains climate refugia along riparian forest (AU2 11.3.25). These riparian forest areas likely act as corridors that extend past the OIA, aiding in koala dispersal, even in periods of drought and bushfire.
- The population is likely necessary for maintaining genetic diversity – as above, riparian forest likely acts as corridors for the koala that extend past the OIA, allowing for genetic diversity to move in and out of the OIA.

However, population within the OIA is not near the limit of the species range, with records north, east, south and west of the OIA.

5 Proposed offsets

5.1 Proposed ornamental snake offset

Within the areas described in *Section 4.3* above, an offset area of 104.77 ha has been selected. The offset area is comprised of:

- RE 11.3.3 which is described as *Eucalyptus coolabah* woodland to open woodland (73.97 ha). This RE is associated with a high number of fauna species (Venz et al. 2002). This patch includes gilgais and complex cracking clays that hold water after rain, which are regarded as suitable habitat features for the snake.
- RE 11.3.27f which is described as *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps (4.26 ha). This also includes gilgais and complex cracking clays.
- RE 11.3.1 which is described as *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains (26.55 ha). Although gilgai and soil depressions are not as complex/frequent, this includes fringing wetland habitat vegetation along watercourses where substitute refuge microhabitat is supported (ground timber and exposed roots). Vegetation functionally connected to moist areas or watercourses that have low levels, absent or impacted refuge microhabitat may also be suitable if the areas provide temporary foraging resources (frog habitat) and/or facilitate movement to other suitable habitat.

5.2 Ornamental snake habitat requirements in the offset area

The habitat requirements for the ornamental snake species are discussed in *Section 3.2.1.* The proposed offset area contains suitable habitat characteristics, being comprised of open coolibah woodlands, fringing watercourses and brigalow vegetation with suitable gilgai formations and floodplain areas and palustrine wetlands. This is supported by sightings of the species in the immediate area during field survey work.

The offset area AUs and their habitat quality scores are summarised in Table 20, and the area is shown in *Figure 7*, which also shows ornamental snake sighting records in the vicinity of the offset area. The full set of field data is provided at *Appendix C2.*

Table 20: Assessment table for ornamental snake offset

Assessment units and RE Habitat quality scores (weighted)	AU5 11.3.3	AU3 11.3.27f	AU4 11.3.3	AU1 11.3.1	
Site condition score (-/3)	1.58	1.66	1.72	1.43	
Site context score (-/3)	2.01	2.01	2.17	2.18	
Species stocking rate score (-/4)	1.43	1.43	1.43	1.43	
Habitat quality score (-/10):	**5.02**	**5.09**	**5.32**	**5.03**	
AU area within offset area (ha)	64.14	4.26	9.83	26.55	
Total offset area for the MNES (ha)	104.77	104.77	104.77	104.77	
Area weighting	0.61	0.04	0.09	0.25	
Weighted habitat quality score:	**3.07**	**0.21**	**0.50**	**1.28**	
				Total:	**5.05**

5.3 Proposed koala offset

Within the areas described in *Section 4.3* above, an offset area of 104.77 ha has been selected. The offset area is comprised of:

- RE 11.3.3 which is described as *Eucalyptus coolabah* woodland to open woodland (73.97 ha). This RE is associated with a high number of fauna species (Venz et al. 2002), and koalas have been observed in this area during the field surveys of 2023 and 2024.
- RE 11.3.27f which is described as *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps (4.26 ha). As this RE is mapped as a wetland this is regarded as suitable climate refuge habitat for koala.
- RE 11.3.1 which is described as *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains (26.55 ha). As this RE has co-dominant emergent *Eucalyptus coolabah* present which is a preferred koala food tree, this is considered as suitable koala habitat.

5.4 Koala habitat requirements in the offset area

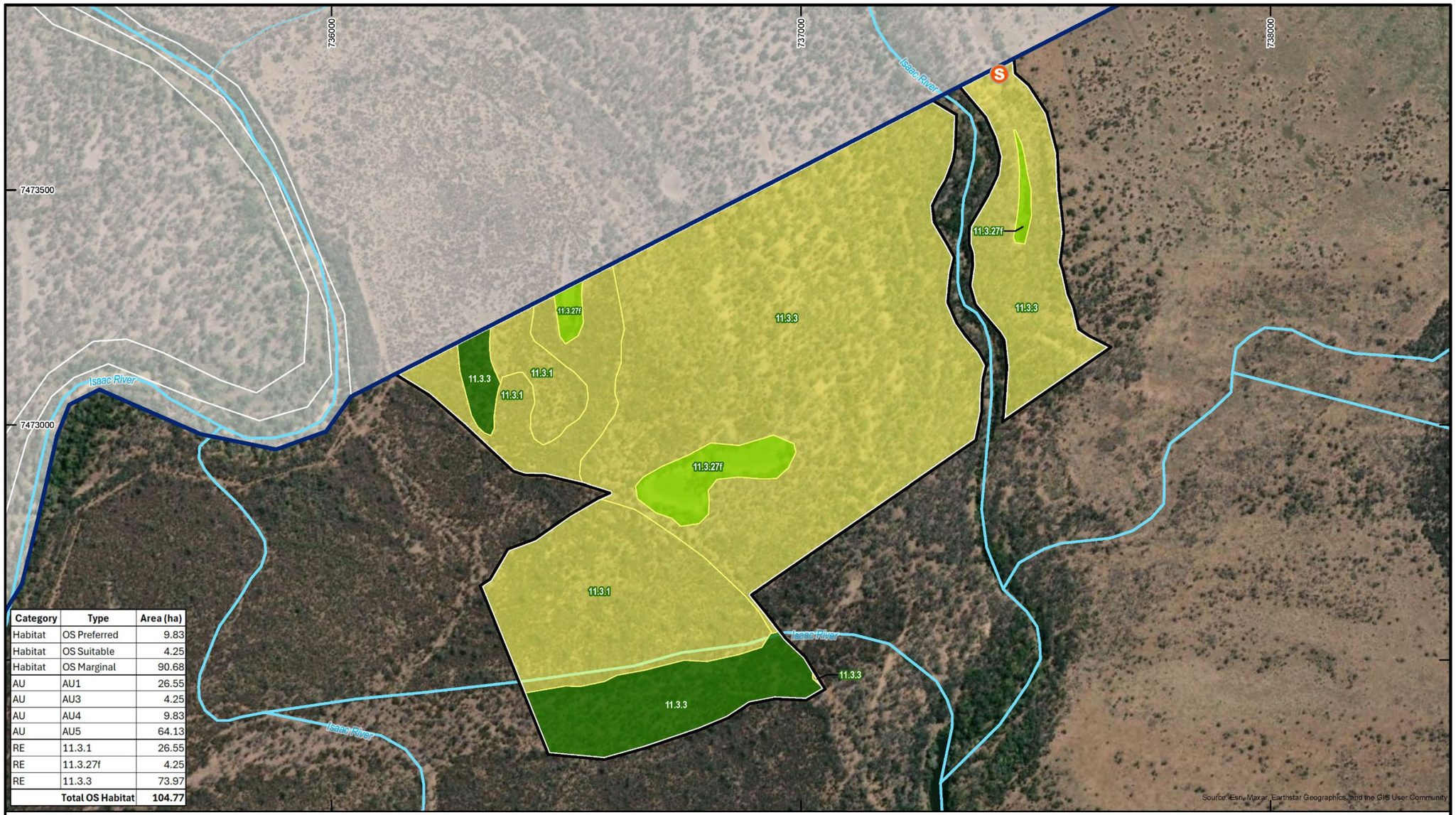
The habitat requirements for the koala species are discussed in *Section 3.2.2.* The offset area contains suitable preferred food trees for the species and suitable climate refuge habitat. This is supported by sightings of koala in the immediate area during field survey work as well as up and down the river corridor on other offset sites.

The offset area AUs and their habitat quality scores are summarised in *Table 21*, and the area is shown in *Figure 8*, which also shows koala sighting records in the vicinity of the offset area. The full set of field data is provided at *Appendix C2.*

Table 21: Assessment table for koala offset

Assessment units and RE Habitat quality scores (weighted)	AU5 11.3.3	AU3 11.3.27f	AU4 11.3.3	AU1 11.3.1	
Site condition score (-/3)	2.09	1.98	2.23	1.35	
Site context score (-/3)	1.94	1.94	1.71	1.76	
Species stocking rate score (-/4)	2.29	2.29	2.29	1.71	
Habitat quality score (-/10):	**6.31**	**6.21**	**6.22**	**4.83**	
AU area within offset area (ha)	64.14	4.26	9.83	26.55	
Total offset area for the MNES (ha)	104.77	104.77	104.77	104.77	
Area weighting	0.61	0.04	0.09	0.25	
Weighted habitat quality score:	**3.86**	**0.25**	**0.58**	**1.22**	
				Total:	**5.92**

Figure 7: Proposed ornamental snake offset



Category	Type	Area (ha)
Habitat	OS Preferred	9.83
Habitat	OS Suitable	4.25
Habitat	OS Marginal	90.68
AU	AU1	26.55
AU	AU3	4.25
AU	AU4	9.83
AU	AU5	64.13
RE	11.3.1	26.55
RE	11.3.27f	4.25
RE	11.3.3	73.97
	Total OS Habitat	**104.77**

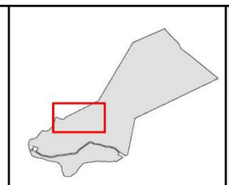
GDA2020, MGA Zone 55

CLEMENTS CREEK LOT 17 RP848822
Ornamental Snake Offset Area

0 100 200 300 400 500
m

Cadastral Boundary
Lot 17 RP848822
Clements Creek Ornamental Snake Offset Area
Watercourse
Ornamental Snake Observation, Earthtrade - 2024

Ornamental Snake Habitat
Preferred (AU4)
Suitable (AU3)
Marginal (AU1, AU5)





Data sources:
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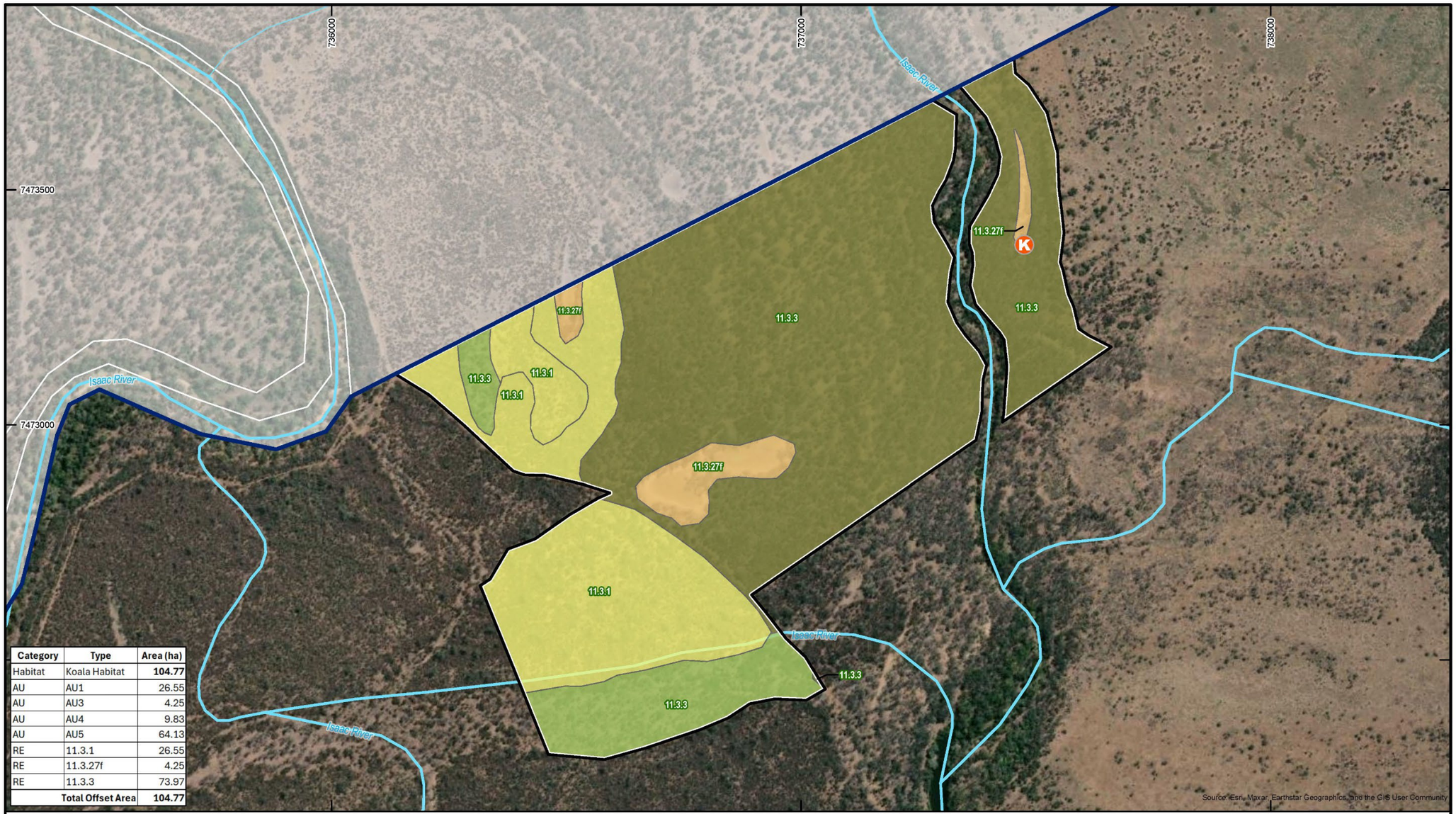
Drawn By: C Schlebusch
Requested by: D Sasse
Date: 6/05/2025

Figure 7
Ornamental Snake Offset Area

RTPL_WOSOA001_MAP_0001_A

Path: S:\Plans\Project_Specific\EarthTrade\Westside Clements Creek Ornamental Snake OA\RTPL_WOSOA001_MAP_0001_A A3L Clements Creek Ornamental Snake Offset Area.aprx

Figure 8: Proposed koala offset



Category	Type	Area (ha)
Habitat	Koala Habitat	**104.77**
AU	AU1	26.55
AU	AU3	4.25
AU	AU4	9.83
AU	AU5	64.13
RE	11.3.1	26.55
RE	11.3.27f	4.25
RE	11.3.3	73.97
	Total Offset Area	**104.77**

CLEMENTS CREEK LOT 17 RP848822

Koala Offset Area

GDA2020, MGA Zone 55

0 100 200 300 400 500 m

Cadastral Boundary
Lot 17 RP848822
Clements Creek Koala Offset Area
Watercourse
Koala Observation, LEC - 2023
No Habitat, AU1
Koala Habitat, AU3
Koala Habitat, AU4
Koala Habitat, AU5

Data sources:
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Requested by:	D Sasse
Date:	6/05/2025

Figure 8
Koala
Offset Area

RTPL_WOSOA001_MAP_0002_A

Path: S:\Plans\Project_Specific\EarthTrade\Westside Clements Creek Ornamental Snake OA\RTPL_WOSOA001_MAP_0002_A A3L Clements Creek OSOA Koala Habitat.aprx

5.5 Key threats to the MNES

The EOP states that an offset should address key priority actions in any approved recovery plans, threat abatement plans, conservation advice, ecological character description or approved Commonwealth Management Plan for an impacted MNES.

5.5.1 Key threats to the ornamental snake

An analysis of the documents listed below to determine the key threats to the ornamental snake has been undertaken and is presented in *Table 22.*

Table 22: Key threats to the ornamental snake

Document	Key threats
Approved Conservation Advice for Denisonia maculata *(Ornamental Snake)* (2014) Department of the Environment (DOE), Canberra.	<u>Clearing and degradation of habitat</u> Vegetation clearing for cropping, and pasture and grazing: the main identified threat to the ornamental snake is a continued legacy of past broadscale land clearing and habitat degradation.
	<u>Destruction of wetland habitat by feral pigs</u> Destruction of wetland habitat by feral pigs (*Sus scrofa*) is also a threat, along with the associated destruction of frog habitat and direct competition for the ornamental snake's food source (frogs) (WWF-Australia/QMDC, 2008).
Draft Referral guidelines for the nationally listed Brigalow Belt reptiles (version 1.1) (2023). DCCEEW, Canberra	<u>Invasion of weeds</u> The presence of exotic plant species can lead to the degradation of habitat.
	<u>Inappropriate fire reqimes</u> Inappropriate fire management or wildfire can result in the degradation of habitat, increased mortality of the species, and increased risk of predation.
	<u>Inappropriate grazing practices</u> Cattle can trample and degrade the microhabitat features of gilgai formations, particularly in the wet season.
Threat Abatement Plan for predation, habitat degradation, competition and disease transmission by feral pigs (2005) Department of Environment and Heritage, Canberra	Predation by feral pigs
Threat Abatement Plan for predation by the European red fox (2008) Department of the Environment, Water, Heritage and the Arts, Canberra.	Predation by foxes
Threat Abatement Plan for predation by feral cats. (2015) DOE, Canberra.	Predation by cats

5.5.2 Priority management actions for the ornamental snake

A set of priority management actions required to address the key threats described above has been developed, and these are detailed in *Table 23*. Each of these management actions and the ecological benefits that their implementation will bring are discussed in further detail in *Section 5.6*.

Table 23: Priority management actions for the ornamental snake

Threats	Management action
Clearing and degradation of habitat	Past broad scale land clearing is a legacy threat that is now prohibited under this plan. On the offset site, no forestry or timber harvesting activities will be authorised to be undertaken during the period of the declared area. Forestry and native timber harvesting practices in the offset is considered a potential threat to the quality of the vegetation community and habitat due to a reduction in cover and fragmentation of habitat.
Destruction of wetland habitat by feral pigs	Major damage to the environment/habitat occurs when large numbers of animals congregate in the area. Feral animals will be monitored and controlled as described in *Table 26.*
Inappropriate grazing practices	Grazing will not be permitted during the wet season; ground cover levels will be monitored and managed. Appropriate stocking densities will be utilised. Stock will be grazed in the offset areas for fuel reduction purposes during September to January, or until the wet season starts, to avoid soil pugging.
Predation by feral pest animals	The offset management actions will minimise the presence of feral animals and control of existing populations of feral animals (feral cats, dogs, foxes and pigs) within the offset areas in accordance with the Biosecurity Act.

5.5.3 Key threats to the koala

An analysis of the documents listed below to determine the key threats to the koala has been undertaken and is presented in *Table 22.*

Table 24: Key threats to the koala

Document	Key threats
Conservation advice for Phascolarctos cinereus *(Koala).* (2022) DAWE, Canberra.	<u>Clearing and degradation of koala habitat:</u> Human activities (e.g., deforestation and land clearance for grazing, agriculture, urbanisation, timber harvesting, mining and other activities) have resulted in habitat loss, fragmentation and degradation.
	<u>Climate change driven processes and drivers:</u> These may include loss of climatically suitable habitat, the increased intensity and/or frequency of drought, the increased intensity and/or frequency of heatwaves, the increased intensity and/or frequency of bushfires, and the declining nutritional value of foliage.
National Recovery Plan for the Koala: Phascolarctos cinereus *(combined populations of Queensland, New South Wales and the Australian Capital Territory.* (2022) DAWE, Canberra	<u>Increased mortality due to vehicle strikes and dogs</u> Vehicle related mortality occurs regularly on roads in close proximity to occupied koala habitat (Gonzalez-Astudillo 2018; Queensland Government 2021). Dog attacks are also a significant cause of death and injury especially in areas within and adjacent to peri-urban and residential areas (DPIE 2020).

Document	Key threats
	Koala retrovirus (**KoRV**) and Chlamydia (*Chlamydia percorum*) Wild populations carry disease pathogens. Inadvertent spread of disease also occurred historically following koala translocations. Disease can be a major contributor to population decline and reduces population viability. Chlamydia causes infertility, blindness and death (Polkinghorne et al. 2013). The prevalence of disease (chlamydiosis) has been found to increase following extreme stress from hot weather, drought, habitat loss and fragmentation (Lunney et al. 2012; Davies et al. 2013). KoRV was relatively recently identified and is thought to be responsible for a range of conditions, including leukaemia (Tarlinton et al. 2005) and an immunodeficiency syndrome. Up to 100% of koalas in Queensland and NSW have KoRV. There is some evidence that chlamydiosis may be exacerbated by KoRV (Tarlinton et al. 2005). KoRV has endogenised in koalas (Tarlinton et al. 2006) in Queensland and New South Wales.
Threat Abatement Plan for predation, habitat degradation, competition and disease transmission by feral pigs (2005) Department of Environment and Heritage, Canberra	Predation by feral pigs
Threat Abatement Plan for predation by the European red fox (2008) Department of the Environment, Water, Heritage and the Arts, Canberra.	Predation by foxes
Threat Abatement Plan for predation by feral cats. (2015) DOE, Canberra.	Predation by cats

5.5.4 Priority management actions for the koala

A set of priority management actions required to address the key threats described above has been developed, and these are detailed in *Table 25*. Each of these management actions and the ecological benefits that their implementation will bring are discussed in further detail in *Section 5.6*.

Table 25: Priority management actions for the koala

Threats	Management action
Clearing and degradation of habitat	No forestry or timber harvesting activities will be authorised to be undertaken during the period of the declared area. Forestry and native timber harvesting practices in the offset is considered a potential threat to the quality of the vegetation community and habitat due to a reduction in cover and fragmentation of habitat.
Predation by feral pest animals	The offset management actions will minimise the presence of feral animals and control of existing populations of feral animals (feral cats, dogs, foxes and pigs) within the offset areas in accordance with the Biosecurity Act.

Threats	Management action
Increased mortality due to vehicle strikes and dogs	Access will be restricted. The proposed offset area is on a privately owned agricultural property with access to the area restricted to the landholders. Access to the offset area property is restricted by boundary fencing to prohibit access to the offset area. Therefore, impacts to resident koala populations arising from car strikes are unlikely.
Climate change driven processes and drivers	Protecting these areas from native timber harvesting and fire will add significant value to the area by improving the condition of the habitat for koala. As the offset area borders the Isaac River that contains permanent water, and contains watercourses of various stream orders, the area provides higher quality habitat and moisture source for fauna during extended periods of hot and/or dry weather.
Koala retrovirus and chlamydia	There is no known treatment for disease which is prevalent in the populations naturally. The establishment of the offset area which adjoins the landscape corridors, as well as buffers and increases in extent and condition of the habitat may act to reduce some of the environmental stresses that are thought to accentuate the diseases.

Specific and detailed management actions have been developed that address these key threats to each MNES, and are described in detail in *Section 6*. Some of the management actions are common to each of the subject MNES.

The environmental benefits that each management action will bring are discussed in detail in the following section.

5.6 Environmental benefits of the priority management actions

5.6.1 Prevention of clearing and degradation of habitat

In general terms, clearing, fragmentation and degradation of habitat comprise the single biggest threat to biodiversity values across the spectrum of native flora and fauna species, and ecological communities. Clearing, fragmentation and degradation of habitat are identified as the primary threat to biodiversity values across almost all conservation advice, listing advice, and threat abatement plan documents issued under the EPBC Act, and in fact sheets and species profiles for MSES as developed by the Queensland Government. For the ornamental snake species, a past history of broadscale land clearing, modification of wetlands and drainage features, and pasture improvement have been detrimental to the species. For the koala, human activities such as deforestation and land clearance for grazing, agriculture, urbanisation, timber harvesting, mining and other activities) have resulted in habitat loss, fragmentation and degradation.

The offset areas on Clements Creek will be managed so that no form of clearing or forestry practices will be permitted under this OAMP. As the restoration of these areas progresses, the quality of existing ecosystems will return towards benchmark levels. In turn, this will reestablish habitat connectivity for flora and fauna at a larger scale, thereby reversing the effects of fragmentation and degradation. This conservation outcome is supported by the other management actions described below, that will support and underpin a broader scale of environmental uplift across the rehabilitation areas.

5.6.2 Pest animal management

Pest animals have varied impacts upon vegetation communities through predation and competition with native animals, grazing of native plants and soil disturbance through burrowing

and diggings. Target prey species for feral cats and foxes include granivorous native bird species, small native mammals, and potentially lizards and snakes.

Habitat changes due to feral pigs, wild dogs and feral cats include: destruction of plants, sometimes threatening the survival of specific plant species through reduced or failed recruitment of new plants; changing the composition of plant communities; alteration of soil structure through digging and rooting; increased invasion and spread of weeds through spreading seeds via faeces or in fur, or creating suitable habitat through soil enrichment with urine and faeces or ground disturbance; reduced water quality through disturbance of riparian zones and bodily wastes; and creation of habitat suitable for plant disease vectors (DoEE, 2017).

There are a range of control methods available for feral pigs including trapping, aerial and ground shooting, poisoning, and fencing. At Clements Creek, the preferred control method is ground shooting or trapping, with appropriate disposal methods. Poisoning is regarded as presenting a potential risk to native animals and livestock (Sharp, 2012), so this method will not be used at Clements Creek.

Shooting is a humane method of destroying feral pigs when it is carried out by experienced, skilled and responsible shooters; the animal can be clearly seen and is within range; and the correct firearm, ammunition and shot placement is used. Wounded animals will be located and dispatched as quickly and humanely as possible. If lactating sows are shot, reasonable efforts will be made to find dependent piglets and dispatch them quickly and humanely.

Trapping can also be an effective control method. The trap should be constructed in a way so as not to cause injury from loose wire, sharp edges or malfunctioning gates. Also, a smaller mesh size will be used to prevent injuries to the pigs' snouts if they charge at the trap when attempting to escape. Trapped pigs will be destroyed by shooting as quickly and humanely as possible. If lactating sows are caught in a trap without their young, efforts will be made to find dependent piglets and kill them quickly and humanely. Although pig traps are designed for the capture of feral pigs, there is still a risk of capturing other species. Use of a pig-specific gate trip mechanism minimises the risk of catching some species e.g. wallabies, while the placement of a steel post across a funnel trap entrance at a height of 1 metre above the ground will prevent cattle from entering (Sharp, 2012).

Other pest animal control activities at Clements Creek will target species such as foxes, deer, wild dogs and feral cats. All pest animal control techniques at Clements Creek are based on the model codes of practice for the humane control of each species.

The reduction in presence of feral pest animal species through the implementation of coordinated pest animal control programs will lead to an ecologically beneficial outcome for habitat for both the ornamental snake and koala.

5.6.3 Grazing management

Inappropriate grazing in coolabah-based woodlands can lead to a number of detrimental environmental outcomes; trampling by large herbivores compresses soil, can reduce the amount of leaf litter and woody debris, and alters the composition and density of herbs and shrubs in the understorey (DoE, 2013). It can also lead to increased levels of erosion, and the incursion of invasive weeds, including introduced pasture species, which in turn can alter the effects of wildfire in these areas.

Grazing can lead to degradation of the RE as more palatable species are preferentially grazed and unpalatable species become increasingly dominant. Heavy grazing can reduce grass cover

and diversity, and facilitates the establishment of weed species. By implementing tactical grazing management practices, these threats are reduced.

The management of total grazing pressure requires consideration to be given be given to both domestic and non-domestic stock, to prevent excessive grazing. Tactical grazing of domestic livestock can be managed in a relatively straightforward fashion – this involves adjusting stock numbers in accordance with changes in seasonal and climatic conditions and dry matter yield (**DMY**) (DEH, 2004). The key principle underpinning tactical grazing is the need for grazing to be managed in a way that recognises the critical importance of perennial plants. These species must be able to complete all life cycle stages to ensure the persistence of plant populations. Decisions are made, based on DMY to alter stock numbers or destock.

Tactical grazing is also a useful tool in managing fuel loads, i.e. the presence of excessive dry matter that accumulates during and following wet seasons or substantial rainfall events. Excessive dry matter fuel loads can be made up of both native perennial grasses and introduced pasture species. Reducing these fuel loads leads to a reduced risk of inappropriate hot fire. During a fire, some introduced pasture species such as buffel grass can burn with greater intensity (Miller et al, 2010) which in turn can lead to a greater risk of damage to mid-storey and canopy species. Appropriate tactical grazing decisions, i.e, when to introduce and remove cattle from an area, are based on the assessment of DMY measured in kg/ha of dry matter present. DMY assessments are based on photo standards, and are a tool frequently used by graziers across Queensland in grassland and semi-arid woodland country.

High levels of dry matter increase the risk of hot fires which can destroy habitat and directly threaten fauna species. Mitigating this risk results in a conservation gain for the ecosystem and both the koala and ornamental snake.

Grazing will be used as a tool to mitigate fire risk, as discussed above. It is recognised that if grazing is used inappropriately, detrimental environmental outcomes can result; these include trampling by large herbivores which compresses soil, a reduction in the amount of leaf litter and woody debris, and alters the composition and density of herbs and shrubs in the understorey (DoE 2013). It can also lead to increased levels of erosion, and the incursion of invasive weeds, including introduced pasture species, which in turn can alter the effects of fire in these areas. Overgrazing can also lead to the alteration of the composition and richness of ground cover species as more palatable species are preferentially grazed and unpalatable species become increasingly dominant.

Detailed management actions related to grazing, relevant trigger levels and associated corrective actions are shown in *Table 26*. Details of monthly (during grazing), quarterly and annual monitoring methodologies and responsibilities are shown in Part B of *Table 31.*

Managing grazing pressure from wild stock (including native herbivores such as kangaroos) is more challenging than for domestic stock (DEH, 2004). Management of wild stock generally involves removal or destruction of the animals. Moving wild stock to another part of the landscape is not an option, and fencing is not usually feasible for control of many macropod species. For those species that are highly mobile or have large home ranges, there are benefits in participating in regionally coordinated management activities as well as property-based management actions. These control operations should be timed to take advantage of natural declines in abundance due to poor seasonal conditions or disease outbreaks.

A conservative and tactical approach to grazing management will result in a beneficial conservation gain for the ecosystems and for the ornamental snake and koala in the offset area.

Of particular importance for the ornamental snake species, the grazing regime will not permit livestock to be grazed in the ornamental snake offset areas during the wet season.

5.6.4 Invasive weed management

Nationally, exotic species account for about 10-15% of flora (Groves, 2002). Weeds are known to compete with native species for space, light, water and nutrients, affecting the structure and function of land-based and aquatic ecosystems, and impacting negatively on native fauna and flora. Nineteen of 20 studies on weed impact in Australia reviewed by Adair and Groves (1998) demonstrated a decline in either species richness, canopy cover or frequency of native species.

Weeds can also increase the biomass of ecosystems leading to more intense bushfires, changing the composition and structure of native vegetation (Invasive Plants and Animal Committee, 2016).

Control and removal of invasive introduced grasses and other weeds will result in long term positive ecosystem change – by increasing species richness, abundance and recruitment, and significantly reducing the risk of intense wildfire. Under these conditions there is high confidence that the quality of existing ecosystems will be raised to benchmark levels. An additional benefit of the intended weed management is the reestablishment of habitat connectivity for flora and fauna that are impeded by invasive species (Godfree et al. 2017).

Appropriate weed control techniques will be utilised to minimise the risk of potential damage to native vegetation. This will be achieved through the avoidance of any broadscale applications of herbicides, and the utilisation of targeted methods that include:

- Spot spraying
- Removal by hand
- Cut and paint techniques.

5.6.5 Fire management

Fire regimes that cause declines in biodiversity include the full range of fire-related ecological processes that directly or indirectly cause persistent declines in the distribution, abundance, genetic diversity or function of species or ecological communities (DAWE, 2022). While some fire regimes threaten species directly by reducing their survival and/or reproduction, many impacts of fire regimes on biodiversity are indirect, either because they alter habitats, disrupt dependencies among species, or exacerbate impacts of other threats. Fire regimes that threaten biodiversity may also degrade ecosystem functions, reducing the capacity of ecosystems to sustain native flora and fauna and to supply ecosystem services that support human well-being and livelihoods.

As a mechanism of ecosystem disturbance, fire can maintain or enhance biodiversity, or cause the loss of biodiversity (Whelan et al., 2006; Yates et al., 2008). In Queensland, fire management guidelines have been developed for each RE (Queensland Herbarium, 2023). These guidelines recognise that there is a balance needed in fire management to prevent fire-driven extinction of fauna and flora populations, and ecosystems, caused by inappropriate fire regimes (e.g. too frequent fires), but also to accommodate appropriate fire management to maintain species and ecosystems that require fire to persist. These generic guidelines are provided for regional ecosystems that are in ‘good’ condition, i.e. a condition relatively similar to the benchmark for that RE.

Where vegetation is heavily infested with weed species, the primary aim of the initial fire management may be to control the weeds, and hence a different fire regime to the ‘normal’ may be needed to restore the vegetation. Similarly, if the primary purpose of the management of an area is to enhance the population of a particular species, for example, an endangered plant or

animal, then a different fire regime to the generic regime for the regional ecosystem may be required.

The offset area vegetation on Clements Creek is comprised of eucalyptus woodland, being RE 11.3.3. Many of the eucalypt-based REs have similar fire guidelines, where the recommendations state:

- Burn less than 10-30% in any year to achieve a mosaic.
- Burn under conditions of good soil moisture and when plants are actively growing.

Frequent fires in eucalypt-based REs may also encourage the establishment of eucalypt seedlings (Burrows et al., 1988), especially if fires coincide with capsule ripening and do not burn through the canopy (Burrows and Burrows, 1992). Very young eucalypt seedlings are usually killed by fire (e.g. Williams, 2009), but both seedling and adult eucalypts can survive low to moderate severity fires once a lignotuber is formed, after about 6 months to a year (Wardell-Johnson et al. 1997; Fensham et al., 2008). The presence of a lignotuber enables a plant to resprout from the base of the stem, but beyond a certain height (e.g. >1.5 m for *Corymbia clarksoniana*) saplings also develop the ability to resprout from the upper stems and branches (DSITIA, 2014).

Probably the best fire management for wildlife conservation in eucalypt woodlands is to maintain a range of burning practices that create a fine-scale mosaic of fire histories in the landscape, including unburnt refugia (Woinarski, 1999; Martin and Green, 2002; Valentine et al., 2007) and to avoid hot fires, especially late in the dry season. An emphasis on burning early in the dry season, or early in wet season should reduce the incidence of the hotter and more destructive late dry season fires (Woinarski, 1999).

The risk that this management seeks to mitigate is the occurrence of hot and intense fires at inappropriate times. The attribute that has to be managed to mitigate this risk is fuel load (DMY). There are 2 acknowledged management activities to reduce DMY, being the use of cold fire, and/or the use of grazing. The use of grazing as a management activity is discussed in more detail in *Section 5.6.3* and detailed in *Table 26.*

5.6.6 Access control

Clements Creek is a privately owned property in a remote location, with access to and through the property limited to the landholders and their immediate neighbours. Therefore, impacts to resident koala populations arising from car strikes are unlikely. Control of access to the offset area will further reduce the risk of mortality from vehicle strike to both the subject species.

Fences will be maintained to prevent unauthorised access and to control stock presence. Signs will be erected at all entrances and potential access points to the site stating that access to the site is forbidden. All signs and any new planned fences will be erected within 6 months of the commencement of this OAMP.

5.6.7 Benefits to connectivity

The offset area as a whole will enhance the connectivity and context of the immediate area, by improving the existing regulated vegetation adjacent to and within the landscape corridors that surround the offset areas. This includes connectivity to the Isaac River riparian corridor and to additional riparian corridors associated with Clive Creek and Clements Creek itself. Improved connectivity to adjacent woodland vegetation will also benefit native fauna species that utilise the brigalow and eucalypt vegetation communities for foraging, breeding and refuge purposes, leading to improved population viability.

Additionally, the offset area is adjacent to other proposed offset areas for other project proponents who are utilising the property for their offset requirements, including offsets for ornamental snake habitat. Accordingly, the overall protected area will be substantially larger than the 70 ha being utilised by Westside. This creates further benefits to connectivity and adds to the environmental benefits that the overall protected area of the combined offsets will provide.

Additionally, the offset will provide some benefits towards protection against climate change driven processes and drivers, which is identified as a threat to the koala. As the offset area borders the Isaac River that contains permanent water, and contains watercourses of various stream orders, the area provides higher quality habitat and moisture source for fauna during extended periods of hot and/or dry weather.

Likewise, the establishment of the offset area which adjoins the landscape corridors, as well as buffers and increases in extent and condition of the habitat may act to reduce some of the environmental stresses that are thought to accentuate the diseases that are regarded as a threat to the koala.

5.6.8 Climate change

Climate change drivers present a risk to the offset of the completion criteria being delayed. These drivers present the possibility of increased risk to the offset through bushfire and extreme weather events, in both frequency and intensity. The implementation of all of the management actions described in *Table 26*, and in particular, focusing on managing the effects of storms/rain depressions/flooding/wind damage and fire will contribute towards managing the risks presented by climate change. As habitat quality scores improve, the offset site will increase its resilience and adaptability to these events.

Monthly and quarterly inspections will record any relevant incidents which will be reported in the annual reports. Any impact to the delay in reaching the completion criteria will be detected in the 5 yearly reports.

5.7 OAG inputs for the ornamental snake offset

Inputs for DCCEEW's OAG for the ornamental snake offset were derived from the survey results described in *Section 4.3* above. The habitat quality scores are derived from the modified habitat quality score spreadsheets as developed during the OIA field survey work. These habitat quality scores are provided at *Appendix B*. The OAG output is provided at *Appendix A*.

5.7.1 Time over which loss is averted

The time over which loss is averted is the foreseeable timeframe (in years) over which changes in the level of risk to the proposed offset site are expected to reduce. This is set at 20 years, which is the maximum allowable under the OAG. However, the legally binding mechanism will last for the duration of the approval, which is expected to be longer than 20 years due to the nature of the project.

5.7.2 Time until ecological benefit

The proposed time until ecological benefit has been set at 20 years for the ornamental snake offset. This has been selected to enable the maximum time for the improvement in the presence and numbers of feral pest animals, particularly pigs, and for the improvements in the condition of the vegetation and habitat across the offset area that will be gained as a result of conservative and tactical grazing management. Furthermore, a reduction in the presence and abundance of weed species will assist in attaining an overall ecological benefit.

5.7.3 Risk of loss without the offset

The risk of loss being proposed is based on the risk of loss of 0.0% over 20 years, as the vegetation is classed as of remnant status and is therefore protected from clearing for agricultural purposes under the VM Act.

5.7.4 Risk of loss with the offset

The offset will initially be secured by being declared as an area of high conservation value under section 19F of the VM Act. An additional legally binding mechanism such as a conservation covenant will be registered within 5 years of the commencement of the implementation of the OAMP. The declared area will remain in place as the legally securing mechanism for the offset area. The declared area and approved OAMP will ensure the offset completion criteria are attained, and then maintained, for the period of the EPBC Act approval. Statutory protection of the offset area is maintained under the VM Act and EPBC Act (or subsequent legislation). This statutory protection mitigates the risk of development applications, broadscale clearing, and zoning changes (currently zoned rural). Conservation covenants are registered to the title of the property under the LT Act.

As the statutory protection provided by the declared area mitigates the risk of loss with the offset, this input has been set at 0%. *Section 11* provides further details about the legally binding mechanism.

5.7.5 Confidence in result

The OAG requires an estimation of the projected improvements in habitat quality that can be achieved over 20 years (as the maximum term for averted loss) through management, along with an indication of the level of confidence in these projections. The time to ecological benefit is set at 20 years for remnant, non-remnant, and advanced regrowth communities, with a conservative confidence level of 65% that the goals for the ornamental snake offset area habitat quality will be achieved. The offset area is in the lower part of the landscape that floods regularly, which can impact on the presence of feral pigs, weed levels, and levels of fallen woody debris.

A period of 20 years is required to realise the results of management actions that will improve habitat quality – of these actions, the reduction in feral pest animal numbers (particularly pigs), the removal of invasive weeds and the implementation of conservative and sustainable grazing practices will encourage recruitment and abundance of the brigalow species and the associated shrub and ground cover layers that form the vegetation in the ornamental snake offset area, and the accumulation of woody debris. This is predicted to raise the quality of the remnant ecosystems close to benchmark levels.

5.8 OAG inputs for the koala offset

Inputs for DCCEEW's OAG for the koala offset were derived from the survey results described in *Section 4.3* above. The habitat quality scores are derived from the modified habitat quality score spreadsheets as developed during the OIA field survey work. These habitat quality scores are provided at *Appendix B*. The OAG output is provided at *Appendix A*.

5.8.1 Time over which loss is averted

The time over which loss is averted is the foreseeable timeframe (in years) over which changes in the level of risk to the proposed offset site are expected to reduce. This is set at 20 years, which is the maximum allowable under the OAG. However, the legally binding mechanism will last for

the duration of the approval, which is expected to be longer than 20 years due to the nature of the project.

5.8.2 Time until ecological benefit

The proposed time until ecological benefit has been set at 20 years for the koala offset. This has been selected to enable the maximum time for the improvement in the presence and numbers of feral pest animals, particularly pigs, and for the improvements in the condition of the vegetation and habitat across the offset area that will be gained as a result of conservative and tactical grazing management. Furthermore, a reduction in the presence and abundance of weed species will assist in attaining an overall ecological benefit.

5.8.3 Risk of loss without the offset

The risk of loss being proposed is based on the risk of loss of 0.0% over 20 years, as the vegetation is classed as of remnant status and is therefore protected from clearing for agricultural purposes under the VM Act.

5.8.4 Risk of loss with the offset

The offset will initially be secured be being declared as an area of high conservation value under section 19F of the VM Act. An additional legally binding mechanism such as a conservation covenant will be registered within 5 years of the commencement of the implementation of the OAMP. The declared area will remain in place as the legally securing mechanism for the offset area. The declared area and approved OAMP will ensure the offset completion criteria are attained, and then maintained for the period of the EPBC Act approval. Statutory protection of the offset area is maintained under the VM Act and EPBC Act (or subsequent legislation). This statutory protection mitigates the risk of development applications, broadscale clearing, and zoning changes (currently zoned rural). Conservation covenants are registered to the title of the property under the LT Act.

As the statutory protection provided by the declared area mitigates the risk of loss with the offset, this input has been set at 0%. *Section 11* provides further details about the legally binding mechanism.

5.8.5 Confidence in result

The OAG requires an estimation of the projected improvements in habitat quality that can be achieved over 20 years (as the maximum term for averted loss) through management, along with an indication of the level of confidence in these projections. The time to ecological benefit is set at 20 years for remnant communities, with a confidence level of 65% that the goals for the koala offset area habitat quality will be achieved. The offset area is in the lower part of the landscape that floods regularly, which can impact on the presence of feral pigs, weed levels, and the increased presence of woody weeds.

A period of 20 years is required to realise the results of management actions that will improve habitat quality – of these actions, the reduction in feral pest animal numbers (particularly pigs), the removal of invasive weeds and the implementation of conservative and sustainable grazing practices will encourage recruitment and abundance of the eucalypt species and the associated shrub and ground cover layers that form the vegetation in the koala offset area. This is predicted to raise the quality of the remnant ecosystems close to benchmark levels, increase mobility for the koala, and lead to a reduction in threats to the species.

6 Offset management measures

This section provides the detail of the implementation, timing, and the parties responsible for undertaking the management actions, as well as triggers for corrective actions to be taken. Implementation of this OAMP will commence immediately after the preliminary documentation for the Project has been approved by DCCEEW.

The management schedule describes the actions to be undertaken on the offset site at Clements Creek (*Table 26*). Protection of the offset area will be maintained under the VM Act as a Category A area of vegetation (vegetation subject to a restoration order or an offset).

Regular offset area reports will be prepared by the proponent as listed in *Table 31* and *Table 32* (refer to *Section 10*). These will report against each of the management actions shown in *Table 26.* These management actions enable the offset site to improve to achieve the scores in *Table 29,* thus attaining and maintaining the completion criteria required of the offset or until the end of the approval, whichever is later. The reports will provide transparency regarding how the site management actions are being implemented, and where relevant, identify any force majeure events impacting the offset site, and any non-compliance with the management plan. The monitoring and reporting program will be undertaken for the period of the EPBC Act approval.

A full assessment of risks to achieving the management objectives and outcomes have also been considered as part of this OAMP. This assessment in presented in *Section 7*.

Table 26: Management actions, triggers and corrective actions

The management actions shown in this table are consistent with the risks identified in the listing advice, conservation advice, and threat abatement plans relevant to each matter.

Threat to offset values	Management activity	Performance objectives	Management actions (where, when and how the activity will be carried out).	Who will be carrying out the activity	Monitoring and reporting	Trigger for adaptive management and corrective action(s)	Corrective action and timing
Degradation of ornamental snake and koala habitat offset area	Ornamental snake offset area management	Increase the habitat quality scores for remnant and regrowth ornamental snake habitat based on the results of baseline and subsequent monitoring events to achieve the interim targets and completion criteria targets as listed in *Table 29*.	Pest animal control management actions in ornamental snake habitat offset area. Invasive plants and environmental weed control management actions in ornamental snake offset area. Strategic ecological thinning in regrowth and remnant areas if recommended by an appropriate qualified ecologist.	Offset provider or approval holder or their associated persons	Monitoring of offset value habitat quality scores will be undertaken in accordance with *Section 10*. The results of monitoring events will be compared against the habitat quality scores in the interim performance targets and completion criteria to determine the progress of the offset area and recorded as part of reporting (see *Section 10*).	Ornamental snake and koala offset habitat quality scores, performance targets and completion criteria (*Table 29*) are not on track to being achieved by Year 10 or Year 20.	Step 1: Investigate cause of trigger: • Within one month after 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. • Within 2 months after detection of the trigger, complete a re-evaluation of the suitability of the relevant management measures in the OAMP. The re-evaluation must identify appropriate corrective actions. Step 2: Implementation of corrective action/s The appropriate corrective actions identified under Step 1 will be implemented as soon as practicable, and in any case within 6 months after detection of the trigger.
Habitat or vegetation loss through land clearing	Maintain the extent of offset value habitat within the offset area	No unapproved, unplanned and/or intentional clearing of vegetation within the brigalow TEC and ornamental snake offset areas, except for clearing that is required for fencing, access, firebreaks, ecological restoration and public safety.	Construction and maintenance of access tracks, fencing and firebreaks will be undertaken in accordance with the requirements of *Table 26.* If vegetation clearing is required for fencing, access (i.e. weed control), firebreaks or public safety, it must be undertaken in accordance with best practice management methods and any applicable legislative requirements. Any clearing and/or ecological thinning will be in accordance with the advice of an appropriately suitably qualified ecologist.	Offset provider or approval holder or their associated persons	Quarterly inspections will monitor and document if any unapproved and/or intentional clearing of vegetation in the offset area, and also document vegetation clearing that has occurred for fire break, access road or fence line maintenance. Reporting to the Australian Government consistent with any and all EPBC Act approval(s).	Any activities in contravention of the declared area management plan. Any unapproved and/or intentional clearing of vegetation within the offset areas.	Step 1: Investigate cause of trigger (e.g. unauthorised access) • As soon as practicable, and in any case within one month of detection of the trigger, identify appropriate corrective actions. Step 2: Implementation of corrective action/s • As soon as practicable, and in any case within 2 months of detection of the trigger, the appropriate corrective actions must be implemented. These may include (though are not limited to) additional fencing and/or signage and security for the offset area.
Degradation of habitat by overgrazing	Grazing management	Livestock to be excluded from the offset area at specific times. When the habitat has become more established and better quality, livestock may be progressively removed from the offset area.	Ensure suitable fencing to exclude livestock from offset areas.	Offset provider or approval holder or their associated persons	Quarterly inspections will monitor and document numbers of livestock present in offset area. Habitat quality assessments will be undertaken in accordance with *Section 10*. These will include assessment of percentage cover of native perennial grasses Dry matter yield measurements must be in accordance with the Brigalow Belt pasture	Detection and/or evidence of livestock in offset area outside of specified timeframes and/or if dry matter yield (**DMY**) is <950kg/ha. Decrease in the richness and average ground layer cover at one or more habitat quality assessment sites based on the results of baseline and subsequent monitoring events.	Upon being notified or becoming aware of prohibited livestock grazing in the offset area, the Landholder is to remove the livestock from the area (if present) and assess the adequacy of fencing within 10 days. The land manager is to undertake fence maintenance and repairs to resecure the offset area within 10 days.

Threat to offset values	Management activity	Performance objectives	Management actions (where, when and how the activity will be carried out).	Who will be carrying out the activity	Monitoring and reporting	Trigger for adaptive management and corrective action(s)	Corrective action and timing
					photo standards. The pasture photo standards for RE 11.3.3 are alluvial.[3] (see *Appendix E*).		
Introduction, establishment and spread of non-native weeds including restricted invasive plants listed under the Biosecurity Act 2014 *(Qld)*	Invasive plants and environmental weed management listed under the *Biosecurity Act 2014* (Qld)	Weed cover must not exceed 10% cover of the offset area by Year 20. No new restricted invasive plants listed under the *Biosecurity Act 2014* (Qld) are identified at any monitoring site (based on subsequent monitoring events).	All vehicles accessing the offset area are required to have undergone a weed inspection and vehicle hygiene check, confirming that they are weed free, before accessing the site. Chemical and/or mechanical control of all invasive plants and environmental weeds in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets or other sources of information. If a new weed infestation is identified, consult with local NRM Catchment Group, Healthy Land and Water, Council and Queensland Department of Agriculture and Fisheries to determine the invasiveness of the weed and tested/ recommended control measures Control the spread of new infestation/s. Treat new infestation/s promptly to reduce the extent and spread of the infestation.	Landholder, and associated contractors	Map invasive plant and environmental weeds as part of baseline and ongoing habitat quality monitoring. Quarterly inspections will observe and record the presence of weeds and success of previously applied weed control measures. The inspection will include before and after photos of the weed control area.	Pest plants dominate isolated area and or occur in an area greater than 10% of the offset area. A pest weed species is identified at one or more monitoring sites, or opportunistically during any site inspection or other monitoring.	Step 1: Investigate cause of trigger Step 2: Implementation of corrective action(s) Upon being notified or becoming aware of pest plants dominating isolated areas and or occupying greater than 10% of the offset area. The landholder is to implement pest control measures within one month. These measures may include, and are not limited to: • foliar spraying • basal bark spraying • stem injection • cut stump • cut and swab • stem scraper • wick applicators • mechanical removal.
Increased impacts of feral animals in the offset area.	Pest animal management	Reduction in the observed abundance of wild dog, European foxes and other feral animals from the first year of management. A reduction in koala mortality resulting from wild dogs and feral pigs during the term of the management period.	Participate fully in, and cooperate with, any and all regional pest control programs, unless those would otherwise contravene a part of this OAMP. Pest animal control program to be implemented via appropriately qualified person/s. Control feral pigs, European foxes and wild dogs via a coordinated multiple pronged management program. Pest control will be undertaken twice within a 3-month period. Additionally, if the land manager, during quarterly inspections of the offset area notes an incursion of feral deer, feral pig or wild dog activity, an additional coordinated multiple pronged management program is to be instigated until the increased activity has ceased and/or the deer, feral pigs and wild dogs are removed.	Offset provider or approval holder or their associated persons	Monitoring of this management action will be undertaken at least four times annually. Quarterly inspections will involve traversing the offset area with streams, low lying areas and vehicle access tracks being noted to record the presence of wallow holes, tracks and visual incidents in the offset area. If detected, these areas will be GPS-recorded and photographed and rechecked at the next quarterly inspection. Quarterly and annual inspections of the offset	Any observed evidence of feral animal presence and/or habitat damage in the offsets area An increase in mean feral pig abundance from first year and subsequent monitoring events. Any evidence of koala injury or death from feral animals such as wild dogs and pigs.	• Upon being notified or becoming aware of pest animal populations exceeding the threshold, the land manager is to implement all necessary or appropriate control measures needed to reduce pest animal populations to below trigger thresholds. The land manager is to have completed implementation of all necessary or appropriate pest control measures within one month. • The land manager may approach neighbouring landowners to discuss the increased pest animal presence and an integrated control program may be developed. If an integrated control program is considered appropriate, the land manager will make best endeavours to reach agreement with neighbouring landowners to implement such a program. • If impacts from the pest animal populations have not naturally remediated within 6 months of completion of implementation of the control measures, the land manager is to undertake and complete all works required to remediate those impacts.
Degradation of ornamental snake habitat by feral pigs	Feral pig management	Reduction in mean feral pig relative abundance from the first year of management. With pigs, the gestation period is 3 months, so if control actions are undertaken 3 months apart, the population can be heavily impacted.					

[3] https://futurebeef.com.au/wp-content/uploads/2011/09/Alluvial-July2013.pdf

Threat to offset values	Management activity	Performance objectives	Management actions (where, when and how the activity will be carried out).	Who will be carrying out the activity	Monitoring and reporting	Trigger for adaptive management and corrective action(s)	Corrective action and timing
					area will record the effectiveness of previous control activities and inform the design and timing of future pest animal control programs.		

Fire: the impact from uncontrolled wildfire or inappropriate fire regimes cause degradation in offset area habitat quality	Fire management	Uncontrolled fire does not occur in the offset area.	Implement fire management in accordance with requirements in this OAMP, including:
			• Fire breaks reformed every 2 years and slashed as required to enable access and maintain fuel loads below 1,800 kg/ha DMY.
			• Wildfire response procedure developed
			• Undertake planned burns in surrounding remnant and regrowth non-brigalow-based vegetation in accordance with relevant RE fire management guidelines.
			• Planned burns target mosaic burning resulting in patches of unburnt vegetation providing variation in the stages of response from fire and diversity of habitat.
				Offset provider or approval holder or their associated persons	Quarterly inspections will monitor and document if there is evidence of wildfire, prohibited burning or force majeure events.
					Quarterly inspections will monitor and document if a prescribed low-intensity ecological burn in the surrounding non-brigalow country has occurred.
					Weed cover is to be monitored by the same methodology and at the same time
						The occurrence of deliberately lit fires.
						Offset area habitat degradation as a result of a lack of or inappropriate fire regimes as determined through monitoring.
							Step 1: Investigate cause of trigger
							• Within one month of detection of the trigger, complete an investigation into the reasons why the fire management measures have resulted in a decrease in habitat quality scores. That investigation must review adherence to the fire management measures and must identify appropriate corrective actions.
							Step 2: Implementation of corrective action/s
							• Corrective action: upon being notified or becoming aware of a prohibited fire in the offset area, the landholder is to reassess and implement new access protocols for any lessees etc., signage and general access within one fortnight.
							• Corrective action: subsequent to any occurrence of fire in the offset area, the land manager suitable qualified person appointed by the Landholder will:
							  • inspect and repair, and widen if necessary, all firebreaks; and
							  • reassess fuel load reduction practices.
							  • exclude grazing until the DMY is above 2,560 kg/ha. This higher threshold is to enhance the ground cover recovery process following an uncontrolled hot fire or wildfire.

Fire *Inappropriate fire regimes may have unexpected negative impacts on the quality of the habitat at the offset site.*	No evidence of inappropriate fire regimes in the offset area	Only planned and controlled ecological burns will be used in the offset area.	To ensure that planned burns in any areas surrounding the offset area will be done on a mosaic basis, with no more than 30% of the area in any year, and in keeping with the fire guidelines provided in the RE fire management guidelines. Please note: if fire damages the offset areas, that constitutes an incident for the purposes of *Section 10*.	Offset provider or approval holder or their associated persons	Monitoring of this management action will be undertaken by the landholder or suitable qualified person appointed by the approval holder at least four times annually. Quarterly inspections will monitor and document if a prescribed low-intensity ecological burn has occurred, and recorded in the annual report with the written advice from an ecologist or other suitably qualified person (e.g. Fire Warden) Weed cover is to be monitored by the same methodology and at the same time as the DMY	Destruction of, or significant damage to, regrowth or fallen timber as a result of inappropriate fire regimes.	Step 1: Investigate cause of trigger • Within one month of detection of the trigger, complete an investigation into the reasons why the fire regime measures have resulted in a decrease in habitat quality scores. That investigation must review adherence to the fire management measures and must identify appropriate corrective actions. Step 2: Implementation of corrective action/s • Corrective action: upon becoming aware of inappropriate fire regimes decreasing habitat quality at the offset site, the landholder is to reassess fire management practices and ensure their compliance with the RE fire management guidelines. • Corrective action: exclude grazing until the DMY is above 2,560 kg/ha. This higher threshold is to enhance the ground cover recovery process following a controlled fire.

Threat to offset values	Management activity	Performance objectives	Management actions (where, when and how the activity will be carried out).	Who will be carrying out the activity	Monitoring and reporting	Trigger for adaptive management and corrective action(s)	Corrective action and timing
					and weed control undertaken post a fire event to ensure weed cover (weeds of national significance) is ≤10%. Dry matter yield measurements must be in accordance with the Brigalow Belt pasture photo standards.		
Offset fails to achieve the performance targets and completion criteria within the 10- or 20-year timeframe	Achieve the performance targets and completion scores in *Section 8* at Year 10 or Year 20.	The performance targets and completion criteria are achieved by Year 10 or Year 20.	All management actions outlined in in this OAMP will be implemented to ensure that the interim performance targets and completion criteria are achieved.	Offset provider or approval holder or their associated persons	Monitoring of the offset area will be undertaken in accordance with *Section 10*. The results of monitoring events will be compared against the performance targets and completion criteria to determine the progress of the offset area and recorded as part of reporting.	The performance targets and completion criteria are not achieved by Year 10 or Year 20.	Step 1: Investigate cause of trigger • 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 measures in the OAMP and must identify appropriate corrective actions. Step 2: Implementation of corrective action/s As soon as practicable, and in any case within 3 months of detection of the trigger, complete implementation of the corrective actions identified under Step 1. These may include (though are not limited to): • Increasing the frequency and intensity of pest animal and weed control measures or revising the type of measures to be implemented. • Modifying the fire management measures to better support enhancement of offset values. If the investigation under Step 1 recommends changes to the management regime, then as soon as possible, and in any case within 6 months of detection of the trigger, implement a revised OAMP incorporating those recommended changes.
Site access	Unauthorised persons, vehicles, and/or stock are prevented from accessing the site	Public access to the offset area is prohibited. Access is restricted to those authorised persons required to undertake actions described in this management plan, including the landholder, and approval holder staff and their contractors and assigns. The offset area is not to be utilised for any purpose including recreational activities, or any other activities that deter from achieving the outcomes of this plan.	Fences will be maintained to prevent unauthorised access and to control stock presence. Signs will be erected at all entrances and potential access points to the site stating that access to the site is forbidden. All signs and any new planned fences will be erected within 6 months of the implementation of this OAMP. Any new fencing will be outside of the offset area and will be constructed of 3 barb and plain top wire to facilitate koala movement and to prevent species such as gliders becoming entangled.	Offset provider or approval holder or their associated persons	Monitoring of this management action will be undertaken by the land manager or suitable qualified person within 3 months of the offset area being legally secured and during quarterly inspections. Quarterly inspections will monitor and document evidence of unauthorised access to the offset area. Quarterly inspections will monitor and document if signage is fit for purpose	Evidence of unauthorised persons, vehicles, and/or stock is detected at any point. Evidence of stock is detected at any time. Damage is detected to any fence or sign.	For evidence of unauthorised persons, vehicles, and/or stock; or evidence of stock in an exclusion area: Step 1: determine access method: • Upon being notified or becoming aware of prohibited access to the offset area, the Landholder is to reassess access protocols for any lessees etc., signage and general access within one fortnight. • Damage to signage will be repaired within one fortnight of noting the damage. • If there are areas that have been negatively impacted, the regeneration of those areas will be added to the monitoring sites at *Table 33* and monitored during the quarterly inspections. • Signage will be repaired and maintained as required by the land manager, or suitable qualified person appointed by the approval holder.

Threat to offset values	Management activity	Performance objectives	Management actions (where, when and how the activity will be carried out).	Who will be carrying out the activity	Monitoring and reporting	Trigger for adaptive management and corrective action(s)	Corrective action and timing
		No evidence of unauthorised persons, vehicles, and/or stock is detected on site at any point. Fences and signage are erected at all necessary points and kept in good repair throughout the life of the EPBC Act approval.					
Storms/rain depressions/ flooding/wind damage	Minimise any long-term damage that prevents the achievement of the completion criteria	That the completion criteria are achieved (*Table 29*).	Locations of any areas impacted will be recorded via GPS. Subsequent monthly (during grazing periods), quarterly and annual inspections of the offset area will record the effectiveness of any previous remedial actions.	Offset provider or approval holder or their associated persons	Monthly and quarterly inspections will determine whether these actions will be required.	Any observed areas in excess of 0.5 ha of tree deaths detected during quarterly (or monthly) site inspections (including site meander survey).	The subsequent 5-yearly BioCondition/habitat quality monitoring and reporting event will determine whether these corrective actions will be required. If the 5-yearly BioCondition/habitat quality monitoring and reporting event determines that it is necessary to intervene, the following corrective actions will enhance and accelerate the regeneration process: Step 1: This action entails ripping the bare areas and commencing a propagation and planting program using locally sourced seeds for the appropriate koala habitat trees. The planting pallet will reflect the species composition and stocking rate of the parent RE. Step 2: Undertake an annual review of the planted areas to monitor their progress, with the following attributes to be measured: • Species richness • Stem counts • Stem heights • Stem diameter at breast height (**DBH**). Step 3: Undertake supplementary annual planting if required.
Climate change	Monitor and minimise the effects of climate change that prevent the achievement of the completion criteria	That the completion criteria are achieved (*Table 29*).	Implement all the management actions in this table, with a focus on storms/rain depressions/flooding/wind damage and fire.	Offset provider or approval holder or their associated persons	Monthly and quarterly inspections will record incidents which will be reported in the annual reports. Any impact to the delay in reaching the completion criteria will be detected in the 5 yearly reports.	No specific trigger. Continual review (at least every five years) in line with completion criteria targets.	Corrective actions as per each relevant section above.

6.1 Responsible parties

As the approval holder, Westside is accountable for implementing the OAMP, and commits to doing so. Completing the actions listed in the OAMP will be ensured through the annual reporting requirements (*Section 10*). Westside will coordinate reporting, reviewing, inspections, auditing and any adaptive management changes to the plan. A person within Westside (e.g. Environment Manager or equivalent) will be assigned the responsibility of managing offset requirements for Westside.

The landholder or land manager of each offset area, or their respective contractors or assigns, will maintain accurate records substantiating all activities related to the management of the offset area, and the monitoring of the offset site, as described in *Section 10*. These records will be made available to DCCEEW on request.

The landholder or land manager of each offset area, or their respective contractors or assigns, will undertake the offset management actions and day to day management of the site, including fencing, managing fire breaks, weed management, feral animal management and grazing management. The landholder or land manager, or their respective contractors or assigns, will also undertake the landholder reporting as per *Table 32*.

Westside will engage suitably qualified persons to undertake the BioCondition assessments, ecological studies and surveys, prepare reports and undertake inspections, as required in *Table 31* and *Table 32*.

6.2 Emergency procedures

Incidents identified at any of the offset sites will be reported by the landholder or land manager to Westside. The level of severity will dictate the necessary actions through Westside's formal incident management system. General incidents, for example, wild dog incursion, will be managed by the landholder or land manager, and responses to incidents adversely impacting habitat quality on the offset site, or MNES directly, will be coordinated by Westside, to ensure remediation or enhanced management measures (*Table 26*) are implemented to address the incident as soon as reasonably possible.

Westside will notify DCCEEW (within the timeframe stipulated by the Project approval conditions) after becoming aware of any incident, non-compliance with conditions, or non-compliance with any of the commitments made in this OAMP (see also *Section 12*).

7 Analysis of risks to achieving management objectives and offset completion criteria

Potential risks to achieving the management objectives and outcomes have been considered in this plan, as shown in *Table 28*. These risks include those that have been derived from an assessment of the threats to each of the impacted matters that are discussed in the relevant DCEEW listing advice, conservation advice, threat abatement plans and recovery plans, as detailed in *Section 5.5*. They have been assessed against the risk matrix (*Table 27*) supplied by DCCEEW. The risk matrix has been used to assess the risk that the plan's objectives will not be met and identify the sources of those risks and strategies for managing them.

The risk assessment:

a) identified threats that will, may, or are likely to impact the attainment of the completion criteria
b) assesses the likelihood and consequences of those threats, and characterises residual risk levels, taking into consideration the mitigation of the risk by implementing the management actions
c) identifies the level of uncertainty in mitigating the risk with the management actions and trigger criteria and corrective actions until the risk is reduced to an acceptable level.

The management actions and corrective actions are described in full detail in *Section 6*.

Table 27: Risk matrix

RISK MATRIX	
Qualitative measure of likelihood (how likely is it that this event/circumstances will occur after management activities are implemented)	
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances
Qualitative measure of consequences (what will be the consequence/result if the issue does occur)	
Minor	Minor incident of environmental damage that can be reversed (*e.g. short-term delays to achieving plan objectives, implementing low-cost, well-characterised corrective actions*)
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts (*e.g. short-term delays to achieving plan objectives, implementing well-characterised, high-cost/effort corrective actions*)
High	Substantial instances of environmental damage that could be reversed with intensive efforts (*e.g. medium-long term delays to achieving objectives, implementing uncertain, high-cost/effort corrective actions*)
Major	Major loss of environmental amenity and real danger of continuing (*e.g. plan objectives are unlikely to be achieved, with significant legislative, technical, ecological and/or administrative barriers to attainment that have no evidenced mitigation strategies*)
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage (*e.g. plan objectives are unable to be achieved, with no evidenced mitigation strategies*)

		Consequence				
Likelihood		**Minor**	**Moderate**	**High**	**Major**	**Critical**
	Highly likely	Medium	High	High	Severe	Severe
	Likely	Low	Medium	High	High	Severe
	Possible	Low	Medium	Medium	High	Severe
	Unlikely	Low	Low	Medium	High	High
	Rare	Low	Low	Low	Medium	High

Table 28: Risk assessment for the terrestrial offset sites

Note: The risk ranking codes relate to the risk matrix as follows: L = Likelihood C = Consequence R = Risk

Risk	Threats	Initial risk ranking L	C	R	Management measures	Management measures/actions	Residual risk ranking L	C	R
Force majeure events									
Drought	The threat posed by drought is a decrease in DMY and groundcover, an increase in the likelihood of unplanned fire due to the dry conditions that could be started by lightning strike during storms and an increase in weed cover when rainfall was received. There would also be lower levels of growth expected.	Likely	Moderate	Medium	Offset area management Grazing management	Cattle will be excluded from the offset area during times of drought. Should the offset be deemed by the approval holder or DCCEEW to be delayed due to drought, both parties will work together to determine an appropriate response.	Likely	Moderate	Medium
Storms/severe tropical lows/flooding/wind damage	The most significant impact from storms or tropical lows is typically flooding. Systems generally form between November and April.	Likely	Moderate	Medium	Offset area management	The offset areas at Clements Creek are in parts of the landscape that can experience flooding. However the likelihood of extended flooding of the areas is extremely low due to flood waters usually receding within 1 week. Wind damage to bigger trees would be expected to be the largest impact. Storms and/or severe tropical lows are relatively infrequent (though likely to occur at some point during the life of the approval). However, flooding is not expected to be of sufficient duration, and winds are not expected to be sufficiently severe, to cause substantial long-term harm to the site. Additionally, the increased availability of soil moisture following extreme weather events is expected to increase growth rates, likely assisting natural repair of any potential damage. Wind damage to bigger trees would be expected to be the largest impact. The damage would be limited to loss of limbs, or in extreme cases, the occasional lightning strike causing tree death. Increased soil moisture may assist weed growth, so a meander survey across the entire site will occur as soon after the end of a cyclone and any associated flooding as is safe and reasonably practicable to detect any areas of increased weed density. Flooding may also contribute to erosion (see below).	Likely	Minor	Low
Climate change	Changes to climate with the potential to impact the long-term viability of the offset. Includes: • extreme temperatures and heatwaves • extreme rainfall and flooding • extreme storms • bushfire weather.	Likely	Moderate	Medium		Implement all the management actions in the management actions table (*Table 26*), with a focus on storms/rain depressions/flooding/wind damage and fire.	Likely	Minor	Low
Degradation of habitat or vegetation loss through land clearing									
Mining of the offset site	No mining permits exist over the Clements Creek property.	Rare	Critical	High	Offset area management	If an alternative land use is approved by the Queensland Government, and the declared area is revoked, an alternative offset will be required. The financial implications of impacting any offset area add significant commercial risks to any proposed project in the offset area.	Rare	Critical	High
Degradation of habitat	The degradation of habitat due to the lack of environmental management of the offsets area including appropriate grazing regimes, invasive plant control, fire management, and/or infrastructure maintenance.	Possible	High	Medium	Offset area management Grazing management	Implementation of the management actions and adaptive management framework as outlined in this OAMP.	Unlikely	Minor	Low

Risk	Threats	Initial risk ranking			Management measures	Management measures/actions	Residual risk ranking		
		L	C	R			L	C	R
Erosion	Raindrops hit bare soil with enough force to break the soil aggregates. These fragments wash into soil pores and prevent water from infiltrating the soil. Water then accumulates on the surface and increases runoff which takes soil with it.	Highly likely	Minor	Medium	Offset area management Grazing management	Increases to the severity of erosion at Clements Creek may occur due to the topography of the sites. However, that risk can be further reduced by decreasing stock movement in the Offset Area and maintaining a DMY of at least 950 kg/ha at all times. Stock will be removed from the offset site before that minimum level would be breached.	Possible	Minor	Low
Timber harvesting/ collection	Unauthorised access to the offset areas may result in timber harvesting/collection. Such actions would delay the establishment of the TECs and fauna habitat.	Unlikely	Moderate	Low	Offset area management Site access control	Complete the installation of signage at all vehicle access points identifying the areas as an environmental offset, within 6 months of the approval of the OAMP. Complete the installation of any new planned fences, within 12 months of the approval of the OAMP. All field monitoring (rapid and detailed) will report on any evidence of timber harvesting.	Rare	Moderate	Low
Unplanned clearing	The offset sites occur within properties that are used for cattle production. It is possible for unplanned/illegal clearing for agriculture activities to occur but considered improbable as the offset site will be mapped as Category A on the PMAV. Clearing can also occur by vehicles traversing the area off designated roads/tracks and/or illegal camping. This is also considered improbable, as the sites are remote and access to the site will be restricted. The most plausible (though still unlikely) cause of unplanned/illegal clearing would be if aerial spraying on adjacent properties strayed across the offset boundary.	Unlikely	Major	High	Offset area management Site access control	Complete the installation of signage at all vehicle accesses identifying the areas as an environmental offset, within 6 months of the implementation of the OAMP. Complete the installation of any new fences, within 12 months of the implementation of the OAMP. Any new fences will have a plain top wire instead of barbed wire. Prior to impacting any MNES, the approval holder will apply for registration of the declared area that will legally secure the environmental offset. It is noted that the period taken for the registration to be completed is subject to the timeframes of the regulatory agency. All monitoring (rapid and detailed) will report on any evidence of clearing.	Rare	Major	Medium
Fire: the impact from uncontrolled fire would be a reduction in groundcover, thinning of the canopy and slowing of the offset site achieving the completion criteria									
Unplanned or non-controlled fire in offset area.	The impact from uncontrolled fire would be a reduction in DMY and overall groundcover, thinning of the canopy, destruction of regrowth and emerging saplings and an overall slowing of the offset site achieving the completion criteria.	Likely	High	High	Fire management	The offset site is largely comprised of remnant and regrowth eucalypt species circa 6-12m in height. The risk of a 100% loss is low due to lower DMY (fuel load) within the communities that are further managed with grazing.	Possible	Minor	Low
Increased fire risk due to high fuel loads	During periods when a low-level grazing regime has occurred and an average or above average wet season, there is an opportunity for fuel loads in the form of dry matter to accumulate to unacceptable levels. When this occurs and the high levels of fuel are present prior to summer, then the risk of wild and/or high-intensity fires is exacerbated.	Likely	High	High	Fire management	Graze to reduce DMY to no less than 950 kg/ha.	Unlikely	Minor	Low
Invasive plants: introduction, establishment and spread of non-native weeds including restricted invasive plants listed under the* Biosecurity Act 2014 *(Qld)									
New infestations of invasive weed species in the offset area.	Infestation of previously unidentified invasive weeds within the offset area. If a weed infestation is unchecked, it may cause a significant deterioration in the offset site.	Possible	High	Medium	Invasive plants management listed under the *Biosecurity Act 2014* (Qld)	The proposed offset sites are remote and access to the offset area will be limited, to reduce/prevent pathogen/propagule transmission vectors. All vehicles accessing the offset area are required to have undergone a weed inspection and vehicle hygiene check, confirming that they are weed free, before accessing the site. If a new weed infestation is identified, weed management measures will occur as per *Table 26.*	Unlikely	Minor	Low

Risk	Threats	Initial risk ranking			Management measures	Management measures/actions	Residual risk ranking		
		L	C	R			L	C	R
Expansion of existing infestations of declared weed species in the offset area	The extent of existing infestations of restricted invasive plants species expand or the species become more abundant within the area.	Highly likely	High	High	Invasive plants management listed under the *Biosecurity Act 2014* (Qld)	Access to the offset area will be restricted. Chemical and/or mechanical control of all restricted invasive plants in accordance with the control measures outlined in the Biosecurity Queensland Fact Sheets or other sources of information.	Unlikely	Minor	Low
Pest/feral animals in the offset area									
Increased population of feral animals in the offset area.	Wild cat, pig and dog populations are extensive and highly transient, and therefore the scale of impact is potentially large. Major damage to the environment/habitat occurs when large numbers of animals congregate in the area.	Highly likely	High	High	Pest animal management Feral pig management	Control of pigs and wild dogs will be undertaken via a shooting and/or baiting program on the properties. This would be augmented with trapping of wild pigs, when pest animal numbers increase. Additionally, the Pastoral Manager, during quarterly inspections of the offset area may remove any wild cats, pigs or wild dogs that are seen. If an increase in pig or dog activity is noted, an additional trapping, baiting and/or control program would be instigated until the increased activity has ceased.	Possible	Minor	Low
Degradation of habitat by overgrazing									
Unauthorised or inappropriate grazing in offset area	High density grazing over an extended period destroys shrubs and native grass cover and slows the regeneration of habitat. The natural condition of the native ground cover is a low cover and hence any grazing undertaken is to reduce exotic grass cover whilst retaining a minimum of 950 kg/ha of DMY at the end of the dry season. Stocking rates are not fixed as this region is subject to significant changes in grass cover with seasonal conditions.	Possible	High	Medium	Grazing management	Fences are to be maintained in working order and allow for exclusion of cattle when needed. Signage will be installed on all major access gates to ensure the offset area is well signposted. Stocking rates will not be fixed as this region is subject to significant changes in grass cover with seasonal conditions. However, grazing is used as required when DMY exceeds 950 kg/ha and the fire risk is high. Grazing of the ornamental snake offset area is not permitted during the wet season. Stock will be grazed in the offset areas for fuel reduction purposes during September to January, or until the wet season starts. Cattle are to be excluded from the riparian offset areas, and from all areas during drought and when DMYs are below 950 kg/ha.	Unlikely	Minor	Low
Degradation of habitat or vegetation loss through thickening of native vegetation									
Thickening of vegetation in the offset area	Clearing or the harvesting of the larger trees for sawlogs and other timber products has resulted in a large number of eucalypt seedlings establishing resulting in a thickened or high stem density. The soil has a finite resource of nutrients and water, and this high density of stems results in a situation whereby the stems cease growing and stay at an immature condition/size unless a force majeure event or intervention occurs to reduce the stem density and therefore allowing larger trees to establish and therefore hollows to be produced.	Possible	High	Medium	Offset area management	Fire – if controlled burns are undertaken in non-brigalow based vegetation, burns will be done on a mosaic basis, with no more than 30% of the area in any year, and in keeping with the fire guidelines provided in the RE fire management guidelines. Ecological burns undertaken in the offset area can be a tool to reduce the stem density of the eucalypt vegetation when there is a density of >750 immature trees/ha[4]. This is done only to reduce competition for soil resources and therefore promote larger trees becoming established.	Unlikely	Minor	Low

[4] Glossary, Accepted development vegetation clearing code, Managing regulated regrowth vegetation, Effective date 7th February 2020; compiled by the Department of Natural Resources, Mines and Energy

Risk	Threats	Initial risk ranking			Management measures	Management measures/actions	Residual risk ranking		
		L	C	R			L	C	R
Offset fails to achieve the interim performance targets and/or completion criteria within the anticipated 5-, 10-, 15- and 20-year timeframes, respectively									
Offset fails to achieve the interim performance targets and/or completion criteria within the anticipated 5, 10-, 15- and 20-year timeframes, respectively	Failure to achieve and maintain offset completion criteria	Possible	High	Medium	Offset area management	Implement the management actions of the approved OAMP. Monitor and report on attainment of interim environmental performance targets and completion criteria.	Unlikely	High	Medium

8 Offset completion criteria and performance targets

Offset completion criteria have been determined for the ornamental snake and koala MNES based on an understanding of the specific habitat, connectivity and other ecological values for the natural species' habitat. These criteria were initially derived from detailed ecology survey information of both the impact and offset sites, as detailed in this OAMP.

The targeted habitat quality meets guidelines published by ANZMEC (2000),[5] stating completion criteria should be:

1. Specific enough to reflect the unique set of environmental, social and economic circumstances.
2. Flexible enough to adapt to changing circumstances without compromising objectives.
3. Include environmental indicators suitable for demonstrating that rehabilitation trends are heading in the right direction.
4. Undergo periodic review resulting in modification if required due to changed circumstances or improved knowledge.
5. Based on targeted research which results in more informed decisions.

The completion criteria and the 'with offset' non-native species attribute (provided in *Appendix B*) establishes the acceptable limits to non-native species in the offset area. These will be achieved as a requirement of this OAMP.

Over the course of the management period, a set number of interim completion criteria have been proposed to track the trajectory of habitat quality improvement towards the desired final completion criteria (*Table 29*). The timing for these interim targets corresponds with the 5-yearly targeted species surveys and detailed ecological condition monitoring in Years 5, 10, 15 and 20.

Interim targets were derived for the MNES by identifying the attributes expected to increase over the period of the approval. The values were determined by differentiating between specific attributes, of which the majority were longer term targets (e.g. species richness, tree canopy cover, number of large trees) and those where an initial benefit could be realised early (e.g. recruitment of woody species, non-native plant cover). The interim targets are expressed as a narrow range, to acknowledge the potential variability in the attributes measured due to seasonal variation during the 5-year periods. For example, droughts, tropical lows and floods are not infrequent in Central Queensland, and can, for a short period, affect individual attributes and overall scoring. Utilising a range for interim targets assists in recognising this variation while ensuring that the offset is improving over the longer term.

The completion of management actions identified in *Table 26* will enable the offset sites to improve and achieve the scores required, thus meeting and maintaining the completion criteria required of the offset. The annual reports (see *Section 10*) will provide transparency regarding how the site management actions are being implemented, and where relevant, identify any force majeure events impacting the offset site, and any non-compliance with the OAMP.

[5] *Strategic Framework for Mine Closure.* (2000). Australian and New Zealand Minerals and Energy Council and Minerals Council of Australia. Canberra, ACT.

Table 29: Interim targets and completion criteria (extracted from Appendix B)

MNES	EPBC status	Stage 1 impact area (ha)	Impact site quality (- /10)	Offset property	Offset Area (ha)	Habitat quality scores (future)				
						Start (- /10)	Year 5 (- /10)	Year 10 (- /10)	Year 15 (- /10)	Year 20 (- /10)
Ornamental snake habitat	VUL	16.00	4.97	Clements Creek	104.77	5.05	5.3-6.0	6.0-6.5	6.5-7.0	7.0
Koala habitat	END	8.90	2.69	Clements Creek		5.92	6.0-6.5	6.5-7.0	7.0-7.5	8.0

9 Offset site management and protection additional to those that currently exist

Securing the offset areas will add additional protection for biodiversity values from clearing[6] and provide additional management of weeds and pest animals that are additional to the general requirements for biosecurity.

The offset areas are currently not protected from timber harvesting, the inappropriate use of hot fires or the under-sowing of exotic pasture species by either the VM Act or the EPBC Act due to exemptions within the legislative frameworks for the continuing use of the land. Remnant vegetation areas are protected from broadscale clearing under the VM Act; however, the clearing of regrowth is permitted (see the offset map at *Figure 7)*. Maintaining the existing condition of regulated vegetation and land for habitat values is not addressed under the VM Act.

The Biosecurity Act imposes a 'general biosecurity obligation' on all Queenslanders to manage biosecurity risks that are under their control and that they know about or could reasonably be expected to know about.[7] In practical terms, this means that:

- If you are a livestock owner, you are expected to stay informed about pests and diseases that could affect or be carried by your animals, as well as weeds and pest animals that could be on your property. You are also expected to manage them appropriately.
- If you are a landowner, you are expected to stay informed about the weeds and pest animals (such as wild dogs) that could be on your property. You are also expected to manage them appropriately.

The Biosecurity Act assigns the pests identified in the offset areas as Restricted Matters in Categories 1-7 and requires the following management as shown below in *Table 30*.

[6] *Vegetation Management Act 1999* (Schedule definitions)
[7] See https://www.daf.qld.gov.au/business-priorities/biosecurity/policy-legislation-regulation/biosecurity-act-2014/general-biosecurity-obligation

Table 30: **Biosecurity Act 2014** ***(Qld) obligations***

Category	What is required	Examples
1	Must advise an authorised officer within 24 hours of becoming aware	Electric ant/ Little Fire ant, Red imported fire ant
2	Must advise an authorised officer within 24 hours of becoming aware	Noxious fish, including alligator gar and black pacu
3	Must not distribute, be traded or released into the environment	Most invasive weeds, pest animals, noxious fish
4	Must not move	Certain weeds, pest animals, noxious fish such as feral pigs, feral deer, rabbits, Hudson pear and jumping cholla cactus
5	Must not possess or keep	Rabbits, carp, bunny ears cactus
6	Must not feed (except if undertaking a control program)	Feral deer, wild dogs, rabbits, foxes, noxious fish
7	Must, as soon as practicable, kill the restricted matter	Noxious fish, including tilapia, gambusia, carp

The obligations in the OAMP are additional to these general obligations, in that control is required once thresholds as detailed in *Table 26* are met, which initiates the respective controlling actions. For example, there is a requirement to control feral pigs if a large number are observed in any one property inspection; this is above and beyond the requirements of the Biosecurity Act, as is the reduction of weed species to 10% of the offset area over the life of the management plan.

Clements Creek is located within the Isaac Regional Council LGA. In the council's *Isaac Region Biosecurity Plan 2024–2027* landholder's responsibilities are listed as:

- to Discharge their General Biosecurity Obligation.
- to exercise due diligence by taking all practical steps towards best practice management of pest species as defined by the Biosecurity Act 2014 or under Isaac Regional Council local laws, on land that they occupy.
- to promote good neighbour ethos.
- to hold a good level of awareness of regional weeds and pests, knowledge of how to obtain further information, and an understanding of the strategies and goals we all work towards in matters of biosecurity.
- promotion of this knowledge within the wider community.

Invasive plants listed under the Biosecurity Act recorded in the OIA included:

- Rubber vine (*Cryptostegia grandiflora*)
- Harrisia cactus (*Harrisia martinii*)
- Tree pears (*Opuntia* spp.)
- Parkinsonia (*Parkinsonia aculeata*)
- Parthenium weed (*Parthenium hysterophorus*)
- Passionfruit vine (*Passiflora foetida)*.

Parkinsonia was recorded in high density in coolabah woodlands (RE 11.3.3) and rubber vine was common in riparian forest (RE 11.3.25).

10 Monitoring and reporting

The offsets area monitoring methods are provided in *Table 31*. Habitat quality monitoring is to be undertaken in Years 5, 10, 15 and 20 to assess comparative changes in habitat condition against baseline data collected on the offset site, as well as attainment and maintenance of the offset completion criteria (see *Section 8*). Further, the monitoring will measure changes resulting from the management actions and variability due to climatic conditions. This will inform the nature and frequency of management actions required and if trigger levels are breached, the use of corrective actions to bring the offset back into compliance.

Note that the methodologies listed, and the RE benchmarks used in the establishment of the baseline data, will be used consistently throughout the reporting period to enable the comparison of data that is collected in a consistent manner.

These methodologies are as prescribed in Queensland Government publications (DEHP 2017; Neldner at al. 2017; Eyre et al. 2015) and in various survey guidelines published by the Australian Government, along with various conservation advices. Sampling methods and sampling strategies are provided in these documents. DMY assessments (fuel load) are determined using guidelines provided by FutureBeef, a government-sponsored organisation that disseminates practical tools and scientific insights to beef producers across northern Australia. The monitoring of DMY (fuel load) is a key practical measurement in assessing and mitigating a high risk.

The survey methods from the original survey work undertaken in 2023 is described in this OAMP (Lyngco, 2023, 2024).

While undertaking monitoring activities, the responsible person will move between the permanent survey points in a random manner noting any substantial variation in the condition of the offset area between the permanent monitoring points. Any substantial variation is to be noted in the subsequent report.

Westside, its successors or assigns, will maintain accurate and complete compliance records. Additionally, if DCCEEW makes a request in writing, the approval holder will provide electronic copies of compliance records to DCCEEW within the specified timeframe.

Westside, its successors or assigns, will provide a Compliance Report annually for each 12-month period following the date of the approval, for the period of the approval. Offset Area Reports describing the progress of the offset area over the relevant 12-month period will be part of those reports until the completion criteria are achieved or the end of the EPBC approval, whichever comes first. The monitoring methodology and schedule is outlined in *Table 31*. The reporting schedule is provided in *Table 32*. The location of the monitoring sites is shown at *Figure 9.* The coordinates of the existing baseline monitoring sites are shown in *Table 33.*

The Offset Area Reports will contain records substantiating all activities relevant to the implementation and management of the offsets.

Westside or a suitably qualified person appointed by Westside will undertake quarterly inspections of the offset area to observe and record dry matter, pest plants, accessibility (i.e. condition of fencing), evidence of fire and evidence of pest animal incursion. The inspection records will serve as the primary data source for the annual Offset Area Report. A report template for an annual report is provided at *Appendix F*.

Table 31: Monitoring schedule and methodology to be used

Monitoring	Attributes monitored	Timing	Method	Location/s
Part A: Surveys undertaken by ecologists in Year 5, 10, 15 and 20				
Targeted ornamental snake surveys Targeted koala surveys	Presence and abundance of ornamental snake in the offset area, and location of sightings. Presence and abundance of koala in the offset area, and location of sightings. If proven, new technology, such as thermal drone flights, may be used to supplement the methodology used in the baseline reports.	In May, in Year 5, 10, 15 and 20 after the commencement of the Project	*Survey guidelines for Australia's threatened reptiles* (DSEWPAC 2011b). *Survey guidelines for Australia's threatened mammals* (DSEWPAC 2011a).	Across the ornamental snake offset area Across the koala offset area
Habitat quality assessments	Landscape-scale attributes • Size of patch • Context • Connectivity Site based attributes • Refer BioCondition Species habitat attributes (ornamental snake only) • Quality and availability of food and habitat required for foraging • Quality and availability of habitat required for shelter and breeding • Quality and availability of habitat required for mobility Absence of threats	A baseline site in AU1 will be established in Year 1 of the offset and will be reported in the first annual report. In May, in Year 5, 10, 15 and 20 after the commencement of the Project.	In accordance with the *Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy Version 1.3.* The data collected is then converted to version 1.2 to enable the use of DCCEEW's modified habitat quality assessment tool. Data collection and OAG calculation methods are to be consistent during the life of the OAMP.	At sites as shown in *Table 33*, and *Figure 9*

Monitoring	Attributes monitored	Timing	Method	Location/s
BioCondition assessments	• Recruitment of woody perennial species in 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	In May, in Year 5 10, 15 and 20 after the commencement of the Project.	Field observations, vegetation assessment as per the *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland Assessment Manual* (Eyre et al., 2015) Data for each of the ecological condition attributes monitored will be collected at each site and reported on and presented in a sequential manner (including previous data collected) to quantify change from the baseline condition. This will record the change in each attribute measured and hence the condition of the habitat, thus enabling a statistical comparison to previous years' data and tracking towards attainment of the offset interim and final completion criteria. In accordance with the *Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy Version 1.3.* The data collected is then converted to version 1.2 to enable the use of DCCEEW's modified habitat quality assessment tool. Biocondition benchmarks are to be consistent with *BioCondition Benchmarks version 3.4* (DESI 2023).	At sites as shown in *Table 33,* and *Figure 9*.
Habitat quality scores for each matter being koala and ornamental snake habitat.	• Site condition • Site context • Species stocking rate	In May, in Year 5, 10, 15 and 20 after the commencement of the Project.	As per the document *How to use the offsets assessment guide* (DSEWPAC, 2012) and baseline methods for scoring for koala and ornamental snake habitat, as described in the offset ecology reports (Lyngco 2023, Lyngco 2024a, Lyngco 2024b, Earthtrade, 2024).	Per matter area

Monitoring	Attributes monitored	Timing	Method	Location/s
Note that the methodologies listed, and the RE benchmarks used in the establishment of the baseline data, will be used consistently throughout the reporting period to enable the comparison of data.				
Part B: Quarterly landholder/approval holder records and monitoring (report to approval holder – end of September, December, March and June each year)				
Forestry operations, native timber harvesting and general vegetation impacts	Any incidence of native plant destruction	Monitored quarterly and reported annually in Offset Area Reports until the offset completion criteria are achieved.	Forestry operations, native timber harvesting and general vegetation impacts	Across the offset areas
Unauthorised impacts to vegetation from activities such as illegal access/ camping	Vegetation, woody debris, grass cover, weed cover, feral animal damage and presence		Landholder or person appointed by the Landholder will undertake quarterly inspections of the offset area to observe and record grass cover levels, weeds, accessibility (e.g., condition of fencing), and evidence of fire, erosion, and feral animal incursion. The inspection records will be provided to the approval holder and serve as the primary data source for the Offset Area Report. Grass cover assessment is to be undertaken as per the DMY measurements in accordance with the Brigalow Belt pasture photo standards.[8] Weed cover is to be monitored by the same methodology and at the same time as the grass cover measurements. This is in addition to BioCondition assessments.	
Grazing	Livestock stocking rates	Monitored monthly during grazing periods at Clements Creek and reported annually until the offset completion criteria are achieved.		
Unplanned fire and inappropriate fire regimes	Occurrence, control measures implemented, timing and result of the control measures.	Monitored quarterly and reported annually in Offset Area Reports until the offset completion criteria are achieved.		
Weeds	Occurrence, control measures implemented, timing and the result of the control measures.			

[8] Available at: https://futurebeef.com.au/wp-content/uploads/2011/09/Eucalypt_woodlands-July2013.pdf https://futurebeef.com.au/resources/brigalow-belt-pasture-photo-standards/

Monitoring	Attributes monitored	Timing	Method	Location/s
Pest animals	Occurrence, control measures implemented, timing, number and type of species and the result of the control measures.		Quarterly inspections will involve traversing the offset area along streams, low lying areas and vehicle access tracks, to record the presence of wallow holes, tracks and any visual incidents. If detected, GPS locations will be recorded and photographed and rechecked at the next quarterly inspection. Any evidence of predation on ornamental snake must be reported immediately to the approval holder and corrective actions implemented.	
Storms/rain depressions/ flooding/wind damage	Occurrence, control measures implemented, timing and result of the control measures.			

Table 32: Reporting schedule

Report Details to DCCEEW	Reporting period	Submission due date
Annual Offset Area Report, which contributes to the Annual Compliance Report detailing photo points (including coordinates), implementation of management actions, any triggers for corrective actions and implementation of those corrective actions, if implemented, and offset condition outcomes, including habitat quality scores, condition of ornamental snake habitat and results of ornamental snake surveys, achieved for preceding reporting period.	Annually until the offset completion criteria are achieved and then every 5 years until the end of the approval.	Within 60 business days following the end of each 12-month period.
Compliance report detailing compliance with approval conditions under the EPBC Act, including compliance with the offset conditions, as detailed in the OAMP.	Compliance Report for each 12-month period following the date of the commencement of the implementation of the OAMP.	
Offset Habitat Quality Reporting including results of targeted fauna surveys, habitat quality and BioCondition monitoring and overall habitat quality scores. Including comparison on habitat quality scores to baseline scoring and provide recommendations for improving habitat quality.	Year 5, 10, 15 and 20 after the commencement of the Project.	Contained within the Annual Offset Area Report.
Reporting non-compliance		
Notification to DCCEEW of any incident and/or potential non-compliance and/or actual non-compliance with the approval conditions or the commitments made in this OAMP.	–	Within 2 business days of becoming aware of the incident.
Written report to DCCEEW providing details of any incident and/or potential non-compliance and/or actual non-compliance with the approval conditions or the commitments made in this OAMP.	–	Within 12 business days of becoming aware of the incident.

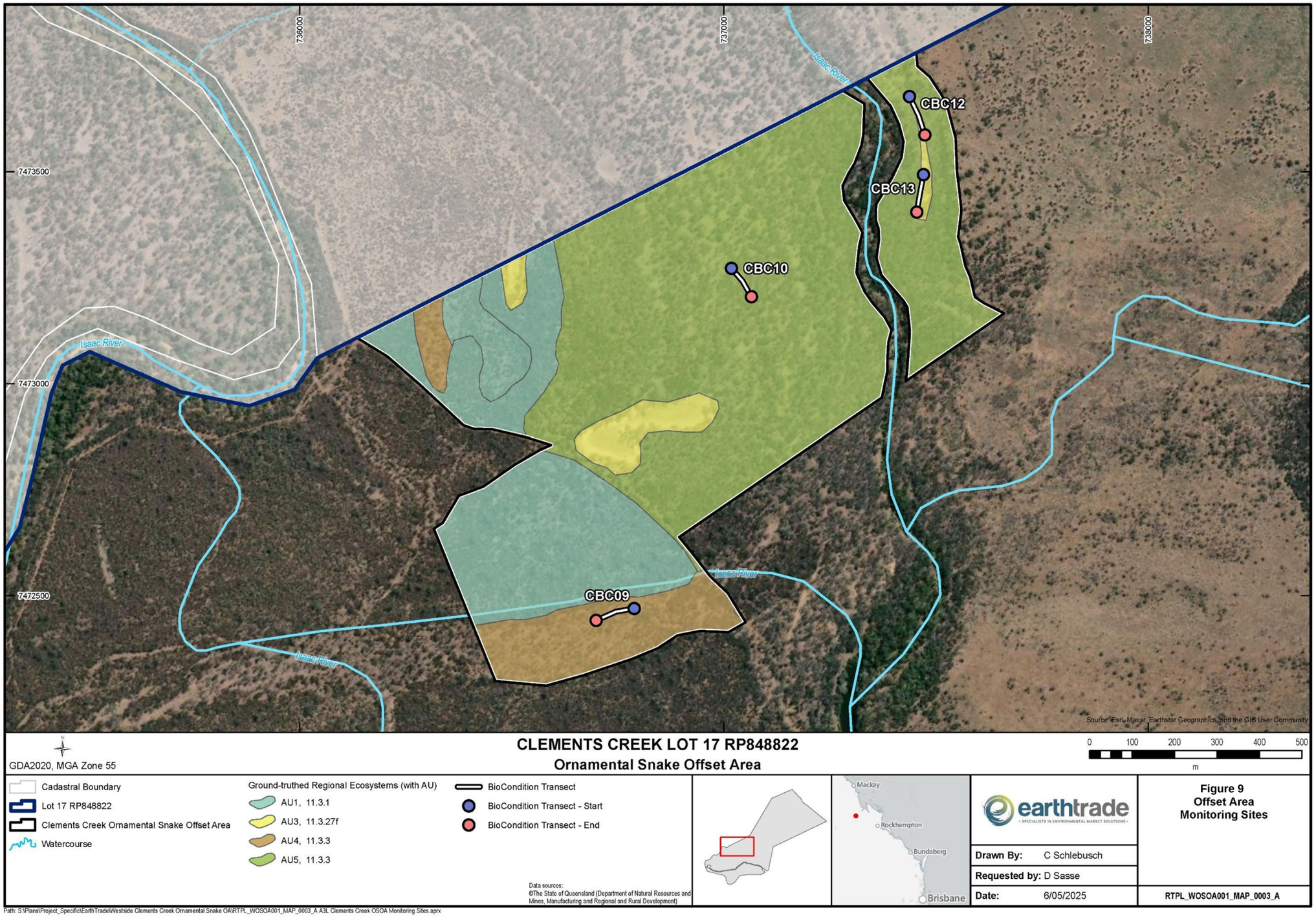
Table 33: Monitoring sites

Survey site name * #	Location: latitude ^	Location: longitude	Survey site name	Location: latitude	Location: longitude
CBC09 start	-22.838844	149.307373	**CBC12 start**	-22.827858	149.313507
CBC09 end	-22.839111	149.306503	**CBC12 end**	-22.828669	149.313873
CBC10 start	-22.831575	149.309483	**CBC13 start**	-22.829502	149.313863
CBC10 end	-22.832172	149.309952	**CBC13 end**	-22.830315	149.313717

** Survey site names are to be consistent with the baseline data collected for the duration of the OAMP*

^ Coordinates system: GDA2020. #One additional baseline monitoring site is to be established in Year 1 of the offset (AU1 – RE 11.3.1) and reported in the first annual report.

Figure 9: Monitoring sites – Clements Creek



GDA2020, MGA Zone 55

CLEMENTS CREEK LOT 17 RP848822
Ornamental Snake Offset Area

0 100 200 300 400 500
m

Cadastral Boundary
Lot 17 RP848822
Clements Creek Ornamental Snake Offset Area
Watercourse

Ground-truthed Regional Ecosystems (with AU)
AU1, 11.3.1
AU3, 11.3.27f
AU4, 11.3.3
AU5, 11.3.3

BioCondition Transect
BioCondition Transect - Start
BioCondition Transect - End

Data sources:
©The State of Queensland (Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development)

earthtrade
• SPECIALISTS IN ENVIRONMENTAL MARKET SOLUTIONS •

Drawn By:	C Schlebusch
Requested by:	D Sasse
Date:	6/05/2025

Figure 9
Offset Area
Monitoring Sites

RTPL_WOSOA001_MAP_0003_A

Path: S:\Plans\Project_Specific\EarthTrade\Westside Clements Creek Ornamental Snake OA\RTPL_WOSOA001_MAP_0003_A A3L Clements Creek OSOA Monitoring Sites.aprx

11 Legally binding mechanism

The approval holder will commence implementing the OAMP at the commencement of the action.

The offsets will initially be secured by being declared as an area of high conservation value under section 19F of the VM Act within 12 months of the action commencing. Once this has been registered on the title, the offset areas will be mapped as a category A area on the property map of assessable vegetation (**PMAV**). An area mapped as category A on a PMAV is described as an 'area subject to compliance notices, offsets and voluntary declarations'.

To secure the declared area on the title of the property, the property owners will complete and submit a request for a declared area form, and a declared area management plan form immediately after the preliminary documentation has been approved by DCCEEW. Both of these forms are requirements of the Queensland Department of Natural Resources and Mines, Manufacturing, and Regional and Rural Development so that the legally binding mechanism may be lodged on the title of the property.

An additional legally binding mechanism such as a conservation covenant will be registered within 5 years of the commencement of the implementation of the OAMP. Conservation covenants are registered to the title of the property under the LT Act.

The approval holder commits to avoiding any direct impacts to MNES before the legally binding mechanism is fully secured, with the exception of the following species habitat:

- squatter pigeon (southern) dispersal habitat; and
- koala dispersal habitat.

It is noted that the period taken for the registration to be completed is subject to the timeframes of the regulatory agency. The approved OAMP will be attached to the legal mechanism used to legally secure the environmental offset. The approval holder will provide written evidence to DCCEEW within 2 weeks of the mechanisms to legally secure the environmental offset having been registered.

Management and monitoring of the offset area will be undertaken in accordance with commitments in the approved OAMP.

The legally enforceable mechanism will remain in place to ensure the offset completion criteria are attained, and then maintained, for the period of the EPBC Act approval. Statutory protection of the offset area is maintained under the VM Act, NC Act and EPBC Act (or subsequent legislation). This will ensure that the ecological benefits of the offset are maintained in perpetuity.

12 Adaptive management and plan review

This OAMP has been prepared to be implemented until the offset completion criteria have been achieved, or when the approval for the Project ceases. Management measures will be reported in the Offset Area reports, and adapted, where required, if triggers are reached and corrective actions are implemented (see *Section 6* and *Table 26*). If management measures need substantial adjustment, Westside will review this plan in consultation with DCCEEW.

Westside will notify DCCEEW electronically within 2 business days of becoming aware of any incident and/or potential or actual non-compliance with the conditions or commitments made in

this OAMP. The notification will specify the condition or commitment made in a plan which has been or may have been breached; provide a short description of the incident and/or potential non-compliance and/or actual non-compliance; and identify the location (including co-ordinates), date, and time of the incident and/or potential or actual non-compliance.

Westside will provide to DCCEEW the details of any incident or non-compliance with the commitments made in this OAMP as soon as practical and no later than 2 business days after becoming aware of the incident or non-compliance, specifying:

a) the condition that the approval holder has potentially breached
b) the nature of the non-compliance
c) when and how the approval holder became aware of the non-compliance
d) how the non-compliance will affect the approved action
e) how the non-compliance will affect the anticipated impacts of the approved action, in particular how the non-compliance will affect the impacts on the MNES
f) the measures the approval holder will take to address the impacts of the non-compliance on the MNES and rectify the non-compliance
g) the time by when the approval holder will rectify the non-compliance.

If Westside wishes to carry out any activity otherwise than in accordance with this OAMP, Westside will submit to DCCEEW for the Minister's written approval, a revised version of the OAMP. The varied activity will not commence until the Minister has approved the varied OAMP in writing. If the Minister approves the revised OAMP, that OAMP will be implemented in place of the OAMP originally approved. If the Minister requests that Westside make specified revisions to the OAMP, Westside will develop and submit the revised OAMP for the Minister's written approval. Westside will implement the revised OAMP. Unless the Minister has approved the revised OAMP, then Westside will continue to implement the OAMP originally approved.

This OAMP will be submitted electronically to DCCEEW and will be published on Westside's website within 2 weeks of the Minister approving the OAMP in writing. The OAMP will remain on Westside's website until the expiry date of the approval.

13 Conclusion

This OAMP has been prepared to address all the requirements of the EPBC Act. This OAMP will be published on Westside's website within 15 days of the OAMP being approved by the Minister. The OAMP will remain on the website and accessible to the public for the duration of the EPBC Act approval.

The offset sites will successfully deliver offsets for the Project's residual significant impacts to habitat for the ornamental snake and koala. This offset for the Project will be implemented consistent with the EPBC Act *Environmental Offset Policy* and the approval conditions for the Project. The approval holder commits to the implementation of this OAMP until the expiry of the EPBC approval.

The approval holder also commits to registering a legally binding conservation mechanism to provide long-term protection to the offset area within 12 months of the action commencing. It is noted that the period taken for the registration to be completed is subject to the timeframes of the regulatory agency. The approval holder will provide DCCEEW with written evidence demonstrating that the offset area at Clements Creek has been legally secured within 2 weeks of

its registration. An additional legally binding mechanism such as a nature refuge or a conservation covenant will be registered within 5 years of the commencement of the implementation of the OAMP.

List of abbreviations

Abbreviation	Description
action, the	The Westside PL94 Coal Seam Gas Project
AU	Assessment unit
DAWE	Department of Agriculture, Water and the Environment (former)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DES	Department of Environment and Science (Queensland)
DEWHA	Department of the Environment, Water, Heritage and the Arts (Australian) (former)
DMY	Dry matter yield
DoE	Department of Environment (Australian) (former)
DoEE	Department of the Environment and Energy (Australian) (former)
DSEWPAC	Department of Sustainability, Environment, Water, Population and Communities (Australian) (former)
Westside	Westside Corporation Pty Ltd
EOP	Environmental Offsets Policy (October 2012) (EPBC Act)
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999* (Cth)
GPS	global positioning system
ha	hectares
HQS	Habitat quality scoring
HVR	High-value regrowth
km	kilometres
KoRV	koala retrovirus
LGA	local government area
LT Act	*Land Title Act 1994* (Qld)
m	metres
MHQA	modified habitat quality assessment
MNES	matters of national environmental significance
MSES	matters of state environmental significance
NC Act	*Nature Conservation Act 1992* (Qld)
OAG	Offset Assessment Guide (DCCEEW)
OMP	Offset Management Plan
OS	Offset strategy
PMAV	Property map of assessable vegetation
Project	The Westside PL94 Coal Seam Gas Project
RE	Regional ecosystem
SRI	significant residual impact
TEC	Threatened ecological community
THQ	Terrestrial habitat quality
VHC	vegetation hazard class
VM Act	*Vegetation Management Act 1999* (Qld)

Glossary

Term	Definition
Approval holder	The person to whom an EPBC Act approval is granted
Approved conservation advice/s	A conservation advice approved by the Minister under section 266B(2) of the EPBC Act.
Business day	A day that is not a Saturday, a Sunday or a public holiday in the state or territory of the action.
Category A vegetation	Under Queensland vegetation management legislation, Category A vegetation is an area which is: • a declared area • an offset area, an exchange area, an area that has been subject to unlawful clearing or an enforcement notice, an area subject to clearing as a result of a clearing offence • an area that the chief executive determines to be Category A. Category A areas are colour-coded red on the regulated vegetation management map. See *Vegetation Management Act 1999* (Qld), s20AL.
Category X vegetation	Under Queensland vegetation management legislation, all areas other than Category A, B, C and R areas are Category X areas. Some Category X areas are also identified on a PMAV as 'locked in'. Category X areas are also known as 'exempt areas' because activity in Category X areas is not regulated by the *Vegetation Management Act 1999*. Category X areas are colour-coded white on the regulated vegetation management map (see *Vegetation Management Act 1999* (Qld) s20A.).
Compliance records	All documentation or other material in whatever form required to demonstrate compliance with the conditions of approval in the approval holder's possession, or that are within the approval holder's power to obtain lawfully.
Compliance report/s	A written report of compliance with, and fulfilment of, the conditions attached to the approval.
Department	The Australian Government Department administering the *Environment Protection and Biodiversity Conservation Act 1999*.
Habitat quality scores	A score out of ten, based on BioCondition assessment plus an assessment of habitat quality. A method of evaluating habitat quality within a particular community based on key indicators including site condition, site context and species habitat index (if necessary). The method produces a score out of 10, where the maximum score of 10 represents a fully intact system. Scores of 4, 5 and 6 may indicate good quality regrowth or medium value habitat.
Minister	The Minister administering the *Environment Protection and Biodiversity Conservation Act 1999*, including any delegate thereof.
Offset calculator	The *Offset Assessment Guide* spreadsheet tool as provided by DAWE
Plan/s	Any of the documents required to be submitted to the Department, implemented by the approval holder and/or published on its website in accordance with the approval conditions.
Property map of assessable vegetation	A map certified by the chief-executive as a PMAV for an area and showing the vegetation category areas for the area (e.g. Category C area, Category X area) See *Vegetation Management Act 1999* (Qld), section 20AK.

Term	Definition
Regional ecosystem	Regional ecosystems are vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil (Sattler and Williams 1999, *Vegetation Management Act 1999*).
Regrowth vegetation	Vegetation that is not remnant vegetation.
Regulated vegetation	Vegetation that: • is an endangered regional ecosystem, an of concern regional ecosystem, or a least concern regional ecosystem, and • forms the predominant canopy of the vegetation covering more than 50% of the undisturbed predominant capacity; averaging more than 70% of the vegetation's undisturbed height; and • composed of species characteristic of the vegetation's undisturbed predominant canopy.
Riparian zone	The area within a minimum of 100 metres of the defining bank of any watercourse (as defined under the Queensland *Water Act 2000*).
Site habitat quality	A score on a scale of 0 to 10 representing a site's utility for each listed threatened species, where zero ('0') represents a site of no value to the species, and '10' represents ideal habitat. Unless agreed otherwise by the Department, site quality must be comprised of 3 points for site condition, 3 points for site context, and 4 points for species stocking rate. These scores must be derived in accordance with the Queensland *Guide to determining terrestrial habitat quality: A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy* (Version 1.3, 2020).
Site specific assessment/s	A baseline investigation which explains the scientific basis on which the description and location of impact/s and associated users, performance indicators, trigger values and limits have been derived, or not derived.
Suitably qualified ecologist	An individual with tertiary qualifications and/or a minimum of three years demonstrated experience relevant to the task in question.
Suitably qualified person	A person who has professional qualifications, training, skills and/or experience related to the nominated subject matter and can give authoritative independent assessment, advice and analysis on performance relative to the subject matter using the relevant protocols, standards, methods and/or literature.
Website	A set of related web pages located under a single domain name attributed to the approval holder and available to the public.

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Appendix A: OAG outputs

Appendix A1: Ornamental snake OAG output

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 19
2 October 2012

Matter of National Environmental Significance	
Name	Ornamental Snake
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	16	WestSide PL94 CSG MNES Chapter
			Quality *(Scale 0-10)*	5	
		Total quantum of impact *(Adjusted Hectares)*		8.00	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	Yes			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss without offset *(%)*		Risk of loss with offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				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)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area without offset	0.0	Future area with offset	0.0			Minimum (90%) direct offset requirement met?			FALSE	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality without offset *(adjusted hectares)*		Future area and quality with offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	8.00	AU1 RE 11.3.1 26.55ha,	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	104.77	Risk of loss without offset *(%)*	0%	Risk of loss with offset *(%)*	0%	0.00	85%	0.00	0.00	Overall net present value	13.09	
				Time until ecological benefit	20	Start quality *(scale of 0-10)*	5	Future quality without offset *(scale of 0-10)*	5	Future quality with offset *(scale of 0-10)*	7	2.00	65%	1.30	1.25	% of impact offset	163.58%	
								Future area without offset	104.8	Future area with offset	104.8			Minimum (90%) direct offset requirement met?			TRUE	

Protected matter attributes	Attribute relevant to case?	Quantum of impact	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)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	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)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	Yes							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	8.00	13.09	1.64	TRUE	0.00	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Appendix A2: Koala OAG output

Offsets Assessment Guide

For use in determining offsets under the Environment Protection and Biodiversity Conservation Act 19
2 October 2012

Matter of National Environmental Significance	
Name	Koala
EPBC Act status	Endangered
Annual probability of extinction Based on IUCN category definitions	1.2%

Impact calculator

Ecological communities

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of community	No		Area *(Hectares)*		
			Quality *(Scale 0-10)*		
		Total quantum of impact *(Adjusted Hectares)*			

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Information source
Area of habitat	Yes		Area *(Hectares)*	8.9	WestSide PL94 CSG MNES Chapter
			Quality *(Scale 0-10)*	3	
		Total quantum of impact *(Adjusted Hectares)*		2.67	

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Number of features e.g. Nest hollows, habitat trees	No			
Condition of habitat Change in habitat condition, but no change in extent	No			

Threatened species

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact	Information source
Birth rate e.g. Change in nest success	No			
Mortality rate e.g Change in number of road kills per year	No			
Number of individuals e.g. Individual plants/animals	Yes			

Offset calculator

Ecological Communities

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality **without** offset *(adjusted hectares)*		Future area and quality **with** offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of community	Yes			Risk-related time horizon *(max. 20 years)*		Start area *(hectares)*		Risk of loss **without** offset *(%)*		Risk of loss **with** offset *(%)*		0.00		0.00	0.00	Overall net present value	0.00	
				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)*		0.00		0.00	0.00	% of impact offset	0.00%	
								Future area **without** offset	0.0	Future area **with** offset	0.0			Minimum (90%) direct offset requirement met?			FALSE	

Threatened species habitat

Protected matter attributes	Attribute relevant to case?	Total quantum of impact *(Adjusted Hectares)*	Proposed offset	Time Horizon *(Years)*		Start area and quality		Future area and quality **without** offset *(adjusted hectares)*		Future area and quality **with** offset *(adjusted hectares)*		Raw gain	Confidence in result *(%)*	Adjusted gain	Net present value *(adjusted hectares)*	Offset Result		Cost *($ total)*
Area of habitat	Yes	2.67	AU1 RE 11.3.1 26.55ha,	Risk-related time horizon *(max. 20 years)*	20	Start area *(hectares)*	104.77	Risk of loss **without** offset *(%)*	0%	Risk of loss **with** offset *(%)*	0%	0.00	85%	0.00	0.00	Overall net present value	10.73	
				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)*	8	2.00	65%	1.30	1.02	% of impact offset	401.85%	
								Future area **without** offset	104.8	Future area **with** offset	104.8			Minimum (90%) direct offset requirement met?			TRUE	

Protected matter attributes	Attribute relevant to case?	Quantum of impact	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)*
Number of features e.g. Nest hollows, habitat trees	No							0.00		0.00	0.00	0.00%	FALSE	
Condition of habitat Change in habitat condition, but no change in extent	No							0.00		0.00	0.00	0.00%	FALSE	

Threatened species

Protected matter attributes	Attribute relevant to case?	Quantum of impact	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)*
Birth rate e.g. Change in nest success	No							0.00		0.00	0.00	0.00%	FALSE	
Mortality rate e.g Change in number of road kills per year	No							0.00		0.00	0.00	0.00%	FALSE	
Number of individuals e.g. Individual plants/animals	Yes							0.00		0.00	0.00	0.00%	FALSE	

Summary

					Cost ($)		
Protected matter attributes	Quantum of impact	Net present value	% of impact offset	Direct offset adequate?	Direct offset	Other compensatory measures	Total
Birth rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Mortality rate	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of individuals	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Number of features	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Condition of habitat	0.00	0.00	0.00	FALSE	0.00	N/A	0.00
Area of habitat	2.67	10.73	4.02	TRUE	0.00	N/A	0.00
Area of community		0.00	0.00	FALSE	0.00	N/A	0.00
					$0.00	**$0.00**	**$0.00**

Appendix B: Detailed habitat quality assessment tables

Appendix B1: Ornamental snake habitat at the impact site

Assessment table for impact for fauna habitat	**Assessment unit:**	**Bench-mark (BM)**	OSB&F			**BM**	OSB&F		
	Property:		Westside PL94				Westside PL94		
	Assessment site no:		13				15		
	Regional ecosystem:	**11.4.9**	11.4.9			**11.4.9**	11.4.9		
Ecological condition indicator			**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**
Recruitment of woody perennial species (%)		**100**	100.0	100%	5.0	**100**	100.0	100%	5.0
Native plant species richness (No.): Trees		**2**	3.0	150%	5.0	**2**	5.0	250%	5.0
Shrubs		**5**	3.0	60%	3.0	**5**	4.0	80%	3.0
Grasses		**5**	2.0	40%	3.0	**5**	5.0	100%	5.0
Forbs		**10**	12.0	120%	5.0	**10**	17.0	170%	5.0
Tree canopy height (m): average of emergent, canopy and sub-canopy layer		**8**	7.0	70%	3.0	**8**	5.0	50%	3.0
Tree sub-canopy height		**0**	3.0	50%	3.0	**0**	0.0	0%	0.0
Average score					3.0				1.5
Tree canopy cover (%): average of emergent, canopy and sub-canopy layer		**18**	24.9	100%	5.0	**18**	38.8	155%	5.0
Tree sub-canopy cover		**0**	9.2	84%	5.0	**0**	0.0	0%	0.0
Average score					5.0				2.5
Shrub canopy cover (%):		**5**	4.0	80%	5.0	**5**	9.1	182%	5.0
Native perennial grass cover (%):		**16**	3.8	24%	1.0	**16**	1.0	6%	0.0
Organic litter (%):		**45**	63.8	142%	5.0	**45**	52.6	117%	5.0
Large trees/ha (euc./non-euc. combined)		**47**	0.0	0%	0.0	**47**	0.0	0%	0.0
Coarse woody debris (m/ha)		**980**	0.0	0%	0.0	**980**	19.0	2%	0.0
Non-native plant cover (%):		**0**	0.0	2%	10.0	**0**	0.7	65%	0.0
Quality/availability of food/foraging habitat (-/10)					9.0				4.8
Quality/availability of shelter (-/10)					16.0				6.4
Site condition score (-/110)					**75.0**				**48.2**
Size of patch (fragmented) (-/10)					5				5
Connectedness (fragmented) (-/5)					0				0
Context (fragmented) (-/5)					2				2
Threats to the species (-/15)					7				9
Site context score (-/35)					**14.0**				**16.0**
Assessment unit totals									
AU site condition score (-/3):									1.68
AU site context score (-/3):									1.29
AU species stocking rate (-/4):									2.00
AU habitat quality score (-/10):									**4.97**
AU area within impact area:									16.00
Total impact area for this MNES:									16.00
Area weighting:									1.00
AU weighted HQS:									**4.97**
Total all AUs:									**4.97**

Appendix B2: Ornamental snake offset site – current quality

Assessment table for offset for fauna habitat	**Assessment unit:**	**Bench-mark (BM)**	AU5			**BM**	AU3			**BM**	AU4			**BM**	AU4			**BM**	AU1		
	Property:		Clements Creek				Clements Creek				Clements Creek				Clements Creek				Clements Creek		
	Assessment site no:		CBC12				CBC13				CBC9				CBC10				CBC8		
	Regional ecosystem:	**11.3.3**	11.3.3			**11.3.27f**	11.3.27f			**11.3.3**	11.3.3			**11.3.3**	11.3.3			**11.3.1**	11.3.1		
Ecological condition indicator			**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**
Recruitment of woody perennial species (%)		**100**	100	100%	5	100	100	100%	5	**100**	100	100%	5	**100**	50	50%	3	**100**	80	80%	5
Native plant species richness (No.): Trees		**3**	2	67%	3	1	3	300%	5	**3**	3	100%	5	**3**	2	67%	2.5	**4**	5	167%	5
Shrubs		**5**	2	40%	3	1	2	100%	5	**5**	5	100%	5	**5**	4	80%	2.5	**4**	10	200%	5
Grasses		**12**	4	33%	3	3	5	100%	5	**12**	6	50%	2.5	**12**	4	33%	2.5	**6**	5	125%	5
Forbs		**15**	4	27%	3	6	8	89%	2.5	**15**	9	60%	2.5	**15**	4	27%	2.5	**10**	3	38%	2.5
Tree canopy height (m): average of emergent, canopy and sub-canopy layer		**18**	20	111%	5	16	22	110%	5	**18**	25	139%	5	**18**	18	100%	5	**15**	11	79%	5
Tree sub-canopy height		**10**	9	90%	5	0	0			**10**	10	100%	5	**10**	10	100%	5	**7**	0	0%	0
Average score					5				5				5				5				2.5
Tree canopy cover (%): average of emergent, canopy and sub-canopy layer		**28**	52.4	187%	5	**40**	73	183%	5	**28**	56.1	200%	3	**28**	69.8	249%	3	**35**	69.8	199%	5
Tree sub-canopy cover		**5**	0	0%	0	**0**	0			**5**	16	320%	3	**5**	1.6	32%	2	**15**	0	0%	0
Average score					2.5				5				3				2.5				2.5
Shrub canopy cover (%):		**4**	1.3	33%	3	0	1.9			**4**	1.3	33%	3	**4**	2	50%	5	**15**	6.1	122%	5
Native perennial grass cover (%):		**45**	24	53%	3	3	62	2067%	5	**45**	36	80%	3	**45**	51	113%	5	**33**	12	36%	1
Organic litter (%):		**30**	52	173%	5	15	23	153%	5	**30**	24	80%	5	**30**	27.4	91%	5	**30**	88	293%	3
Large trees/ha (euc./non-euc. combined)		**10**	2	20%	5	28	0	0%	0	**10**	3	30%	5	**10**	7	70%	10	**53**	0	0%	0
Coarse woody debris (m/ha)		**285**	290	102%	5	530	700	132%	5	**285**	230	81%	5	**285**	95	33%	2	**1520**	590	39%	2
Non-native plant cover (%):		**0**	0	0%	10	0	0	0%	10	**0**	0	0%	10	**0**	0	0%	0%	**0**	0	0%	10
Quality/availability of food/foraging habitat (-/10)					2.6				3.6				7.4				2.6				1.6
Quality/availability of shelter (-/10)					0				1.6				8.0				1.6				4.8
Site condition score (-/110)					**58.1**				**60.7**				**74.4**				**51.7**				**52.4**
Size of patch (fragmented) (-/10)					10				10				10				10				10
Connectedness (fragmented) (-/5)					4				4				5				4				5
Context (fragmented) (-/5)					4				4				5				4				5
Threats to the species (-/15)					5.4				5.4				7.2				5.4				5.4
Site context score (-/35)					**23.4**				**23.4**				**27.2**				**23.4**				**25.4**
Assessment unit totals																					
AU site condition score (-/3):					1.58				1.66								1.72				1.43
AU site context score (-/3):					2.01				2.01								2.17				2.18
AU species stocking rate (-/4):					1.43				1.43								1.43				1.43
AU habitat quality score (-/10):					**5.02**				**5.09**								**5.32**				**5.03**
AU area within offset area:					64.14				4.26								9.83				26.55
Total offset area for this MNES:					104.77				104.77								104.77				104.77
Area weighting:					0.61				0.04								0.09				0.25
AU weighted HQS:					**3.07**				**0.21**								**0.50**				**1.28**
Total HQS all AUs:																					**5.05**

Appendix B3: Ornamental snake offset site – future quality without offset

Assessment table for offset for fauna habitat	**Assessment unit:**	**Bench-mark (BM)**	AU5			**BM**	AU3			**BM**	AU4			**BM**	AU4			**BM**	AU1		
	Property:		Clements Creek				Clements Creek				Clements Creek				Clements Creek				Clements Creek		
	Assessment site no:		CBC12				CBC13				CBC9				CBC10				CBC8		
	Regional ecosystem:	**11.3.3**	11.3.3			**11.3.27f**	11.3.27f			**11.3.3**	11.3.3			**11.3.3**	11.3.3			**11.3.1**	11.3.1		
Ecological condition indicator			**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**
Recruitment of woody perennial species (%)		**100**	100	100%	5	100	100	100%	5	**100**	100	100%	5	**100**	50	50%	3	**100**	80	80%	5
Native plant species richness (No.): Trees		**3**	2	67%	3	1	3	300%	5	**3**	3	100%	5	**3**	2	67%	2.5	**4**	5	167%	5
Shrubs		**5**	2	40%	3	1	2	100%	5	**5**	5	100%	5	**5**	4	80%	2.5	**4**	10	200%	5
Grasses		**12**	4	33%	3	3	5	100%	5	**12**	6	50%	2.5	**12**	4	33%	2.5	**6**	5	125%	5
Forbs		**15**	4	27%	3	6	8	89%	2.5	**15**	9	60%	2.5	**15**	4	27%	2.5	**10**	3	38%	2.5
Tree canopy height (m): average of emergent, canopy and sub-canopy layer		**18**	20	111%	5	16	22	110%	5	**18**	25	139%	5	**18**	18	100%	5	**15**	11	79%	5
Tree sub-canopy height		**10**	9	90%	5	0	0			**10**	10	100%	5	**10**	10	100%	5	**7**	0	0%	0
Average score					5				5				5				5				2.5
Tree canopy cover (%): average of emergent, canopy and sub-canopy layer		**28**	52.4	187%	5	**40**	73	183%	5	**28**	56.1	200%	3	**28**	69.8	249%	3	**35**	69.8	199%	5
Tree sub-canopy cover		**5**	0	0%	0	**0**	0			**5**	16	320%	3	**5**	1.6	32%	2	**15**	0	0%	0
Average score					2.5				5				3				2.5				2.5
Shrub canopy cover (%):		**4**	1.3	33%	3	0	1.9			**4**	1.3	33%	3	**4**	2	50%	5	**15**	6.1	122%	5
Native perennial grass cover (%):		**45**	24	53%	3	3	62	2067%	5	**45**	36	80%	3	**45**	51	113%	5	**33**	12	36%	1
Organic litter (%):		**30**	52	173%	5	15	23	153%	5	**30**	24	80%	5	**30**	27.4	91%	5	**30**	88	293%	3
Large trees/ha (euc./non-euc. combined)		**10**	2	20%	5	28	0	0%	0	**10**	3	30%	5	**10**	7	70%	10	**53**	0	0%	0
Coarse woody debris (m/ha)		**285**	290	102%	5	530	700	132%	5	**285**	230	81%	5	**285**	95	33%	2	**1520**	590	39%	2
Non-native plant cover (%):		**0**	0	0%	10	0	0	0%	10	**0**	0	0%	10	**0**	0	0%	0%	**0**	0	0%	10
Quality/availability of food/foraging habitat (-/10)					2.6				3.6				7.4				2.6				1.6
Quality/availability of shelter (-/10)					0				1.6				8.0				1.6				4.8
Site condition score (-/110)					**58.1**				**60.7**				**74.4**				**51.7**				**52.4**
Size of patch (fragmented) (-/10)					10				10				10				10				10
Connectedness (fragmented) (-/5)					4				4				5				4				5
Context (fragmented) (-/5)					4				4				5				4				5
Threats to the species (-/15)					5.4				5.4				7.2				5.4				5.4
Site context score (-/35)					**23.4**				**23.4**				**27.2**				**23.4**				**25.4**
Assessment unit totals																					
AU site condition score (-/3):					1.58				1.66								1.72				1.43
AU site context score (-/3):					2.01				2.01								2.17				2.18
AU species stocking rate (-/4):					1.43				1.43								1.43				1.43
AU habitat quality score (-/10):					**5.02**				**5.09**								**5.32**				**5.03**
AU area within offset area:					64.14				4.26								9.83				26.55
Total offset area for this MNES:					104.77				104.77								104.77				104.77
Area weighting:					0.61				0.04								0.09				0.25
AU weighted HQS:					**3.07**				**0.21**								**0.50**				**1.28**
Total HQS all AUs:																					**5.05**

Appendix B4: Ornamental snake offset site – future quality with offset

Assessment table for offset for fauna habitat	**Assessment unit:**	**Bench-mark (BM)**	AU5			**BM**	AU3			**BM**	AU4			**BM**	AU4			**BM**	AU1		
	Property:		Clements Creek				Clements Creek				Clements Creek				Clements Creek				Clements Creek		
	Assessment site no:		CBC12				CBC13				CBC9				CBC10				CBC8		
	Regional ecosystem:	**11.3.3**	11.3.3			**11.3.27f**	11.3.27f			**11.3.3**	11.3.3			**11.3.3**	11.3.3			**11.3.1**	11.3.1		
Ecological condition indicator			**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**
Recruitment of woody perennial species (%)		**100**			5	100			5	**100**			5	**100**			3	**100**			5
Native plant species richness (No.): Trees		**3**			5	1			5	**3**			5	**3**			2.5	**4**			5
Shrubs		**5**			3	1			5	**5**			5	**5**			2.5	**4**			5
Grasses		**12**			3	3			5	**12**			2.5	**12**			2.5	**6**			5
Forbs		**15**			3	6			2.5	**15**			2.5	**15**			2.5	**10**			2.5
Tree canopy height (m): average of emergent, canopy and sub-canopy layer		**18**			5	16			5	**18**			5	**18**			5	**15**			5
Tree sub-canopy height		**10**			5	0			0	**10**			5	**10**			5	**7**			0
Average score					5				5				5				5				2.5
Tree canopy cover (%): average of emergent, canopy and sub-canopy layer		**28**			5	**40**			5	**28**			3	**28**			3	**35**			5
Tree sub-canopy cover		**5**			2.5	**0**				**5**			3	**5**			2	**15**			0
Average score					2.5				5				3				2.5				2.5
Shrub canopy cover (%):		**4**			3	0				**4**			3	**4**			5	**15**			5
Native perennial grass cover (%):		**45**			3	3			5	**45**			3	**45**			5	**33**			1
Organic litter (%):		**30**			5	15			5	**30**			5	**30**			5	**30**			3
Large trees/ha (euc./non-euc. combined)		**10**			10	28			10	**10**			10	**10**			10	**53**			10
Coarse woody debris (m/ha)		**285**			5	530			5	**285**			5	**285**			5	**1520**			5
Non-native plant cover (%):		**0**			10	0			10	**0**			10	**0**			10	**0**			10
Quality/availability of food/foraging habitat (-/10)					6				8				7.4				6				1.6
Quality/availability of shelter (-/10)					12				12				8.0				12				10
Site condition score (-/110)					**81.75**				**81.0**				**80.0**				**74.5**				**69.6**
Size of patch (fragmented) (-/10)					10				10				10				10				10
Connectedness (fragmented) (-/5)					4				4				5				4				5
Context (fragmented) (-/5)					4				4				5				4				5
Threats to the species (-/15)					10				10				10				10				10
Site context score (-/35)					**23.4**				**23.4**				**30.0**				**28.0**				**30.0**
Assessment unit totals																					
AU site condition score (-/3):					2.23				2.21								2.15				1.90
AU site context score (-/3):					2.40				2.40								2.49				2.57
AU species stocking rate (-/4):					2.57				2.57								2.57				1.43
AU habitat quality score (-/10):					**7.20**				**7.18**								**7.21**				**5.90**
AU area within offset area:					64.14				4.26								9.83				26.55
Total offset area for this MNES:					104.77				104.77								104.77				104.77
Area weighting:					0.61				0.04								0.09				0.25
AU weighted HQS:					**4.41**				**0.29**								**0.68**				**1.49**
Total HQS all AUs:																					**6.87**

Appendix B5: Koala habitat at the impact site

	Assessment unit:	Bench-mark (BM)	KB&F			BM	KSH			BM	KSH		
	Property:		Westside PL94				Westside PL94				Westside PL94		
	Assessment site no:		12				13				15		
	Regional ecosystem:	11.9.2	11.9.2			11.4.9	11.4.9			11.4.9	11.4.9		
Ecological condition indicator			**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**
Recruitment of woody perennial species (%)		**100**	60	60%	3	**100**	100	100%	5.0	**100**	100	100%	5.0
Native plant species richness (No.):	Trees	**2**	13	650%	5	**2**	3	150%	5.0	**2**	5	250%	5.0
	Shrubs	**10**	11	110%	5	**5**	3	60%	3.0	**5**	4	80%	3.0
	Grasses	**7**	5	71%	3	**5**	2	40%	3.0	**5**	5	100%	5.0
	Forbs	**12**	20	167%	5	**10**	12	120%	5.0	**10**	17	170%	5.0
Tree canopy height (m): average of emergent, canopy and sub-canopy layer		**15**	15	100%	5	**10**	7	70%	3.0	**10**	5	50%	3.0
Tree sub-canopy height		**6**	0	0%	0	**6**	3	50%	3.0	**6**	0	0%	0.0
Average score					2.5				3.0				1.5
Tree canopy cover (%): average of emergent, canopy and sub-canopy layer		**25**	28.1	112%	5	**25**	24.9	100%	5.0	**25**	38.8	155%	5.0
Tree sub-canopy cover		**3**	0	0%	0	**11**	9.2	84%	5.0	**11**	0	0%	0.0
Average score					2.5				5.0				2.5
Shrub canopy cover (%):		**25**	11.3	45%	3	**5**	4	80%	5.0	**5**	9.1	182%	5.0
Native perennial grass cover (%):		**18**	10.2	57%	3	**16**	3.8	24%	1.0	**16**	1	6%	0.0
Organic litter (%):		**30**	46.2	154%	5	**45**	63.8	142%	5.0	**45**	52.6	117%	5.0
Large trees/ha (euc./non-euc. combined)		**13**	8	62%	10	**47**	0	0%	0.0	**47**	0	0%	0.0
Coarse woody debris (m/ha)		**366**	140	38%	2	**980**	0	0%	0.0	**980**	19	2%	0.0
Non-native plant cover (%):		**0**	0.2	20%	5	**0**	0.02	2%	10.0	**0**	0.65	65%	0.0
Quality/availability of food/foraging habitat (-/10)					8				4				4
Quality/availability of shelter (-/10)					3				0				0
Site condition score (-/100)					**65.0**				**54.0**				**41.0**
Size of patch (fragmented) (-/10)					5				5.00				5.00
Connectedness (fragmented) (-/5)					0				0.00				0.00
Context (fragmented) (-/5)					2				2.00				2.00
Ecological corridors (-/6)					0				0				0
Threats to the species (-/15)					4.8				1.80				1.80
Species mobility capacity (-/10)					3.5				4.50				4.50
Site context score (-/51)					**15.3**				**13.3**				**13.3**
Assessment unit totals													
AU site condition score (-/3):					1.95								1.43
AU site context score (-/3):					0.90								0.89
AU species stocking rate (-/4):					0.57								0.29
AU habitat quality score (-/10):					**3.42**								**2.60**
AU area within impact area:					2.00								16.00
Total impact area for this MNES:					18.00								18.00
Area weighting:					0.11								0.89
AU weighted HQS:					**0.38**								**2.31**
Total all AUs:													**2.69**

Appendix B6: Koala offset site – current quality

Assessment table for offset for fauna habitat	**Assessment unit:**	**Bench-mark (BM)**	AU5			**BM**	AU3			**BM**	AU4			**BM**	AU4			**BM**	AU1		
	Property:		Clements Creek				Clements Creek				Clements Creek				Clements Creek				Clements Creek		
	Assessment site no:		CBC12				CBC13				CBC9				CBC10				CBC8		
	Regional ecosystem:	**11.3.3**	11.3.3			**11.3.27f**	11.3.27f			**11.3.3**	11.3.3			**11.3.3**	11.3.3			**11.3.1**	11.3.1		
Ecological condition indicator			**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**
Recruitment of woody perennial species (%)		**100**	100	100%	5	**100**	100	100%	5.0	**100**	100	100%	5	**100**	50	50%	3	**100**	80	80%	5.0
Native plant species richness (No.): Trees		**3**	2	67%	3	**1**	3	300%	5.0	**3**	3	100%	5	**3**	2	67%	3	**4**	5	125%	5.0
Shrubs		**5**	2	40%	3	**2**	2	100%	5.0	**5**	5	100%	5	**5**	4	80%	3	**4**	10	250%	5.0
Grasses		**12**	4	33%	3	**5**	5	100%	5.0	**12**	6	50%	3	**12**	4	33%	3	**6**	5	83%	3.0
Forbs		**15**	4	27%	3	**9**	8	89%	3.0	**15**	9	60%	3	**15**	4	27%	3	**10**	3	30%	3.0
Tree canopy height (m): average of emergent, canopy and sub-canopy layer		**18**	20	111%	5	**20**	22	110%	5.0	**18**	25	139%	5	**18**	18	100%	5	**15**	11	73%	5.0
Tree sub-canopy height		**10**	9	90%	5	**0**	0		0.0	**10**	10	100%	5	**10**	10	100%	5	**7**	0	0%	0.0
Average score					5				2.5				5				5				2.5
Tree canopy cover (%): average of emergent, canopy and sub-canopy layer		**28**	52.4	187%	5	**44**	73	166%	5.0	**28**	56.1	200%	3	**28**	69.8	249%	3	**35**	69.8	199%	5.0
Tree sub-canopy cover		**5**	0	0%	0	**0**	0		0.0	**5**	16	320%	3	**5**	1.6	32%	2	**15**	0	0%	0.0
Average score					2.5				2.5				3				2.5				2.5
Shrub canopy cover (%):		**4**	1.3	33%	3	**0**	1.9		0.0	**4**	1.3	33%	3	**4**	2	50%	3	**15**	6.1	203%	3.0
Native perennial grass cover (%):		**45**	24	53%	3	**5**	62	1240%	5.0	**45**	36	80%	3	**45**	51	113%	5	**33**	12	36%	1.0
Organic litter (%):		**30**	52	173%	5	**11**	23	209%	3.0	**30**	24	80%	5	**30**	27.4	91%	5	**30**	88	293%	3.0
Large trees/ha (euc./non-euc. combined)		**10**	2	20%	5	**24**	0	0%	0.0	**10**	3	30%	5	**10**	7	70%	10	**53**	0	0%	0.0
Coarse woody debris (m/ha)		**285**	290	102%	5	**770**	700	91%	5.0	**285**	230	81%	5	**285**	95	33%	2	**1520**	590	39%	2.0
Non-native plant cover (%):		**0**	0	0%	10	**0**	0	0%	10.0	**0**	0	0%	10	**0**	0	0%	10	**0**	0	0%	10.0
Quality/availability of food/foraging habitat (-/10)					10				10				10				10				0
Quality/availability of shelter (-/10)					4				5				5				6				0
Site condition score (-/100)					**69.5**				**66.0**				**75.0**				**73.5**				**45.0**
Size of patch (fragmented) (-/10)					10				10				10				10				10
Connectedness (fragmented) (-/5)					4				4				5				4				5
Context (fragmented) (-/5)					4				4				5				4				5
Ecological corridors (-/6)					6				6				6				6				6
Threats to the species (-/15)					4				4				4				4				4
Species mobility capacity (-/10)					5				5				0				0				0
Site context score (-/51)					**33.0**				**33.0**				**30.0**				**28.0**				**30.0**
Assessment unit totals																					
AU site condition score (-/3):					2.09				1.98								2.23				1.35
AU site context score (-/3):					1.94				1.94								1.71				1.76
AU species stocking rate (-/4):					2.29				2.29								2.29				1.71
AU habitat quality score (-/10):					**6.31**				**6.21**								**6.22**				**4.83**
AU area within offset area:					64.14				4.26								9.83				26.55
Total offset area for this MNES:					104.77				104.77								104.77				104.77
Area weighting:					0.61				0.04								0.09				0.25
AU weighted HQS:					**3.86**				**0.25**								**0.58**				**1.22**
Total HQS all AUs:																					**5.92**

Appendix B7: Koala offset site – future quality without offset

Assessment table for offset for fauna habitat	**Assessment unit:**	**Bench-mark (BM)**	AU5			**BM**	AU3			**BM**	AU4			**BM**	AU4			**BM**	AU1		
	Property:		Clements Creek				Clements Creek				Clements Creek				Clements Creek				Clements Creek		
	Assessment site no:		CBC12				CBC13				CBC9				CBC10				CBC8		
	Regional ecosystem:	**11.3.3**	11.3.3			**11.3.27f**	11.3.27f			**11.3.3**	11.3.3			**11.3.3**	11.3.3			**11.3.1**	11.3.1		
Ecological condition indicator			**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**
Recruitment of woody perennial species (%)		**100**	100	100%	5	**100**	100	100%	5.0	**100**	100	100%	5	**100**	50	50%	3	**100**	80	80%	5.0
Native plant species richness (No.): Trees		**3**	2	67%	3	**1**	3	300%	5.0	**3**	3	100%	5	**3**	2	67%	3	**4**	5	125%	5.0
Shrubs		**5**	2	40%	3	**2**	2	100%	5.0	**5**	5	100%	5	**5**	4	80%	3	**4**	10	250%	5.0
Grasses		**12**	4	33%	3	**5**	5	100%	5.0	**12**	6	50%	3	**12**	4	33%	3	**6**	5	83%	3.0
Forbs		**15**	4	27%	3	**9**	8	89%	3.0	**15**	9	60%	3	**15**	4	27%	3	**10**	3	30%	3.0
Tree canopy height (m): average of emergent, canopy and sub-canopy layer		**18**	20	111%	5	**20**	22	110%	5.0	**18**	25	139%	5	**18**	18	100%	5	**15**	11	73%	5.0
Tree sub-canopy height		**10**	9	90%	5	**0**	0		0.0	**10**	10	100%	5	**10**	10	100%	5	**7**	0	0%	0.0
Average score					5				2.5				5				5				2.5
Tree canopy cover (%): average of emergent, canopy and sub-canopy layer		**28**	52.4	187%	5	**44**	73	166%	5.0	**28**	56.1	200%	3	**28**	69.8	249%	3	**35**	69.8	199%	5.0
Tree sub-canopy cover		**5**	0	0%	0	**0**	0		0.0	**5**	16	320%	3	**5**	1.6	32%	2	**15**	0	0%	0.0
Average score					2.5				2.5				3				2.5				2.5
Shrub canopy cover (%):		**4**	1.3	33%	3	**0**	1.9		0.0	**4**	1.3	33%	3	**4**	2	50%	3	**15**	6.1	203%	3.0
Native perennial grass cover (%):		**45**	24	53%	3	**5**	62	1240%	5.0	**45**	36	80%	3	**45**	51	113%	5	**33**	12	36%	1.0
Organic litter (%):		**30**	52	173%	5	**11**	23	209%	3.0	**30**	24	80%	5	**30**	27.4	91%	5	**30**	88	293%	3.0
Large trees/ha (euc./non-euc. combined)		**10**	2	20%	5	**24**	0	0%	0.0	**10**	3	30%	5	**10**	7	70%	10	**53**	0	0%	0.0
Coarse woody debris (m/ha)		**285**	290	102%	5	**770**	700	91%	5.0	**285**	230	81%	5	**285**	95	33%	2	**1520**	590	39%	2.0
Non-native plant cover (%):		**0**	0	0%	10	**0**	0	0%	10.0	**0**	0	0%	10	**0**	0	0%	10	**0**	0	0%	10.0
Quality/availability of food/foraging habitat (-/10)					10				10				10				10				0
Quality/availability of shelter (-/10)					4				5				5				6				0
Site condition score (-/100)					**69.5**				**66.0**				**75.0**				**73.5**				**45.0**
Size of patch (fragmented) (-/10)					10				10				10				10				10
Connectedness (fragmented) (-/5)					4				4				5				4				5
Context (fragmented) (-/5)					4				4				5				4				5
Ecological corridors (-/6)					6				6				6				6				6
Threats to the species (-/15)					4				4				4				4				4
Species mobility capacity (-/10)					5				5				0				0				0
Site context score (-/51)					**33.0**				**33.0**				**30.0**				**28.0**				**30.0**
Assessment unit totals																					
AU site condition score (-/3):					2.09				1.98								2.23				1.35
AU site context score (-/3):					1.94				1.94								1.71				1.76
AU species stocking rate (-/4):					2.29				2.29								2.29				1.71
AU habitat quality score (-/10):					**6.31**				**6.21**								**6.22**				**4.83**
AU area within offset area:					64.14				4.26								9.83				26.55
Total offset area for this MNES:					104.77				104.77								104.77				104.77
Area weighting:					0.61				0.04								0.09				0.25
AU weighted HQS:					**3.86**				**0.25**								**0.58**				**1.22**
Total HQS all AUs:																					**5.92**

Appendix B8: Koala offset site - future quality with offset

Assessment table for offset for fauna habitat	**Assessment unit:**	**Bench-mark (BM)**	AU5			**BM**	AU3			**BM**	AU4			**BM**	AU4			**BM**	AU1		
	Property:		Clements Creek				Clements Creek				Clements Creek				Clements Creek				Clements Creek		
	Assessment site no:		CBC12				CBC13				CBC9				CBC10				CBC8		
	Regional ecosystem:	**11.3.3**	11.3.3			**11.3.27f**	11.3.27f			**11.3.3**	11.3.3			**11.3.3**	11.3.3			**11.3.1**	11.3.1		
Ecological condition indicator			**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**		**Value**	**% BM**	**Score**
Recruitment of woody perennial species (%)		**100**			5	100			5	**100**			5	**100**			3	**100**			5
Native plant species richness (No.): Trees		**3**			5	1			5	**3**			5	**3**			2.5	**4**			5
Shrubs		**5**			3	1			5	**5**			5	**5**			2.5	**4**			5
Grasses		**12**			3	3			5	**12**			3	**12**			3	**6**			3
Forbs		**15**			3	6			5	**15**			3	**15**			3	**10**			3
Tree canopy height (m): average of emergent, canopy and sub-canopy layer		**18**			5	16			5	**18**			5	**18**			5	**15**			5
Tree sub-canopy height		**10**			5	0				**10**			5	**10**			5	**7**			0
Average score					5				5				5				5				2.5
Tree canopy cover (%): average of emergent, canopy and sub-canopy layer		**28**			5	**40**			5	**28**			3	**28**			3	**35**			5
Tree sub-canopy cover		**5**			2.5	**0**				**5**			3	**5**			2	**15**			0
Average score					3.75				5				3				2.5				2.5
Shrub canopy cover (%):		**4**			3	0				**4**			3	**4**			3	**15**			3
Native perennial grass cover (%):		**45**			3	3			5	**45**			3	**45**			5	**33**			1
Organic litter (%):		**30**			5	15			5	**30**			10	**30**			5	**30**			3
Large trees/ha (euc./non-euc. combined)		**10**			5	28			10	**10**			10	**10**			10	**53**			10
Coarse woody debris (m/ha)		**285**			5	530			5	**285**			5	**285**			5	**1520**			5
Non-native plant cover (%):		**0**			10	0			10	**0**			10	**0**			10	**0**			10
Quality/availability of food/foraging habitat (-/10)					10				10				10				10				3
Quality/availability of shelter (-/10)					8				8				8				8				3
Site condition score (-/100)					**76.75**				**88.0**				**82.0**				**78.5**				**64.0**
Size of patch (fragmented) (-/10)					10				10				10				10				10
Connectedness (fragmented) (-/5)					5				5				5				5				5
Context (fragmented) (-/5)					5				5				5				5				5
Ecological corridors (-/6)					6				6				6				6				6
Threats to the species (-/15)					12				12				12				12				12
Species mobility capacity (-/10)					8				8				8				8				8
Site context score (-/51)					**46.0**				**46.0**				**46.0**				**46.0**				**46.0**
Assessment unit totals																					
AU site condition score (-/3):					2.30				2.52								2.42				1.92
AU site context score (-/3):					2.71				2.71								2.71				2.71
AU species stocking rate (-/4):					2.86				3.43								2.86				1.71
AU habitat quality score (-/10):					**7.87**				**8.65**								**7.99**				**6.34**
AU area within offset area:					64.14				4.26								9.83				26.55
Total offset area for this MNES:					104.77				104.77								104.77				104.77
Area weighting:					0.61				0.04								0.09				0.25
AU weighted HQS:					**4.81**				**0.35**								**0.75**				**1.61**
Total HQS all AUs:																					**7.52**

Appendix C: Field survey data sheets

Appendix C1: Impact field survey data sheets

Source: extracted from Umwelt 2024 Excel spreadsheet titled 22822_MHQA_Umwelt

Site	Impact/ Offset	RE	RE BioCondition Benchmark	Condition/ Status	Species	AU	Number of large native trees	Tree canopy height	Recruitment of woody perennial species (in EDL) (%)	Tree canopy cover	Native shrub layer cover (%)	Coarse woody debris
1	Impact	non-rem		Non-remnant	Koala	Dispersal	5	3	0	0	0	0
3	Impact	11.3.2		Remnant	Koala	Breeding and foraging	5	4	5	5	3	2
4	Impact	11.4.8		Regrowth	Koala	Shelter vegetation	5	3	3	5	2	2.0
6	Impact	non-rem		Non-remnant	Koala	Dispersal	5	4	3	0	5	0.0
12	Impact	11.9.2		Remnant	Koala	Breeding and foraging	10	5	3	3	2	2
13	Impact	11.4.9		Regrowth	Koala	Shelter vegetation	0	4	5	5	5	0
14	Impact	11.3.1		Regrowth	Koala	Breeding and foraging	5	5	3	4	3	0
15	Impact	11.4.9		Regrowth	Koala	Shelter vegetation	0	1.5	5	2.5	5	0
16	Impact	11.5.2a		TBC - regrowth/ remnar	Koala	Shelter vegetation	0	3	3	5	3	2
17	Impact	11.4.8		Regrowth	Koala	Shelter vegetation	5	3	5	0	3	5
20	Impact	11.9.10		Remnant	Koala	Breeding and foraging	10	5	3	2.5	3	5
21	Impact	non-rem		Non-remnant	Koala	0	0	3	0	0	0	0
22	Impact	non-rem		Regrowth	Koala	Dispersal	5	3	3	5	0	5
23	Impact	11.3.1		Remnant	Koala	Breeding and foraging	0	1.5	3	2.5	5	0
24	Impact	non-rem		Non-remnant	Koala	Dispersal	0	0	0	2.5	0	0
27	Impact	non-rem		Regrowth	Koala	Dispersal	0	0	3	2.5	5	0
28	Impact	11.3.25		Remnant	Koala	Breeding and foraging	5	5	3	5	2	2
32	Impact	non-rem		Non-remnant	Koala	Dispersal	0	0	0	0	0	0
1	Impact	non-rem		Non-remnant	Ornamental snake	Breeding, foraging and dispersal	5	3	0	0	0	0
3	Impact	11.3.2		Remnant	Ornamental snake	Breeding, foraging and dispersal	5	4	5	5	3	2
4	Impact	11.4.8		Regrowth	Ornamental snake	Breeding, foraging and dispersal	5	3	3	5	2	2
6	Impact	non-rem		Non-remnant	Ornamental snake	Breeding, foraging and dispersal	5	4	3	0	5	0
12	Impact	11.9.2		Remnant	Ornamental snake		10	5	3	3	2	2
13	Impact	11.4.9		Regrowth	Ornamental snake	Breeding, foraging and dispersal	0	4	5	5	5	0
14	Impact	11.3.1		Regrowth	Ornamental snake	Breeding, foraging and dispersal	5	5	3	4	3	0
15	Impact	11.4.9		Regrowth	Ornamental snake	Breeding, foraging and dispersal	0	1.5	5	2.5	5	0
16	Impact	11.5.2a		TBC - regrowth/ remnar	Ornamental snake	Breeding, foraging and dispersal	0	3	3	5	3	2
17	Impact	11.4.8		Regrowth	Ornamental snake	Breeding, foraging and dispersal	5	3	5	0	3	5
20	Impact	11.9.10		Remnant	Ornamental snake		10	5	3	2.5	3	5
21	Impact	non-rem		Non-remnant	Ornamental snake	Breeding, foraging and dispersal	0	3	0	0	0	0
22	Impact	non-rem		Regrowth	Ornamental snake	Breeding, foraging and dispersal	5	3	3	5	0	5
23	Impact	11.3.1		Remnant	Ornamental snake	Breeding, foraging and dispersal	0	1.5	3	2.5	5	0
24	Impact	non-rem		Non-remnant	Ornamental snake	Breeding, foraging and dispersal	0	0	0	2.5	0	0
27	Impact	non-rem		Regrowth	Ornamental snake		0	0	3	2.5	5	0
28	Impact	11.3.25		Remnant	Ornamental snake	Breeding, foraging and dispersal	5	5	3	5	2	2
32	Impact	non-rem		Non-remnant	Ornamental snake	Breeding, foraging and dispersal	0	0	0	0	0	0

BioCondition/ Vegetation component								Quality and availability of habitat required for foraging			
Native tree species richness	Native shrub species richness	Native grass species richness	Native forbs/other species richness	Non-native plant cover (%)	Native perennial grass cover (%)	Organic litter cover (%)	Total vegetation component score	Foraging attribute 1	Foraging attribute 2	Foraging attribute 3	Foraging habitat Total Score
2.5	0	2.5	2.5	0	1	3	19.5	0	0		0
5	5	2.5	5	10	0	5	56.5	0	7.5		7.5
5.0	2.5	2.5	5.0	3.0	1.0	5.0	44	0	7.5		7.5
5.0	2.5	0.00	2.5	0.0	0.0	0.0	27	0	0		0
5	5	2.5	5	5	3	5	55.5	5	7.5		12.5
5	2.5	2.5	5	10	1	5	50	0	10		10
5	5	2.5	5	3	0	5	45.5	7.5	7.5		15
5	2.5	5	5	0	0	5	36.5	0	10		10
5	5	2.5	2.5	5	1	5	42	12.5	7.5		20
5	5	2.5	5	5	1	0	44.5	7.5	2.5		10
5	5	2.5	2.5	5	1	5	54.5	7.5	2.5		10
5	2.5	2.5	0	0	0	0	13	0	0		0
5	2.5	0	5	0	0	3	36.5	7.5	0		7.5
5	2.5	2.5	5	5	1	3	36	0	7.5		7.5
0	0	2.5	2.5	10	3	5	25.5	0	0		0
5	2.5	2.5	2.5	0	0	0	23	0	0		0
5	5	2.5	5	0	0	5	44.5	12.5	10		22.5
2.5	0	0	2.5	0	0	3	8	0	0		0
2.5	0	2.5	2.5	0	1	3	19.5	5			5
5	5	2.5	5	10	0	5	56.5	10			10
5	2.5	2.5	5	3	1	5	44	10			10
5	2.5	0	2.5	0	0	0	27	10			10
5	5	2.5	5	5	3	5	55.5	0			0
5	2.5	2.5	5	10	1	5	50	25			25
5	5	2.5	5	3	0	5	45.5	10			10
5	2.5	5	5	0	0	5	36.5	10			10
5	5	2.5	2.5	5	1	5	42	0			0
5	5	2.5	5	5	1	0	44.5	10			10
5	5	2.5	2.5	5	1	5	54.5	0			0
5	2.5	2.5	0	0	0	0	13	5			5
5	2.5	0	5	0	0	3	36.5	5			5
5	2.5	2.5	5	5	1	3	36	25			25
0	0	2.5	2.5	10	3	5	25.5	20			20
5	2.5	2.5	2.5	0	0	0	23	0			0
5	5	2.5	5	0	0	5	44.5	20			20
2.5	0	0	2.5	0	0	3	8				5

Quality and availability of habitat required for shelter and breeding		Quality and Availability of Habitat Required for Mobility (new)				Absence of Threats	Landscape Asesement				
Shelter/ breeding attribute 1	Shelter/ breeding attribute 2	Mobility attribute 1	Mobility attribute 2	Mobility attribute 3	Mobility habitat total score	Threat Score	Size of patch	Connectivity	Site context	Ecological corridor	Role of site location to species overall population in the state
0	0	0	3.75		3.75	5	0	0	2	6	4
0	0	0	6.25		6.25	6	5	0	2	6	4
5	0	3.75	6.25		10	6	2	0	2	6	4
0	0	0	6.25		6.25	5	2	4	2	6	4
7.5	0	3.75	5		8.75	6	5	0	2	6	4
0	0	7.5	3.75		11.25	3	5	0	2	6	4
0	12.5	3.75	6.25		10	6	5	2	2	6	4
0	0	7.5	3.75		11.25	3	5	0	2	6	4
0	0	3.75	6.25		10	4	5	0	2	6	4
0	7.5	3.75	6.25		10	3	0	0	2	6	4
12.5	0	3	5		8	6	0	0	2	6	4
0	0	0	0		0	0	0	0	2	6	4
2.5	0	0	0		0	3	0	0	2	6	4
0	7.5	3.75	5		8.75	2	2	0	2	6	4
0	0	0	3.75		3.75	5	0	0	2	6	4
0	7.5	0	5		5	3	0	0	2	6	4
0	12.5	7.5	6.25		13.75	6	5	0	2	6	4
0	7.5	0	6.25		6.25	5	0	0	2	6	4
4	0	4			4	0	5	0	2	6	4
8	3	11			11	0	5	0	2	6	4
8	1	9			9	0	2	0	2	6	4
8	0	8			8	0	5	4	2	6	4
0	1	1			1	0	0	0	2	6	4
20	0	20			20	0	5	0	2	6	4
8	1	9			9	0	5	2	2	6	4
8	0	8			8	0	5	0	2	6	4
0	0	0			0	0	5	4	2	6	4
8	4	12			12	0	0	0	2	6	4
0	2	2			2	0	0	0	2	6	4
4	0	4			4	0	10	2	2	6	4
4	5	9			9	0	10	2	2	6	4
20	0	20			20	0	2	2	2	6	4
16	0	16			16	0	5	0	2	6	4
0	0				0	0	0	0	2	6	4
16	4	20			20	0	2	0	2	6	4
4	0	4			4	0	5	0	2	6	4

Appendix C2: Offset field survey data sheets

Source: Lyngco (2025). Westside Petroleum Project – Ecological Assessment Report - Clements Creek (Lot 17 on RP848822) Queensland.

Survey ID	Clements Creek 2	**Site ID:**	CBC8	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	100	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	1	
RE Code	11.3.1	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU1**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	20 25	23	0.2 - 2%	Eucalyptus camaldulensis	D
T1	8 15	11	2 - 20%	Acacia harpophylla (brigalow)	D
				Lysiphyllum hookeri	A
T2					
T3					
S1	0.5 2	2	0.2 - 2%	Lysiphyllum hookeri	C
				Alectryon diversifolius	D
S2					
G	0 0.5		2 - 20%	Paspalidium caespitosum	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover l = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				100m line transect - Crown cover - Shrub layer			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	0.5	0.5	T1	76.9	77.8	0.9	S1
6.9	22	15.1	T1	76	76.5	0.5	S1
22.5	29	6.5	T1	66.8	67.6	0.8	S1
31.5	40	8.5	T1	62.4	64.2	1.8	S1
40	48.1	8.1	Emergent	43.8	45.6	1.8	S1
48.2	61	12.8	T1	33	33.3	0.3	S1
61.5	66	4.5	T1			0	
66	74	8	Emergent			0	
74	82.1	8.1	T1			0	
82.9	88.5	5.6	T1			0	
89.8	95.3	5.5	T1			0	
95.8	98	2.2	T1			0	
99.5	100	0.5	T1			0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	**69.8**	**Total T2 (%)**	**0**	**Total TE(%)**	**16.1**	**Total S (%)**	**6.1**

| Site ID: | CBC8 | | |

Survey ID	Clements Creek 2	**Site ID:**	CBC9 spot moved	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	240	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU		**AU4**		

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	20 35	25	2 - 20%	Eucalyptus coolabah (coolibah)	D
T2	5 15	10	2 - 20%	Eucalyptus coolabah (coolibah)	D
T3					
S1	0.5 2	2	2 - 20%	Terminalia oblongata	D
				hookeri	C
S2					
G	0 0.5		2 - 20%		

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover l = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				100m line transect - Crown cover - Shrub layer			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	11.4	11.4	T1	83	83.1	0.1	S1
14.3	50	35.7	T1	80.5	80.6	0.1	S1
55	65	10	T2	67.6	67.7	0.1	S1
74	83	9	T1	65	65.4	0.4	S1
94	100	6	T2	38.1	38.2	0.1	S1
		0		9	9.5	0.5	S1
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	**56.1**	**Total T2 (%)**	**16**	**Total TE(%)**	**0**	**Total S (%)**	**1.3**

Site ID:	CBC9 spot moved

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1	T2		Yes	Y		Terminalia oblongata	<5% - commo	Shrub
Acacia harpophylla	T2			Yes	N		Parkinsonia aculeata	<5% - rare	Shrub
Terminalia oblongata	T2			Yes	N		Acacia harpophylla (brigalow)	<5% - rare	Shrub
							Bothriochloa petusa	<5% - commo	Exotic Grass
							Juncus usitatus	<5% - rare	Native Forb / Other
							Melaleuca trichostachya	<5% - rare	Shrub
							Alectryon diversifolius (holly bush)	<5% - rare	Shrub
							Harrisia martinii	<5% - rare	Exotic Other
							Schizachyrium sp.	<5% - commo	Native Grass
							Marsilea drummondii	<5% - rare	Native Forb / Other
							Cassytha filiformis (dodder laurel)	<5% - rare	Native Forb / Other
							Paspalidium caespitosum	<5% - rare	Native Grass
							Sida cordifolia	<5% - rare	Exotic Other
							Parthenium hysterophorus	<5% - rare	Exotic Other
							Apophyllum anomalum (warrior bush)	<5% - rare	Native Forb / Other
							Chrysopogon fallax	<5% - rare	Native Grass
							Panicum effusum	<5% - rare	Native Grass
							Sporobolus caroli	<5% - rare	Native Grass
							Jasminum didymum subsp lineare	<5% - rare	Native Forb / Other
							Passiflora aurantia var. aurantia	<5% - rare	Exotic Other
							Paspolidium sp.	<5% - rare	Native Grass
							Acacia sp.	<5% - rare	Native Forb / Other
							Cyperus sp.	<5% - rare	Native Forb / Other
							Lomandra longifolia	<5% - rare	Native Forb / Other
							Cryptostegia grandiflora	<5% - rare	Exotic Other
							Achyranthes aspera	<5% - rare	Native Forb / Other

Species Richness in 50m x 10m plot			Photo No.							
Native Tree	3		Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native Shrub	5		Native perennial grass	100	40	30	0	10	36	
Native Grass	6		Native other grass	0	0	0	0	0	0	
Forbs / Other	9		Native forb & other	0	1	5	40	40	17.2	
Total Non-native (%)	0		Native shrub (<1m)	0	0	0	0	0	0	
Coarse Woody Debris	230		Exotic grass	0	0	0	0	0	0	
Large Trees	**Benchmark**	**Total**	Exotic forb & other	0	0	0	0	0	0	
Eucs	45	3	Leaf & stick litter	0	30	35	30	25	24	
Non-Eucs			Rocks	0	0	0	0	0	0	
Braun Blanquet Cover Classes			Bare ground	0	29	30	30	25	22.8	
			Cryptogams	0	0	0	0	0	0	
1	<5% - rare		Total	100	100	100	100	100	100	
2	<5% - common		Plot Disturbance				Fire damage:			
3	5 - 25%		Clearing (inc. logging):				Storm damage:			
4	25 - 50%		Cultivation (inc. pasture):				Trampling:			
5	50 - 75%		Soil erosion:				Flood damage:			
6	75 - 100%		Firewood collection:				Feral herbivores:		cattle and pig damage	
			Stock grazing:				Other:			

Survey ID	Clements Creek 2	**Site ID:**	CBC10	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	125	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU5**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	12 25	18	2 - 20%	Eucalyptus coolabah (coolibah)	D
T2	4 12	10	0.2 - 2%	Eucalyptus coolabah (coolibah)	D
T3					
S1	0.5 2	2	0.2 - 2%	Enchylaena tomentosa (ruby saltbush)	
S2					
G		0 0.5	2 - 20%		

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover l = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				100m line transect - Crown cover - Shrub layer			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	3	3	T1	73	73.1	0.1	S1
3.8	9	5.2	T1	56.5	58	1.5	S1
11.4	24	12.6	T1	46	46.2	0.2	S1
24.5	33.6	9.1	T1	12.3	12.5	0.2	S1
35.6	37.2	1.6	T2			0	
37.5	46	8.5	T1			0	
46.5	49	2.5	T1			0	
57	59	2	T1			0	
61.6	74.5	12.9	T1			0	
75.5	82	6.5	T1			0	
92.5	100	7.5	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	**69.8**	**Total T2 (%)**	**1.6**	**Total TE(%)**	**0**	**Total S (%)**	**2**

Site ID:	CBC10

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1			Yes	Y		Parkinsonia aculeata	<5% - rare	Exotic Other
Acacia salicina	T1						Enchylaena tomentosa (ruby saltbush)	<5% - rare	Shrub
							Atalaya hemiglauca	<5% - commo	Shrub
							Schizachyrium fragile	5 - 25%	Native Grass
							Passiflora aurantia var. aurantia	<5% - rare	tic Other
							Bothriochloa petusa	5 - 25%	tic Grass
							Heteropogon contortus	<5% - rare	ve Grass
							Parthenium hysterophorus	<5% - rare	tic Other
							Sida cordifolia (flannel weed*)	<5% - rare	tic Other
							Sesbania cannabina	<5% - rare	tic Other
							Dianella longifolia	<5% - rare	Native Forb / Other
							Cenchrus ciliaris	<5% - rare	tic Grass
							digtaria brownii	<5% - rare	ve Grass
							Marsilea drummondii	<5% - rare	Forb / Other
							Sida sp.	<5% - rare	Native Forb / Other
							Chrysopogon fallax	<5% - rare	Native Grass
							Grewia latifolia	<5% - rare	Shrub
							Capparis arborea	<5% - rare	Shrub
							Achyranthes aspera	<5% - rare	Native Forb / Other
							Vachellia farnesiana		Exotic Other

Species Richness in 50m x 10m plot		
Native Tree	2	
Native Shrub	4	
Native Grass	4	
Forbs / Other	4	
Total Non-native (%)	0	
Coarse Woody Debris	95	
Large Trees	**Benchm**	**Total**
Eucs	45	7
Non-Eucs		

Braun Blanquet Cover Classes	
1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.							
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	20	0	80	80	75	51	
Native other grass	0	50	0	0	0	10	
Native forb & other	1	1	5	1	1	1.8	
Native shrub (<1m)	0	0	0	0	0	0	
Exotic grass	0	0	0	0	0	0	
Exotic forb & other	0	0	0	0	0	0	
Leaf & stick litter	40	39	15	19	24	27.4	
Rocks	0	0	0	0	0	0	
Bare ground	39	10	0	0	0	9.8	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance		Fire damage:	
Clearing (inc. logging):		Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	
Stock grazing:		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC12	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	180	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Depression			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU5**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	12 35	20	2 - 20%	Eucalyptus coolabah (coolibah)	D
				Acacia harpophylla (brigalow)	A
T2	8 10	9	2 - 20%	Eucalyptus coolabah (coolibah)	D
				Acacia harpophylla (brigalow)	A
T3					
S1					
S2					
G					

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover l = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				100m line transect - Crown cover - Shrub layer			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	4	4	T1	92.9	93.7	0.8	S1
8	9	1	T1	59.9	60.2	0.3	S1
23	34	11	T1	33	33.2	0.2	S1
42	46	4	T1			0	
49	49.8	0.8	T1			0	
52	54.5	2.5	T1			0	
62.6	62.8	0.2	T1			0	
67.6	72.2	4.6	T1			0	
75.4	96.7	21.3	T1			0	
97	100	3	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	**52.4**	**Total T2 (%)**	**0**	**Total TE(%)**	**0**	**Total S (%)**	**1.3**

| Site ID: | CBC12 | | |

Survey ID	Clements Creek 2	**Site ID:**	CBC13	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	175	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.27f	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Watercourse			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU3**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	12 35	22	2 - 20%	Eucalyptus coolabah (coolibah)	D
				Eucalyptus camaldulensis	C
T2					
T3					
S1	0.5 2	2	0.2 - 2%	Parkinsonia aculeata	D
S2					
G	0 0.5		2 - 20%	bothriochloa petusa	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover i = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				100m line transect - Crown cover - Shrub layer			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
99	100	1	T1	99	99.3	0.3	S1
92	92.5	0.5	T1	90	90.5	0.5	S1
90	90.5	0.5	T1	86	86.5	0.5	S1
81	82	1	T1	14	14.3	0.3	S1
53	80	27	T1	18.3	18.6	0.3	S1
33	54	21	T1	.		#VALUE!	
0	22	22	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	73	**Total T2 (%)**	0	**Total TE(%)**	0	**Total S (%)**	**#VALUE!**

| Site ID: | CBC13 | | |

Appendix D: REs at the impact and offset sites

Appendix D1: Ground-truthed REs at the impact site

RE	Description	VM Act status
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest (particularly in southern parts), with or without scattered emergent *Eucalyptus* spp. such as *E. coolabah, E. largiflorens, E. populnea, E. orgadophila*, and *E. woollsiana*. A low tree layer dominated by *Geijera parviflora* and *Eremophila mitchellii* is usually present. The vegetation sometimes occurs as low open forest or woodland. The ground stratum is usually sparse. Associated with Cainozoic alluvial plains which may be occasionally flooded. Landforms range from level to very gently sloping plains, alluvial flats, drainage floors, back-swamps and abandoned channels. Associated soils are predominantly deep to very deep cracking clays, sometimes with gilgai or texture contrast soils with sandy surface (particularly where *Eucalyptus populnea* is present). Not a Wetland. (BVG1M: 25a).	Endangered
11.3.2	*Eucalyptus populnea* woodland to open woodland. Occasionally, *E. melanophloia* or *E. crebra* may be present. A secondary tree layer may occur and include species such as *Geijera parviflora*, *Eremophila mitchellii*, *Acacia salicina*, *Cassia brewsteri,* and *Acacia excelsa*. The ground layer is dominated by a range of tussock grasses, including *Chloris* spp., *Enteropogon* spp., and *Aristida* spp. Occurs on Cainozoic alluvial plains with variable soil types including texture contrast, deep uniform clays, massive earths and sometimes cracking clays. Contains Palustrine. (BVG1M: 17a).	Of concern
11.3.3	*Eucalyptus coolabah* woodland to open woodland. A secondary tree or shrub layer may occur, including *E. populnea*, *Melaleuca bracteata*, *Acacia stenophylla*, *Alectryon oleifolius*, *Terminalia oblongata* (in the north), *Acacia pendula*, *A. cambagei* and *Duma florulenta*. The ground layer is dominated by a range of grass and forb species depending on season. Occurs on Cainozoic alluvial plains or levees with clay or sometimes texture contrast soils. Not a Wetland. (BVG1M: 16c).	Of concern
11.3.4	*Eucalyptus tereticornis* woodland to open forest. Other tree species that may be present include *E. camaldulensis, Corymbia tessellaris, C. clarksoniana, E. melanophloia, E. platyphylla* or *Angophora floribunda. E. crebra* and *Lophostemon suaveolens* may be locally common. A shrub layer is usually absent, and a grassy ground layer is prominent, and may include any of *Bothriochloa bladhii* subsp. *bladhii*, *Aristida* spp., *Heteropogon contortus*, *Dichanthium* spp. and *Themeda triandra.* Occurs on Cainozoic alluvial plains and terraces. Occurs on variety of soils, including deep cracking clays, medium to fine textured soils, and deep texture-contrast soils. Not a Wetland. (BVG1M: 16c).	Of concern
11.3.6	*Eucalyptus melanophloia* woodland to open woodland, generally with a grassy ground layer. Occasional *E. populnea, E, crebra, Corymbia dallachiana, E. tereticornis* may occur in the canopy. A secondary tree or tall shrub layer, including *Callitris glaucophylla*, *Alphitonia excelsa, Lysicarpus angustifolius* and *Petalostigma pubescens* may occur. The ground layer is usually dominated by perennial grasses. Occurs on levees and higher Cainozoic alluvial plains. Soils are usually deep red and yellow massive earths with dark brown loamy sand to sandy loam grading to light clay textures or texture contrast soils. In some areas this RE occurs on heavy cracking clay soils. Not a Wetland. (BVG1M: 17b).	Least concern
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland to open forest. Other tree species, including *Casuarina cunninghamiana, E. coolabah, Melaleuca bracteata, Melaleuca viminalis, Livistona* spp. (in north), *Melaleuca* spp. and	Least concern

RE	Description	VM Act status
	Angophora floribunda, may occur. A tall shrub layer may occur, including *Acacia salicina, A. stenophylla* and *Lysiphyllum carronii*. Low shrubs are present, but rarely form a conspicuous layer. The ground layer is open to sparse and dominated by perennial grasses, sedges or forbs. Occurs on fringing levees and banks of major rivers and drainage lines of alluvial plains throughout the region. Soils are very deep, alluvial, grey and brown cracking clays with or without some texture contrast. These are usually moderately deep to deep, soft or firm, acid, neutral or alkaline brown sands, loams or black cracking or non-cracking clays, and may be sodic at depth (Burgess 2003). Riverine. (BVG1M: 16a).	
11.4.3	*Acacia harpophylla* and/or *Casuarina cristata* open forest. *Acacia harpophylla* forms a continuous canopy with varying densities of *Casuarina cristata*, forming part of the canopy or emerging above it. *Casuarina cristata* may be dominant or form pure stands particularly in the south of the bioregion (subregions 33, 36). *Eucalyptus* spp. such as *E. orgadophila, E. populnea, E. microcarpa, E. woollsiana, E. cambageana* and *E. thozetiana* (on shallower soils and upper slopes) may be scattered through the canopy or occur as emergents. *Brachychiton rupestris* may also be present in places. An open to dense, tall shrub layer is present, and is dominated by *Eremophila mitchellii* and/or *Geijera parviflora*. Low shrubs are often present, occasionally forming a distinct layer dominated by species such as *Carissa ovata* and *Alectryon diversifolius. Melaleuca bracteata* may be present in low-lying areas. The ground layer is sparse to open, and composed of grasses and forbs. Occurs on Cainozoic clay plains with cracking clay soils which are often with a weak gilgai microrelief. The plains may be flat to gently undulating. Soils are often cracking clay which are usually deep to very deep, often self-mulching, and sometimes with surface stone. Texture contrast soils and other clays may also be present in places. Contains Palustrine. (BVG1M: 25a).	Endangered
11.4.7	*Eucalyptus populnea* and *Acacia harpophylla* and/or *Casuarina cristata* open forest. The secondary tree layer is typically *Acacia harpophylla* and/or *Casuarina cristata*. A tall shrub layer commonly occurs, and is dominated by *Eremophila mitchellii* and *Geijera parviflora*. Other tall shrubs, such as *Ventilago viminalis* and *Archidendropsis basaltica*, and lower shrubs such as *Carissa ovata* and *Alectryon oleifolius* may occur. The ground layer is often sparse. Usually associated with flat or lower, middle and upper slopes of gently undulating Cainozoic clay plains. Soils are usually texture contrast, but gilgai microrelief with cracking clays and earths may also be present. Not a Wetland. (BVG1M: 25a)	Endangered
11.4.8	*Eucalyptus cambageana* and *Acacia harpophylla* woodland to open forest. *Acacia harpophylla* may be replaced by *A. argyrodendron* in northern areas. *E. thozetiana* may occur on shallower soils. A secondary tree layer of *Eremophila mitchellii* and a low shrub layer of *Carissa ovata* and *Geijera parviflora* commonly occur. Occurs on level to gently undulating plains formed from Cainozoic deposits. Associated soils are usually deep texture contrast with thin loamy or sandy surface horizons overlying strongly alkaline clay subsoils. Surface or subsurface gravel is common. Contains Palustrine. (BVG1M: 25a).	Endangered
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).	Endangered
11.9.1	*Eucalyptus cambageana* or *E. thozetiana* and *Acacia harpophylla* woodland to open forest. *Eucalyptus cambageana* is commonly codominant with *Acacia harpophylla* in the open forest, or the open forest may be dominated by *A. harpophylla* and have scattered emergent *Eucalyptus cambageana* or *E. thozetiana* trees. The community has a lower tree/tall shrub layer dominated by species such as *Eremophila mitchellii*, *Carissa ovata* and *Geijera parviflora*,	Endangered

RE	Description	VM Act status
	with *Terminalia oblongata* often present in the north. The ground layer is frequently sparse. Associated with slopes and crests of undulating plains and below low ridges and escarpments formed from Cainozoic to Proterozoic consolidated, fine-grained sediments. Texture contrast soils predominate, often with surface stone or gravel in sub-surface horizons, but other soils such as clays, sandy clay loams and cracking clays may also be present. Not a Wetland. (BVG1M: 25a).	
11.9.2	*Eucalyptus melanophloia* and/or *E. orgadophila* woodland to open woodland. Other tree species occasionally present as subdominants include *Corymbia erythrophloia, Eucalyptus populnea* or *Corymbia dallachiana*. Occurs on rises on undulating plains with cracking clay or texture contrast soils. Not a Wetland. (BVG1M: 17b).	Least concern
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* or *Acacia harpophylla* open forest to woodland. *Casuarina cristata* is more common in southern parts of the bioregion. A prominent low tree or tall shrub layer dominated by species such as *Geijera parviflora* and *Eremophila mitchellii*, and occasionally with semi-evergreen vine thicket species is often present. The latter include *Flindersia dissosperma, Brachychiton rupestris, Excoecaria dallachyana, Macropteranthes leichhardtii* and *Acalypha eremorum* in eastern areas, and species such as C*arissa ovata, Owenia acidula, Croton insularis, Denhamia oleaster* and *Notelaea microcarpa* in south-western areas. *Melaleuca bracteata* may be present along watercourses. Occurs on fine-grained sediments. The topography includes gently undulating plains, valley floors and undulating footslopes and rarely on low hills. The soils are generally deep texture-contrast and cracking clays. The cracking clays are usually black or grey to brown or reddish-brown in colour, often self-mulching and sometimes with gilgai microrelief in flatter areas. Some texture contrast soils are shallow to only moderately deep. Not a Wetland. (BVG1M: 25a).	Endangered
11.9.7	*Eucalyptus populnea* predominates forming a distinct but discontinuous canopy (10-20 m tall). Occasionally *E. melanophloia* is present in the canopy. Lower trees are absent or infrequent. An open to dense, tall shrub layer is always present, with *Eremophila mitchellii* often dominant. A patchy low shrub layer of varying density may be formed, where the tall shrub layer is more than 6 m tall. The ground layer is dominated by perennial grasses and varies from sparse to dense, depending on the shrub and tree density. *Bothriochloa decipiens, Enteropogon acicularis, Aristida ramosa* and *Aristida jerichoensis* are the most common dominants in the east with *Aristida calycina* var. *praealta, Aristida jerichoensis, Eragrostis* spp. and *Chloris pectinata* dominant further west. Forbs are seasonally abundant. Occurs on the lower and middle slopes of gently undulating lowlands and plains formed from Cainozoic to Proterozoic consolidated, fine-grained sediments. Associated soils are predominantly deep loamy red earths with sparse superficial ferruginous gravel, or deep texture contrast soils with thin sandy or loamy surfaces over strongly alkaline subsoils. Not a Wetland. (BVG1M: 17a).	Of concern
11.9.10	*Eucalyptus populnea* open forest forming a distinct but discontinuous canopy. *Acacia harpophylla* and sometimes *Casuarina cristata* usually form a secondary tree layer which occasionally becomes the dominant layer. A layer of shrubs is usually present and dominated by *Eremophila mitchellii* and *Geijera parviflora* with *Acacia excelsa, Atalaya hemiglauca, Psydrax oleifolia, Alectryon oleifolius* frequent. Scattered low shrubs such as *Carissa ovata* and *Eremophila deserti* are frequently present. The ground cover is usually sparse, and dominated by the grasses *Aristida ramosa, Enteropogon acicularis, Bothriochloa decipiens* and *Paspalidium* spp. Occurs on Cainozoic to Proterozoic consolidated, fine-grained sediments. Occurs on lower parts of undulating plains often with deep texture-contrast soils. Occurs on sodic and saline soils which may act as a discharge area if adjacent to alluvium. Not a Wetland. (BVG1M: 25a).	Of concern

Appendix D2: Regional ecosystems at the offset site

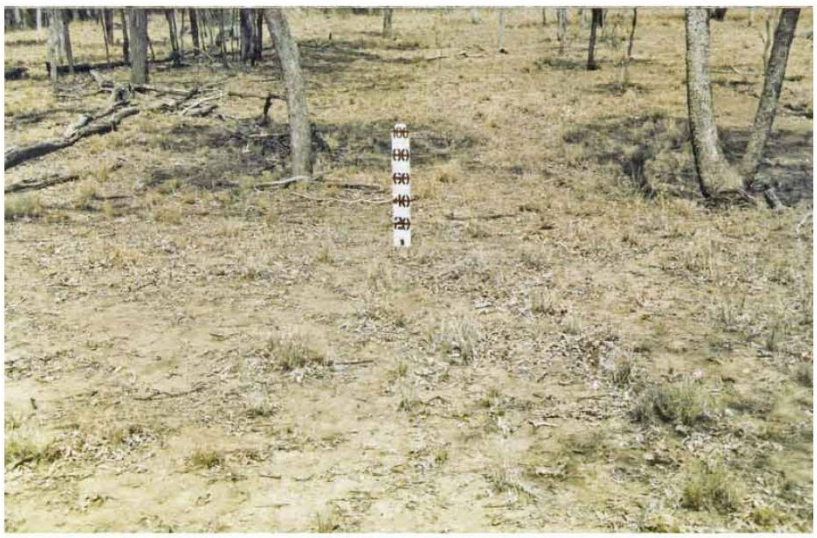
RE	Description	VM Act status
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest (particularly in southern parts), with or without scattered emergent *Eucalyptus* spp. such as *E. coolabah, E. largiflorens, E. populnea, E. orgadophila*, and *E. woollsiana*. A low tree layer dominated by *Geijera parviflora* and *Eremophila mitchellii* is usually present. The vegetation sometimes occurs as low open forest or woodland. The ground stratum is usually sparse. Associated with Cainozoic alluvial plains which may be occasionally flooded. Landforms range from level to very gently sloping plains, alluvial flats, drainage floors, back-swamps and abandoned channels. Associated soils are predominantly deep to very deep cracking clays, sometimes with gilgai or texture contrast soils with sandy surface (particularly where *Eucalyptus populnea* is present). Not a Wetland. (BVG1M: 25a).	Endangered
11.3.2	*Eucalyptus populnea* woodland to open woodland. Occasionally, *E. melanophloia* or *E. crebra* may be present. A secondary tree layer may occur and include species such as *Geijera parviflora*, *Eremophila mitchellii*, *Acacia salicina*, *Cassia brewsteri,* and *Acacia excelsa*. The ground layer is dominated by a range of tussock grasses, including *Chloris* spp., *Enteropogon* spp., and *Aristida* spp. Occurs on Cainozoic alluvial plains with variable soil types including texture contrast, deep uniform clays, massive earths and sometimes cracking clays. Contains Palustrine. (BVG1M: 17a).	Of concern
11.3.3	*Eucalyptus coolabah* woodland to open woodland. A secondary tree or shrub layer may occur, including *E. populnea*, *Melaleuca bracteata*, *Acacia stenophylla*, *Alectryon oleifolius*, *Terminalia oblongata* (in the north), *Acacia pendula*, *A. cambagei* and *Duma florulenta*. The ground layer is dominated by a range of grass and forb species depending on season. Occurs on Cainozoic alluvial plains or levees with clay or sometimes texture contrast soils. Not a Wetland. (BVG1M: 16c).	Of concern
11.3.21	*Dichanthium sericeum* and/or *Astrebla* spp. (*A. lappacea, A. elymoides* and *A. squarrosa*) tussock grassland. Frequently occurring species include the grasses *Aristida leptopoda, A. latifolia, Bothriochloa bladhii subsp. bladhii, Brachyachne convergens, Heteropogon contortus, Panicum decompositum, Eriochloa* spp., *Sporobolus mitchellii* and *Thellungia advena* and the forbs *Abelmoschus ficulneus, Corchorus trilocularis, Commelina ensifolia, Euphorbia coghlanii, Ipomoea lonchophylla, Neptunia gracilis, Phyllanthus maderaspatensis, Sida trichopoda* and *Trichodesma zeylanicum* var. *latisepaleum*. Scattered emergent trees and shrubs may occur, including *Eucalyptus coolabah*, *E. populnea, E. tereticornis* and *Acacia* spp. Occurs on Cainozoic alluvial plains on flats associated with rivers and creeks, including back-plains, terraces, low levees and back-swamps. Associated soils are usually heavy cracking clays. Not a Wetland. (BVG1M: 30a).	Of concern
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland to open forest. Other tree species, including *Casuarina cunninghamiana, E. coolabah, Melaleuca bracteata, Melaleuca viminalis, Livistona* spp. (in north), *Melaleuca* spp. and *Angophora floribunda*, may occur. A tall shrub layer may occur, including *Acacia salicina, A. stenophylla* and *Lysiphyllum carronii*. Low shrubs are present, but rarely form a conspicuous layer. The ground layer is open to sparse and dominated by perennial grasses, sedges or forbs. Occurs on fringing levees and banks of major rivers and drainage lines of alluvial plains throughout the region. Soils are very deep, alluvial, grey and brown cracking clays with or without some texture contrast. These are usually moderately deep to deep, soft or firm, acid, neutral or alkaline brown sands, loams or black cracking or non-cracking clays, and may be sodic at depth (Burgess 2003). Riverine. (BVG1M: 16a).	Least concern

RE	Description	VM Act status
11.3.27	Freshwater wetlands. Vegetation is variable including open water with or without aquatic species and fringing sedgelands and eucalypt woodlands. Occurs in a variety of situations including lakes, billabongs, oxbows and depressions on floodplains. Palustrine. (BVG1M: 34d).	Of concern
11.4.2	*Eucalyptus populnea/brownii* or *E. melanophloia* +/- *Corymbia dallachiana* +/- *C. tessellaris* +/- *E. crebra* +/- *E. platyphylla* woodland. Occurs on Cainozoic clay plains, often on rises or patches of coarser textured material. Cracking clay and texture contrast soils. Not a Wetland. (BVG1M: 17a).	Of concern

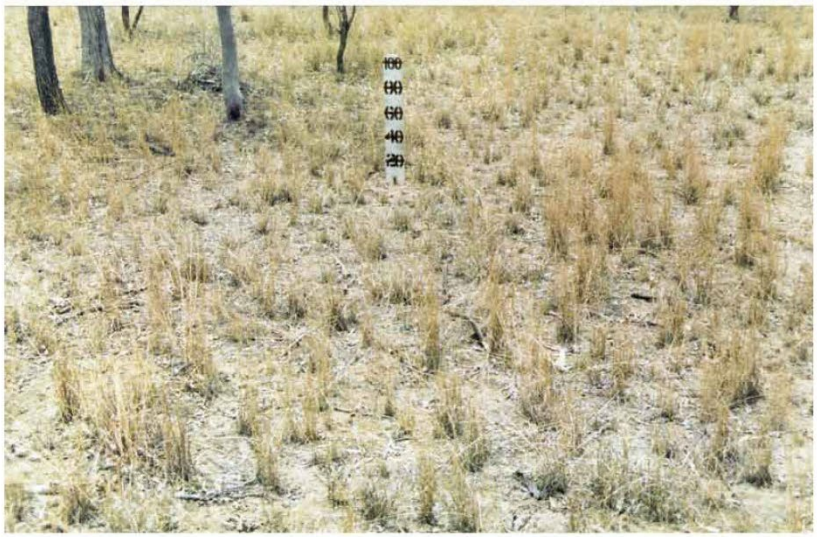
Appendix E: Pasture photo standards for dry matter yield

Alluvial

450 kg/ha



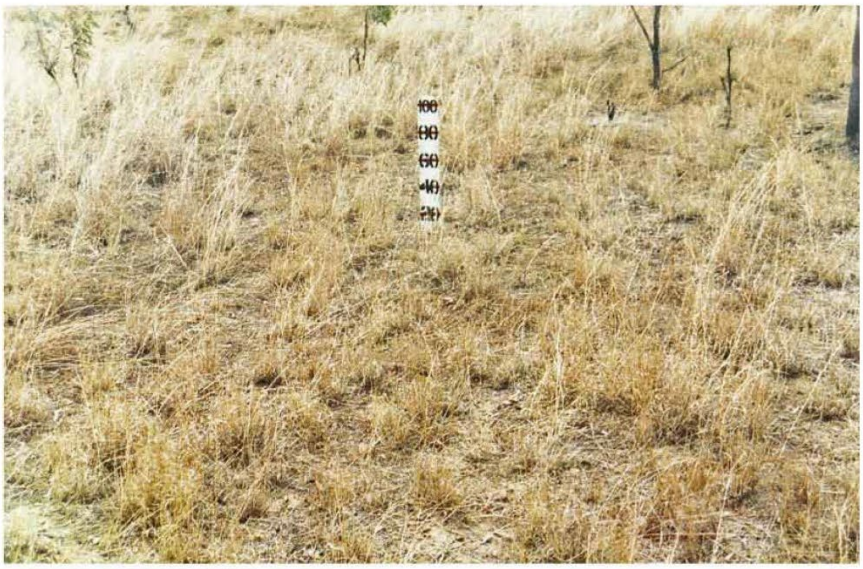
700 kg/ha



950 kg/ha



Queensland Government



Alluvial

1940 kg/ha



2560 kg/ha



4250 kg/ha

Queensland Government

Appendix F: Annual report template



DOCUMENT CONTROL				
Version No.	Date	Revision details	Prepared by	Approved by

ACKNOWLEDGEMENTS AND DISCLAIMER
ACKNOWLEDGEMENTS: DISCLAIMER:

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Summary

Project description

OMP approval details

Location of approved offsets *Figure 1.*

Overview of the purpose of this report

Summary of compliance outcomes for the reporting period.

Recommendations

Recommendations:

- Recommendation 1
- Recommendation 2.
- Recommendation 3.

Figure 1: Offset site locality map

1 Introduction

1.1 Purpose and scope of this report

Description of purpose and scope of report

This report is divided into the following main sections:

- Methodology of monthly inspections and quarterly monitoring
- Results of inspections and monitoring
- Management actions undertaken over the reporting period
- Assessment of compliance with the approval conditions, and the commitments made in the OAMP
- Recommendations.

1.2 Project details

The details of the project, approval, and details of the offsets are shown below in *Table 1*.

Table 1: Project details

Item	Details
Project name	
Project location	
EPBC approval number	
Approved actions	
Approval holder	
Offset location - address	
Lot/Plan (s)	
Offset area (ha)	
Landholder name	
Landholder postal address	

2 Offset monitoring and reporting methodology

The requirements and scheduling of monitoring and reporting of the offset areas are detailed in Section X of the OAMP and are summarised in this section. The requirements of the monitoring and reporting are a combination of site survey work and landholder record keeping and collation.

2.1 Quarterly and monthly inspections

Table X of the OAMP details the management measures that are to be undertaken across the offset areas. The offset areas are illustrated in *Figure 2*. The management measures include:

- Management measure 1
- Management measure 2
- Management measure 3
- Management measure 4

- Management measure 5.

As a part of the schedule of these management measures, regular quarterly inspections are conducted to monitor the effectiveness of management actions across the offset areas. These monitoring inspections target the following attributes:

- Attribute 1
- Attribute 2
- Attribute 3
- Attribute 4
- Attribute 5
- Attribute 6

2.2 Photo point monitoring for annual reporting purposes

During the quarterly inspection conducted each (month), photo point monitoring is undertaken at the permanent survey sites (as shown in *Figure 2,* and detailed in *Table 2*). A full set of photos is produced, taken at the start point of each transect, in a north, east, south and west direction. Photos of ground cover are taken at the same location from a height of 1.5 metres. These photos are then included in the annual offset implementation monitoring report.

Table 2: Location of monitoring sites

Regional ecosystem of each assessment unit	**Survey site number** (to be consistent with the baseline data collected for the duration of the OAMP)	**Hectares of the assessment unit in the offset area**	**Location - longitude**	**Location - latitude**

Figure 2: Offset area on Property Name

2.3 Five-yearly ecological surveys

Background and details of 5 yearly ecological surveys, and next due date.

3 Monitoring results 2024

Details of personnel conducting annual inspection, date of inspection

3.1 Suitably qualified persons

Qualifications of personnel.

3.2 Site inspection – general observations

Weather conditions

Summary of rainfall records for the period covered by this report comparative to the mean are shown in *Table 3*.

Table 3: Rainfall records for the offset areas for the reporting period

Month	Actual rainfall recorded (mm)	Long-term mean rainfall (mm)*	Variance (mm)

Summary of offset condition and any observed triggers that align with the OAMP, e.g.

- Description of ground cover attributes
- DMY assessments
- Evidence of pest plants
- Evidence of pest animals
- Evidence of fire
- Evidence of storm damage

The DMY results for each survey site are summarised in *Table 4*. DMY measurements are in accordance with the pasture photo standards for the Brigalow Belt bioregion.[1]

Table 4: Dry matter yields at the survey sites

Area	Site No.	Dry matter yield (kg/ha)

3.3 Photo point monitoring

Description of photo point monitoring

3.4 Management activities report

During the annual inspection undertaken on (Date), the management activities that had been undertaken over the reporting period were noted and landholder records collected and collated. The landholder records are presented in *Appendix B*. A summary of the management activities undertaken is provided in *Table 5*. The following sections provide further detail on each of the management actions over the reporting period.

3.4.1 Management action 1

Description of activities over the course of the year, timing, outcomes, and any subsequent recommendations.

[1] Available at https://futurebeef.com.au/resources/brigalow-belt-pasture-photo-standards/

3.4.2 Management action 2

As above

3.4.3 Management action 3

As above

3.4.4 Management action 4

As above

3.4.5 Management action 5

As above

Table 5: Summary timetable of management actions from (Date) to (Date)

Period	Management Actions							Monitoring and Reporting
Month	Grazing management – livestock numbers in the offset area		Management action 1	Management action 2	Management action 3	Management action 4	Management action 5	Quarterly and Annual Inspections and Report

4 Assessment of compliance against the OAMP

The details of the EPBC approval conditions that relate to the delivery of offsets are shown below in *Table 6.*

A number of commitments related to the delivery of offsets were also made in the approved OAMP (see Table X of the OAMP). *Table 7* lists these commitments and provides details on whether the offset implementation is compliant with those commitments.

Table 8 provides an assessment of whether each of the management actions undertaken in the offset area over the period covered by this report are compliant with the OAMP (see Table X of the OAMP).

Table 6: EPBC approval conditions related to the offsets on Property Name

Condition	Relevant section in this report or comment
Offset Area Management Plan	

Table 7: Compliance with commitments made in the OAMP

Commitment	Relevant approval condition	Compliant?	Comment

Table 8: Assessment of compliance of management actions over the offset area with the OAMP

Threat to offset values	Management actions	Monitoring	Trigger for adaptive management and corrective action(s)	Have trigger values been reached in the reporting period?	Description of corrective action undertaken and timing (if applicable), or other comments

5 Conclusions and recommendations

Conclusion

Recommendations:

- Recommendation 1
- Recommendation 2
- Recommendation 3.

List of abbreviations

Abbreviation	Description

Glossary

Term	Definition

Appendix A: Survey photographs

Appendix B: Landholder records

Appendix G: Author CVs

Alan Key – Managing Director, Earthtrade Group

Current industry position	A leader in the offset industry, Alan has been the Managing Director of the Earthtrade Group since its inception in 2007. With over 16 years of experience assisting clients on policy, legal, financial and operational aspects of offset solutions in the corporate sector, he also has strong links with landholders in the agricultural, resources, and development sectors, and Indigenous landowners. Alan is an active member of a number of industry groups and regularly speaks at conferences and at various events held by industry, law firms and academia. Earthtrade is today Australia's leading offset solutions specialist delivering offsets required by government to meet project approval conditions. Alan has experience and a strong understanding of the complex environmental legislation and policy in place at the local, state and Australian Government tiers. Earthtrade also specialises in providing assessments of highest and best land use scenarios for properties, land parcels and project sites. This incorporates modelling for carbon and renewables projects that inform whole-of-project design, and has evolved to include financial and investment modelling.
Education and qualifications	• Associate Diploma Rural Techniques Agriculture - University of Qld (1985) • Diploma in Financial Planning - Financial Institute of Australasia (2007)
Professional association memberships	• Queensland Resource Council • Queensland Environmental Law Association • Environment Institute of Australia & New Zealand • Accredited EnviroDevelopment Practitioner • Australian Institute of Company Directors
Professional recognition, registrations, licences, certifications.	• Project Management – IPAA • Certification in understanding *Vegetation Management Act 1999*; *Land Act 1994* – Part 6; *Integrated Planning Act 1997*; Integrated Development Assessment Systems (IDAS) • Regional Ecosystems Accreditation (Assessor) • Certification in understanding Landscape Processes and Hydrology; Acid Sulphate Soils; Geology and Landforms; Dryland Salinity; Effluent Irrigation
Key achievements	• Authored and co-authored over 100 Offset Area Management Plans, Offset Delivery Plans and Offset Strategies • Successfully transacted the first koala offset obligation in the State of Queensland. • Successfully delivered the two largest koala offset projects in Queensland • Negotiated the first offset project where state and Australian Government matters were co-located on the same site • Negotiated the first offset project where three mining companies collaborated to satisfy their offset requirements on the same portion of land held by Indigenous people. The project provides ongoing training, employment and income opportunities to the community. • Has now successfully delivered over 90 offset projects with a value of over $140 million.

David Sasse – Technical Writer/Editor, Earthtrade Group

Current industry position	David began working with Earthtrade in 2011. In his role as Technical Writer/Editor, David is responsible for all QA aspects of the company's documentary output including Offset Area Management Plans, Offset Delivery Plans, Offset Strategies, Offset Options Papers and the full range of briefing documents, technical reports, request for tenders, and marketing materials. Since 2011, David has authored and co-authored over 100 Offset Area Management Plans, Offset Delivery Plans, and Offset Strategies to meet the requirements of the EPBC Act and the Queensland environmental offsets framework. Additionally, David has authored over 50 annual compliance reports for ongoing offset projects around Queensland. This is a highly specialised role requiring the rigorous review, editing and proofreading of written material, the verification and checking of technical data outputs, and the presentation of complex technical material in an effective and easily interpreted manner. David's role also includes the overall responsibility for document formatting and styling across the full suite of documentary output. Under David's supervision, Earthtrade produce documents that are consistent with both Australian and Queensland Government style and content standards, and that meet the requirements of the EPBC Act *Environmental Management Plan Guidelines*.
Education and qualifications	• Bachelor of Arts – Monash University (1995) • Graduate Certificate in Editing and Electronic Publishing – Macquarie University (2017).
Professional recognition, registrations, licences, certifications	• Numerous industry-related training courses, certifications and inductions including in the first aid, project management, safety and training areas. • Member, Small Press Network
Key achievements	• Authored and co-authored over 100 Offset Area Management Plans, Offset Delivery Plans and Offset Strategies • Authored over 50 annual offset compliance reports • Design, development and deployment of ISO Management Systems to contemporary standards (WHS, Quality and Environment) across a number of industries including civil construction, ecological consultancies and professional services.

Thomas Key – Business Manager, Earthtrade Group

Current industry position	Thomas commenced working in the environmental offset market in 2014. In his current role as Business Manager, Thomas is responsible for oversight of operational aspects of the company including administration, project management, financial management and reporting, IT and marketing. During this time, Thomas has developed and manages several spreadsheets, databases, and processes that remain core to the management and operation of investments into environmental offsets. This informs modelling to ascertain highest and best use of properties, land parcels and projects across Queensland. This has evolved to include financial and investment modelling. Thomas manages the transformation of raw ecological data collected in the field into preferred regulatory formats and scoring systems. He also uses this data to ascertain necessary management and implementation costs that underpin commercial negotiations. Thomas has also undertaken and managed the process of FullCAM assessments of projects for government and primary producer client bases. The models that Thomas has developed are used both internally and externally for company management, contractual negotiation and investment analysis and evaluation. Thomas has also authored and co-authored over 50 Offset Area Management Plans, Offset Delivery Plans, and Offset Strategies.
Education and qualifications	• Currently studying a Master of Business (Applied Finance) at the Queensland University of Technology • Bachelor of Business (Financial Planning) - University of the Sunshine Coast (2019) • Bachelor of Science (Mathematics) - University of the Sunshine Coast (2019)
Professional recognition, registrations, licences, certifications	• Mazars Financial Modelling and Best Practice Course
Key achievements	• Successfully developed models that are used both internally and externally for company management, contractual negotiation and investment analysis and evaluation • Authored and co-authored over 50 Offset Area Management Plans, Offset Delivery Plans, and Offset Strategies • Engaged with and completed work for corporations such as BHP Billiton, Anglo American, Arrow Energy, Senex Energy, QCoal, Sunwater, Gladstone Area Water Board, Rio Tinto, Bowen Coking Coal, Windlabs and Cubico.

Attachment 1: Terrestrial ecology reports

Attachment 1A: Impact site field survey report

Westside PL94 Coal Seam Gas Project: Matters of National Environmental Significance Assessment (Umwelt, 2025).

Please see file supplied separately in Attachment A of the Preliminary Documentation Report.

Attachment 1B: Koala scoring methodology for use in PL94 field work to support the OAMP

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Briefing Note

To: Mark Rodiger

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Cc: Scott Mainey

E | Scott.mainey@erm.com

From: Jessie Mckee

Date: 2 April 2024

Subject: **Koala scoring methodology for use in PL94 field work to support the OAMP**

Purpose

Where field teams propose to collect data within PL94 to support the Project's OAMP, in addition to BioCondition data, habitat attribute scoring should be collected for both Ornamental snake and Koala per site.

Scoring methodology for Ornamental snake should be as per Lyngco Clements Creek Ecology report.

Scoring methodology for Koala is provided in this briefing note.

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This briefing note and any attachments are confidential and are intended to provide information for use in discussions between Umwelt and the named recipient(s) only.

Table 1 Site condition and context scoring criteria

MHQA component	Attribute	Sub-attribute	Attribute indicator(s)	Max Score
Site condition	Quality and availability of food and habitat required for foraging	Presence of preferred food tree species	Diversity of locally important koala tree species and their dominance within the canopy layer.	5
		Size of habitat patch	Size of habitat patch relative to the species foraging requirements. Greater than 100 ha is considered the maximum condition.	5
	Quality and availability of habitat required for shelter and breeding	Presence of shelter trees i.e. large trees (BioCondition)	Availability of shelter trees respective to the RE.	5
		Presence of refugia	Availability and proximity of the patch to areas of refuge such as drainage lines where koalas could retreat to during time of drought and/ or fire.	5
Site context	Quality and availability of habitat required for mobility	Size of habitat patch	Size of habitat patch relative to the species foraging requirements. Greater than 1000 ha is considered the maximum condition.	7.5
		Presence of nearby vegetated watercourses	Proximity of the site to vegetated watercourses that facilitate koala movement through the landscape.	2.5
	Absence of threats	Habitat clearing	See matrix below	15
		Wildlife damage		
		Feral animal predation and/or control		

Table 2 Threats matrix

Threat	Scope / Severity	Contributing factors	SCOPE Very high - 1	SCOPE High - 2	SCOPE Medium - 3	SCOPE Low - 4	SCOPE Very low - 5
			SEV Very high - 1	SEV High – 1.5	SEV Medium - 2	SEV Low – 2.5	SEV Very low - 3
Wildfire	Scope	The fuel load associated with the vegetation hazard class (VHC) of the patch that the monitoring site is located within Proximity of firebreaks to the monitoring site Availability of access for emergency response personnel Fire management regime in accordance with RE recommended guidelines The sensitivity of each species to fire as described in the EPBC Conservation Advice or Recovery Plan	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, Recovery plan) AND The patch has a VHC-fuel load greater than 25t/ha AND fire regime not consistent with RE fire management guidelines AND no fire breaks/ non-remnant grassland which provides access for fire response within 100m of the site	The habitat patch has a VHC-fuel load greater than 25t/ha AND fire regime not consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response OR The habitat patch has a VHC fuel load =>15t/ha and <25t/ha AND neither of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	The habitat patch has a VHC-fuel load =>15t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines OR There are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load greater than 25t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR	The habitat patch has a VHC-fuel load between 15t/ha and <25t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load less than 15t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines OR There are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	The habitat patch has a VHC-fuel load less than 15t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load less than 10t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site

					The habitat patch has a VHC-fuel load less than 15t/ha AND fire regime not consistent with RE fire management guidelines AND no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	OR The habitat patch has a VHC-fuel load less than 10t/ha AND neither of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	
	Severity	The fuel load associated with the VHC) of the patch that the monitoring site is located within Whether the species is arboreal and therefore less capable to retreat into connected refuge The size of the patch considering that the fire intensity increases with patch size	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, Recovery plan) AND The patch is one contiguous area (insignificant gaps) greater than 1000ha and the site is within vegetation classified a VHC of at least 15t/ha	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, Recovery plan) AND The patch is one contiguous area (insignificant gaps) greater than 500ha and the site is within vegetation classified a VHC of at least 15t/ha OR The matter species is not arboreal, fire is	The patch is one contiguous area (insignificant gaps) between 250ha and <500ha and the site is within vegetation classified a VHC of at least 15t/ha OR The patch is one contiguous area greater than 500ha and the site is within vegetation classified a VHC of at least 10t/ha OR The matter species is not arboreal, fire is	The patch is one contiguous area (insignificant gaps) between 100 and <250ha and the site is within vegetation classified a VHC of at least 15t/ha OR The patch is one contiguous area between 250t/ha and <500t/ha and the site is within vegetation classified a VHC of at least 10t/ha OR	The patch is one contiguous area (insignificant gaps) less than 100ha and the site is within vegetation classified a VHC of at least 15t/ha OR The patch is one contiguous area less than 250ha and the site is within vegetation classified a VHC of =<10t/ha OR The matter species is not arboreal, fire is not considered a

				considered a severe threat AND The patch is one contiguous area (insignificant gaps) greater than 1000ha and the site is within vegetation classified a VHC of at least 15t/ha	not considered a severe threat AND The patch is one contiguous area (insignificant gaps) greater than 1000ha and the site is within vegetation classified a VHC of at least 15t/ha OR The matter species is not arboreal, fire is not considered a severe threat AND The patch is one contiguous area (insignificant gaps) greater than 500ha and the site is within vegetation classified a VHC of => 15t/ha	The patch has a fuel load =<10/tha within one contiguous patch =>250ha OR The matter species is not arboreal, fire is not considered a severe threat AND The patch is one contiguous area (insignificant gaps) greater than 500ha and the site is within vegetation classified a VHC of => 15t/ha OR The matter species is not arboreal, fire is not considered a severe threat AND the site is within vegetation classified a VHC of <15t/ha	severe threat AND the site is within vegetation classified a VHC of <15t/ha
Habitat clearing	Scope	The level of statutory protection of an area as classified by Qld state mapping	The site is located within mapped habitat subjected to selective logging, thinning or other tree-loss related practice.	The site is within a mapped habitat patch AND mapped as Category X/ non-remnant vegetation	The site is within a habitat patch AND mapped as Category C/ High-value regrowth vegetation or Category R.	The site is within a habitat patch AND mapped as Category B/ Remnant vegetation	Mapped as Category A vegetation

	Severity	The importance of an area to each species as classified through ground-truthed surveys and subsequent habitat mapping	The monitoring site is within breeding/climate refuge habitat (if relevant) AND within 100m to a mapped watercourse AND ground-truthed as remnant status	The monitoring site is within breeding or foraging habitat AND ground truthed as remnant vegetation	The monitoring site is within breeding or foraging habitat AND ground truthed as regrowth vegetation	The monitoring site is outside but adjacent (within 100m) of mapped breeding or foraging habitat AND ground truthed as regrowth or remnant vegetation (clearing this vegetation would increase edge effect or possibly connectivity of adjacent habitat)	Mapped as Category A vegetation OR The monitoring site is outside of mapped habitat AND within an area ground truthed as non-remnant, OR The monitoring site is outside of mapped breeding or foraging habitat AND not adjacent (>100m away from mapped habitat) AND ground truthed as regrowth or remnant vegetation.
Feral animal predation	Scope	The presence of feral predators Extent of feral animal management The species' vulnerability to feral animal predation	Feral dogs, cats or foxes present on site, no active management actions to monitor AND no active management actions in place to reduce/ prevent the increase of feral animal numbers AND the species is commonly preyed upon by the feral animals (EPBC recovery plan) to a point where it can	Feral dogs, cats or foxes present on site, no active management actions to monitor AND no active management actions in place to reduce/ prevent the increase of feral animal numbers	Feral dogs, cats or foxes present on site. There are active management actions to monitor AND reduce/ prevent all known species and increase of feral animal numbers anywhere on the site.	Feral dogs, cats or foxes present on site, active management actions to monitor and reduce/ prevent the increase of feral animal numbers within 3km of the monitoring site.	Feral dogs, cats or foxes present on site, active management to monitor and reduce/ prevent the increase of feral animal numbers within 3km of the monitoring site for a minimum of 5 years

			remove a population in absence of other threats.				
	Severity	The species' behaviour and particularly, duration and frequency on ground where they could be preyed upon The sensitivity of each species to fire as described in the EPBC Conservation Advice or Recovery Plan	The species is a terrestrial forager, disperser and breeder species spending most of its life on ground AND the species is commonly preyed upon by the feral animals (EPBC recovery plan) to a point where it can remove a population in absence of other threats.	The species is terrestrial forager, disperser or breeder species and expected to be on the ground daily during any stage of its annual behavioral cycle AND the species is commonly preyed upon by the feral animals on site (EPBC advice)	The species is terrestrial forager, disperser or breeder species and expected to be on the ground daily during any stage of its annual behavioral cycle AND the species is not commonly preyed upon by the feral animals on site (EPBC advice) AND it is expected that feral animals are present	The species is terrestrial forager, disperser or breeder species and expected to be on the ground weekly during any stage of its annual behavioral cycle OR The habitat patch has been burnt within the past 2 years AND it is expected that feral animals are present	The species very rarely comes to ground AND the habitat has not been burnt within the past 2 years AND there are no active feral animal management actions within 250m of the site OR The species very rarely comes to ground AND the habitat has been burnt within the past 2 years AND there are active feral animal management actions within 250m of the site

Attachment 1C: Clements Creek 2024 survey report

Westside Petroleum Project – Ecological Assessment Report – Clements Creek (Lot 17 RP848822) Queensland. Lyngco Environmental Consulting (2025)

PREPARED FOR EARTHTRADE

Westside Petroleum Project – Ecological Assessment Report - Clements Creek (Lot 17 on RP848822) Queensland



1.0 Document Control Sheet

Project Name	Westside Petroleum - Ecological Assessment Report - Clements Creek (Lot 17 on RP848822) – Queensland
Project Number	ET028
Project Manager	Steve Lyngcoln
Report Authors	Jannico Kelk Laura Harms
Version - Date	RevA 17/12/2024 Final 28/04/25

INTENDED USE: Lyngco Environmental Consulting (LEC) has prepared this report for Earthtrade to support environmental offsets required for Westside Petroleum on the Clements Creek property (Lot 17 on RP848822). Information and recommendations contained herein are purpose and project specific and LEC accepts no liability for the use or interpretation of any information contained in this report for any other purposes other than intended.

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1.1 Executive Summary

The purpose of the Ecological Assessment Report on Clements Creek Property (Lot 17 on RP848822), was to undertake BioCondition surveys, terrestrial habitat surveys and targeted threatened fauna surveys to determine the Terrestrial Habitat Quality scores of MNES and MSES within the Offset Investigation Area (OIA).

Clements Creek Property (Lot 17 on RP848822) is located approximately 50 km west of Marlborough. The ecological assessment focused on the OIA within Clements Creek Property supporting vegetation and habitat associated with Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) that can potentially support environmental offsets for Westside Petroleum.

The terrestrial habitat quality scores detailed in this report will be used to inform the Westside Petroleum Offsets Strategy by providing scores as per the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* - Offsets Assessment Guide (EPBC Act OAG).

Executive Summary Table 1 summarises MNES and MSES within the OIA detected or confirmed by the desktop assessment, literature review and field assessment.

Executive Summary Table 1: MNES and MSES detected or confirmed by the desktop assessment, literature review and field assessment.

MNES	**Status and Act**	
	EPBC Act	**NC Act**
Brigalow TEC (RE 11.3.1)	E	E
Ornamental snake	V	V
Koala	E	E
Greater glider	E	E
Squatter pigeon	V	V
MSES	**VM Act**	
RE 11.3.3	Of Concern	
RE 11.3.2	Of Concern	
RE 11.3.25	Least Concern	
RE 11.3.27f	Least Concern	

Executive Summary Table 2 contains the habitat quality scores for MNES and MSES within the OIA returned in this Ecological Assessment Report.

Executive Summary Table 2: Summary of habitat quality scores of MNES and MSES within the OIA.

MNES	Status and Act		Hectares	Habitat Quality Score
	EPBC Act	NC Act		
Brigalow TEC (RE 11.3.1)	E	E	510.16	7.56
Ornamental snake	V	V	840.01	5.54
Koala	E	E	461.22	6.80
Greater glider	E	E	459.82	6.68
Squatter pigeon	V	V	453.71	6.07
MSES	**VM Act**		**Hectares**	**Habitat Quality Score**
RE 11.3.3	Of Concern		322.33	7.60
RE 11.3.2	Of Concern		2.43	6.09
RE 11.3.25	Least Concern		128.94	7.58
RE 11.3.27f	Least Concern		7.52	7.21

Definitions and Abbreviations

Acronym or Term	Definition
ALA	Atlas of Living Australia
AU	Assessment Unit
DCCEW	Commonwealth Department of Climate Change, Energy, Environment and Water
DESI	Queensland Department of Environment, Science and Innovation
DoR	Queensland Department of Resources (formerly the Department of Natural Resources, Mines and Energy)
EA	Environmental Authority
EO Act	Environmental Offsets Act 2014 (QLD)
EP Act	Environmental Protection Act 1994 (QLD)
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)
EVNT	Extinct, extinct in the wild, critically endangered, endangered, vulnerable, near threatened
GIS	Geographic information system
Ground-truthing	Assessing the accuracy of remote sensing data by comparing it with physical measurement collected at the ground level
HVR	High value regrowth
KSAT	Koala Spot Assessment Technique
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NC Act	Nature Conservation Act
OAG	Offset Assessment Guide
PMST	Protected Matters Search Tool
sp.	Species (singular)
spp.	Species (plural)
SPRAT	Species Profile and Threats Database
SSR	Species Stocking Rate
subsp.	Subspecies
Transect	A line or narrow area along or within which measurements are taken, and items counted.
VM Act	Vegetation Management Act 1999 (QLD)

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1.0 Introduction

The purpose of this Ecological Assessment Report (EAR) is to provide the results of ecological and terrestrial habitat quality surveys undertaken within the Offset Investigation Area (OIA) on Clements Creek (Lot 17 on RP848822), as illustrated in Figure 1

The OIA contain Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) available to potentially supports environmental offsets for Westside Petroleum.

Targeted ecological and habitat quality assessments were undertaken to determine the presence, extent and habitat quality for MNES and MSES, including, but not limited to the following:

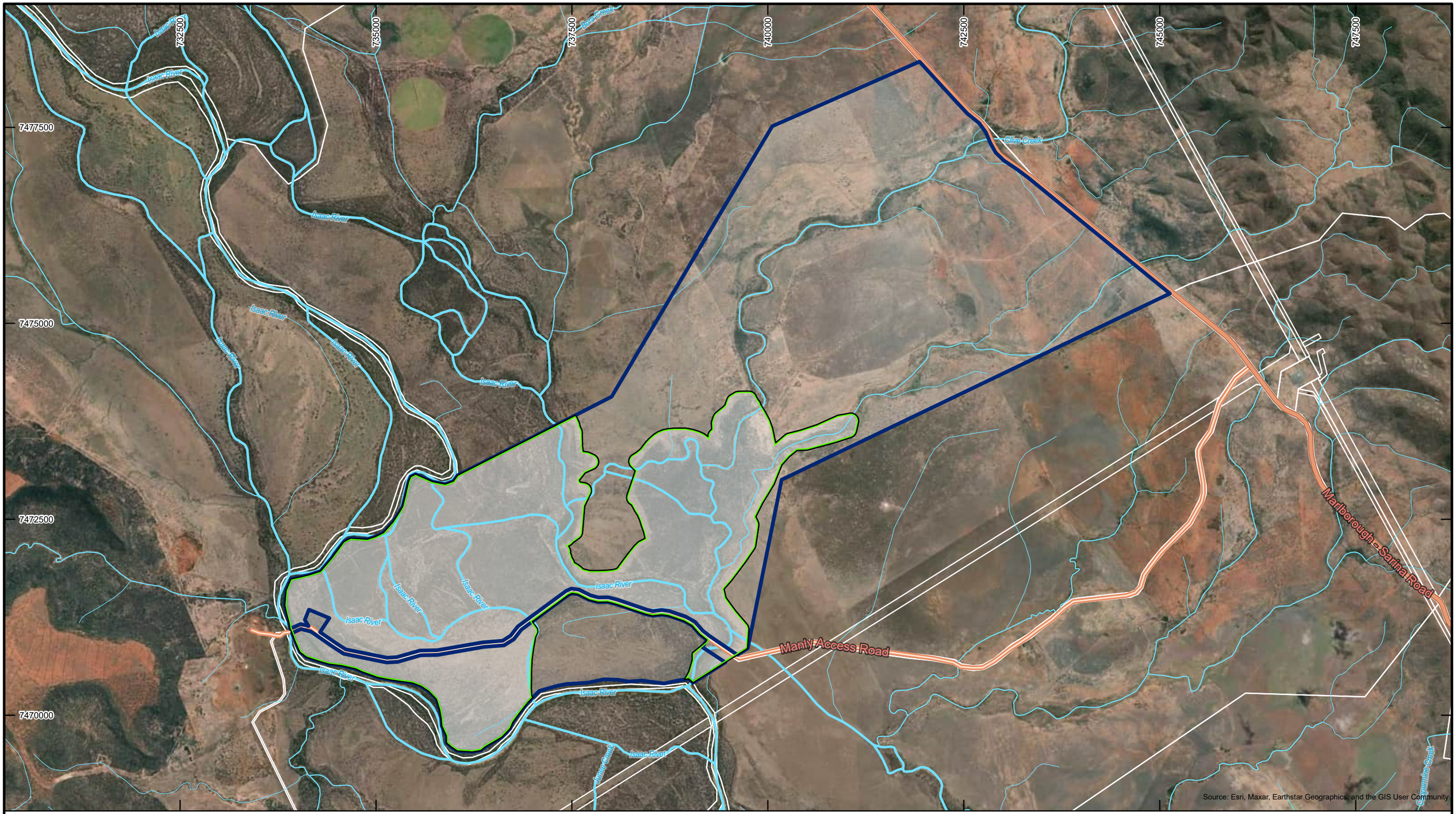
- Ornamental snake (*Denisonia maculata*) – listed as vulnerable under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Nature Conservation Act 1992* (NC Act)
- Koala (*Phascolarctos cinereus*) – listed as endangered under the EPBC Act and NC Act
- Greater glider (southern and central) (*Petauroides volans volans*) – listed as endangered under the EPBC Act and NC Act
- Squatter pigeon (*Geophaps scripta scripta*) – listed as vulnerable under the EPBC Act and NC Act
- Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (Brigalow TEC) listed as endangered under the EPBC Act
- Poplar Box Grassy Woodland on Alluvial Plains Threatened Ecological Community (Poplar Box TEC) – listed as endangered under the EPBC Act
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (SEVT TEC) – listed as endangered under the EPBC Act.

The ecological assessment survey was led by Jannico Kelk (Senior Ecologist) and Laura Harms (Graduate Ecologist) over five days and four nights between 20-24 November 2024. The survey included:

- Vegetation ground truthing
- Mapping regional ecosystems (RE)
- BioCondition assessments
- Terrestrial habitat assessments
- Threatened ecological community (TEC) assessments
- Targeted ornamental snake, koala and greater glider surveys
- Ornamental snake, koala, greater glider and squatter pigeon habitat assessments
- Fauna spotlighting.

BioCondition assessments, terrestrial habitat assessments and targeted threatened fauna assessments were used to derive terrestrial habitat quality scores for each MNES and MSES identified within the OIA in accordance with the *Queensland Guide to determining terrestrial habitat quality: Methods for assessing habitat quality under the Queensland Environmental Offsets Policy,* herein after referred to as the 'Guide' (DES, 2020).

Figure 1: Project overview.


7477500
7475000
7472500
7470000
7325000
7350000
7375000
7400000
7425000
7450000
7475000
Isaac River
Isaac River
Isaac River

2.0 Offset Investigation Area

The Offset Investigation Area (OIA) is located on the alluvial floodplains on the western portion of the Clements Creek property situated on Lot 17 on RP848822 (Figure 1). The OIA is approximately 1,360.29 ha in area, supporting 970.48 ha remnant vegetation and 388.91 ha cleared non-remnant vegetation. The remnant vegetation is dominated by open coolabah (*Eucalyptus coolabah*) woodlands and brigalow (*Acacia harpophylla*) forest on alluvium. The OIA is bordered to the west by the Isaac River (stream order 8) and associated tributaries and is dissected east to west by Clive Creeks (stream order 3) and Clements Creek (stream order 8) which flow into the Isaac River. The rivers and tributaries support narrow riparian forests dominated by river red gum (*E. camaldulensis*) with Melaleuca species. Palustrine freshwater wetlands occur within depressions in the coolabah and brigalow forests and woodlands. Evidence of historical logging, clearing for cattle grazing and pest animals (i.e., dingo/dogs, deer, pigs) were observed during the habitat quality surveys.

Previous ecological surveys at Clements Creek have identified the following relevant MNES and MSES:

- The presence of the ornamental snake (*Denisonia maculata*) (Earthtrade, 2024)
- The presence of koala (*Phascolarctos cinereus*) (LEC, 2023) (Earthtrade, 2024)
- Multiple sightings of the greater glider (southern and central) (*Petauroides volans*) (LEC, 2023) (Earthtrade, 2024)
- Potential squatter pigeon (*Geophaps scripta scripta*) habitat (Earthtrade, 2024)
- Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (LEC, 2023)
- Regulated Vegetation:
    - RE 11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines (LEC, 2023)
    - RE 11.327f - *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps (LEC, 2023).

3.0 Methods

3.1 Suitably qualified persons

The desktop assessment and field survey was undertaken by appropriately qualified ecologists Jannico Kelk (Senior Ecologist) and Laura Harms (Graduate Ecologist). Their experience and roles within the ecological assessment is summarise below in Table 1. Principal Ecologist Steve Lyngcoln was responsible for project management and technical review.

Table 1. Suitably qualified persons.

Ecologist and Role	Experience	Professional Qualifications	Years of Experience
Stephen Lyncoln • Reporting • Project management	Steve has over 20 years' experience conducting targeted ecological field surveys including baseline offsets area assessments, monitoring and management. Steve specialises in vegetation ecology including survey and mapping of regional ecosystems and threatened ecological communities, threatened flora surveying and mapping.	Master of Environmental Science, University of New England (UNE) Graduate Diploma in Natural Resources (UNE) Bachelor of Applied Science (Protected Area Management, University of Queensland (UQ)	20
Jannic Kelk • Senior Fauna Ecologist • Desktop assessment • Field assessment • Reporting	Jannico is a Senior Ecologist with 10 years of experience undertaking targeted searches for threatened species particularly in Central Queensland. He has experience over multiple projects in offset baseline assessments, monitoring and management within Queensland.	Bachelor of Environmental Science (Resource Management), Southern Cross University, (2019)	10
Laura Harms • Graduate Ecologist • Desktop assessment • Field assessment • Reporting	Laura is a Graduate Ecologist. She holds a Bachelor of Advanced Science (First Class Honours) majoring in Ecology from the University of Queensland. Laura has a well-rounded base of experience in terrestrial ecology and has worked on projects ranging from threatened fauna surveys, pre-clear habitat assessments for civil construction clients. Laura has experience with various flora and fauna monitoring methods, including BioCondition surveys, camera trapping, acoustic monitoring, live trapping and active searches.	Bachelor of Advanced Science (Hons First Class): Ecology	1

3.2 Desktop Assessment

An initial desktop assessment was undertaken of the following databases and literature to determine the mapped regional ecosystems and potential habitat and/or historical records for the relevant threatened species and TECs within or surrounding the OIA:

- Regulated vegetation and regional ecosystem mapping (Appendix A)
- Matters of state environmental significance mapping (Appendix A)

- EPBC Act Protected Matters Search Tool (PMST) (Appendix A)
- Wildlife Online (Appendix A)
- Atlas of Living Australia (ALA, 2024)
- Eagle Downs Coal Mine Project (EDCM), Ecological Assessment Report (EAR), Clements Creek (LEC, 2023)
- Clements Creek Offset Area: Supplementary survey for ornamental snake - Memorandum. Earthtrade (Earthtrade, 2024)
- Conservation Advice for *Denisonia maculata* (Ornamental Snake) (DCCEEW, 2024)
- Conservation Advice for *Phascolarctos cinereus* (Koala) (DCCEEW, 2022)
- Conservation Advice for *Petauroides Volans* (Greater glider (southern and central) (DCCEEW, 2022)
- Conservation Advice for *Geophaps scripta scripta* (Squatter Pigeon) (DCCEEW, 2024)
- Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community (Brigalow TEC) (DCCEEW, 2013)
- Conservation Advice for Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions (Brigalow Belt SEVT TEC) (DCCEEW, 2023)
- Conservation Advice for Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box TEC) (DCCEEW, 2017)
- Central Queensland Threatened Species Habitat Descriptions (Kerswell A, 2020)
- ACARP Project C15044: Assessment of Seasonal Habitat Characteristics as Predictors of Habitat Suitability for the Threatened Ornamental Snake (*Denisonia maculata*) (Veary, 2011)
- Koala Habitat Scoring Methodology V2 (Umwelt, 2024).

3.2.1 Likelihood of Occurrence Assessment

A likelihood of occurrence assessment was conducted based on the results of the desktop assessment. The criteria for the likelihood of occurrence assessment is summarised inTable 2.

Table 2: Likelihood of Occurrence Assessment criteria.

Criteria	Criteria for Threatened Species	Criteria for Threatened Ecological Communities
Unlikely to occur	The OIA and surrounds does not comprise of suitable habitat for the species, is outside of the species known distribution or the species is extinct in the wild.	State mapped Regional Ecosystems (RE) within the OIA do not correspond with the TEC.
Potential to occur	The OIA is within the species known distribution and suitable habitat to support the species is present; however: • The species has not previously been recorded within the desktop search extent and/or • suitable habitat is degraded or of limited extent, thereby	N/A

Criteria	Criteria for Threatened Species	Criteria for Threatened Ecological Communities
	reducing the likelihood of the species occurrence	
Likely to occur	Suitable habitat to support the species is present and the species has previously been recorded within desktop search extent distance of the OIA	State mapped REs corresponding to the TEC have been identified by the desktop assessment within the OIA
Known to occur	Has been recorded within the OIA previously.	The TEC has been recorded within the OIA previously

3.3 Field Assessment

The field assessment was undertaken in accordance with following methods and guidelines:

- *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland Assessment Manual. Version 2.2* (Eyre T. &., 2015)
- *Guide to determining terrestrial habitat quality A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy Version 1.2 (Determining terrestrial habitat quality methods)* (DEHP, 2017)
- *Central Queensland Threatened Species Habitat Descriptions* (Kerswell A, 2020)
- *The Spot Assessment Technique* (Callaghan, 2011).

3.4 Survey Effort

The survey effort is detailed in Table 3 and illustrated in Figure 2. All field work was undertaken by Jannico Kelk (Senior Fauna Ecologist) and Laura Harms (Graduate Ecologist) between 20-24 November 2024.

Table 3: Survey effort undertaken during the Clements Creek EAR, survey requirements and relevant management plan, guideline or literature.

Method	Target Matter	Survey Effort		Dates	Management Plan, Guideline or Literature
		Number of Sites	Person Hours		
BioCondition	Determine the capacity of a terrestrial ecosystem to maintain biodiversity values.	21 sites	Undertaken over 10 person days (five times two person days)	20-24 November	BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland (Eyre T. &., 2015)
Quaternary vegetation surveys	Ground truth regional ecosystem (GTRE) and vegetation, in accordance with Nelder, 2023.	As required to further refine existing GTRE mapping		20-24 November	Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland V7 (V.J. Neldner, 2023)
Terrestrial habitat assessments	Koala, greater glider, ornamental snake and squatter pigeon terrestrial habitat assessments undertaken during BioCondition surveys in accordance with the Guide to determining terrestrial habitat quality (the Guide)	21 sites	Undertaken during BioCondition surveys	20-24 November	BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland (Eyre T. &., 2015) Guide to determining terrestrial habitat quality (DES, 2020)
Targeted ornamental snake survey (spotlight survey)	Ornamental snake	Undertaken in ornamental snake habitat, primarily consisting of areas of gilgai	12 hours (six hours x two ecologist)	20-23 November	Survey guidelines for Australia's Threatened Reptiles (DSEWPC, 2004)
Targeted greater glider survey	Greater glider	Undertaken in greater glider habitat, primarily along riparian corridors	12 hours (six hours x two ecologist)	20-23 November	Survey guidelines for Australia's Threatened Mammals (DSEWPC, 2011)

Method	Target Matter	Survey Effort		Dates	Management Plan, Guideline or Literature
		Number of Sites	Person Hours		
(spotlight survey)		where greater glider abundance is typically highest			
Targeted koala survey (spotlight survey)	Koala	Undertaken in koala habitat primarily along riparian corridors where greater glider abundance is typically highest	12 hours (six hours x two ecologist)	20-23 November	Survey guidelines for Australia's Threatened Mammals (DSEWPC, 2011)
Targeted squatter pigeon survey	Squatter pigeon	Undertaken throughout the entire OIA, primarily focusing on areas with low grass cover and open canopy and water sources		20-24 November	Conservation Advice for *Geophaps scripta scripta* (Squatter Pigeon) (DCCEEW, 2024)
Koala Spot Assessment Technique (KSAT)	Koala	Five sites - one per Assessment Unit	Five hour (two and half hours x two ecologist)	20-24 November	The Spot Assessment Technique (Callaghan, 2011)

3.5 BioCondition Survey

The BioCondition method provides a framework to assess vegetation condition and a measure of the capacity of a terrestrial ecosystem to maintain biodiversity values. It is a quantitative repeatable assessment procedure that provides a score of vegetation community condition. The higher the BioCondition score, the more biodiversity will be supported in a specific ecosystem type (Eyre T. &., 2015).

The BioCondition assessment method (Eyre T. &., 2015) is included as part of the overall assessment of habitat quality.

The BioCondition assessment method requires delineation of field verified vegetation communities and REs into Assessments Units (AUs). Assessments Units are relatively homogenous patches of vegetation. They are defined by a distinct RE and broad vegetative condition (remnant, regrowth, non-remnant) (Eyre T. &., 2015). The AUs and relevant REs are detailed Table 4. Results of the BioCondition surveys were scored against the relevant RE benchmarks to determine an overall score of habitat quality.

BioCondition assessments were undertaken in field verified ground-truthed REs, illustrated in Figure 2 and Figure 3. The BioCondition method captures the average representation of the relevant AU; as such each patch of mapped AU does not require a BioCondition site, as per the BioCondition method (Eyre, et al. 2015). A minimum of two BioCondition sites per AU is required, as per the BioCondition assessment method (Eyre, et al. 2015). A single 2.43 ha patch of RE 11.3.2 *Eucalyptus populnea woodland* on alluvial plains was identified during the field survey. Due to size constraints one BioCondition survey site was undertaken in this patch.

Site locations were informed by the desktop survey and previous GTRE (LEC, 2023), illustrated in Figure 3.

The name and number of BioCondition sites undertaken per AU and the relevant REs is detailed in Table 4. The start and end points (0 m and 100 m) of each BioCondition site is summarised in Table 5 and illustrated in Figure 3.

Table 4: Assessment Unit, Regional Ecosystem, BioCondition site, and number of BioCondition assessments.

Assessment Unit	Regional Ecosystem and short description	BioCondition Sites	Number of BioCondition Assessments
AU1	RE 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	CBC3, CBC5, CBC6, CBC7, CBC8, CBC17	6
AU2	RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	CBC1, CBC11, CBC16, CBC18	4

Assessment Unit	Regional Ecosystem and short description	BioCondition Sites	Number of BioCondition Assessments
AU3	RE 11.3.27f *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps.	CBC4, CBC9, CBC10, CBC20	2
AU4	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with gilgai	CBC12, CBC14, CBC15, CBC21	4
AU5	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with no gilgai	CBC12, CBC14, CBC15, CBC21	4
AU6	RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains	CBC19	1

Table 5: Field BioCondition site locations.

Site Name	Transect start/end	Latitude	Longitude
CBC01s	Start	-22.8538	149.2828
CBC01e	End	-22.8545	149.2833
CBC02e	Start	-22.8536	149.288
CBC02s	End	-22.8539	149.2889
CBC03S	Start	-22.8477	149.2854
CBC03E	End	-22.8484	149.2859
CBC04S	Start	-22.8418	149.2917
CBC04E	End	-22.8424	149.2921
CBC05S	Start	-22.8506	149.2987
CBC05E	End	-22.8497	149.2991
CBC06S	Start	-22.848	149.3065
CBC06E	End	-22.8477	149.3056
CBC07S	Start	-22.8445	149.3116
CBC07E	End	-22.8437	149.3114
CBC08S	Start	-22.836	149.2953
CBC08E	End	-22.8362	149.2962
CBC09S	Start	-22.8388	149.3074
CBC09E	End	-22.8391	149.3065
CBC10S	Start	-22.831575	149.3094

Site Name	Transect start/end	Latitude	Longitude
CBC10E	End	-22.832172	149.3099
CBC11S	Start	-22.8407	149.3128
CBC11E	End	-22.8415	149.3128
CBC12S	Start	-22.8279	149.3135
CBC12E	End	-22.8287	149.3139
CBC13S	Start	-22.8303	149.3137
CBC13e	End	-22.8303	149.3137
CBC14S	Start	-22.8473	149.3217
CBC14E	End	-22.8469	149.3209
CBC15S	Start	-22.8509	149.3316
CBC15E	End	-22.8501	149.3315
CBC16S	Start	-22.8489	149.3321
CBC16E	End	-22.8481	149.3320
CBC17S	Start	-22.8449	149.3295
CBC17E	End	-22.8442	149.3290
CBC18S	Start	-22.8320	149.3333
CBC18E	End	-22.8318	149.3324
CBC19S	Start	-22.8302	149.3368
CBC19E	End	-22.8297	149.3361
CBC20S	Start	-22.8461	149.2918
CBC20E	End	-22.8466	149.2925
CBC21S	Start	-22.8345	149.3356
CBC21E	End	-22.8336	149.3355

3.6 Targeted Threatened Fauna Surveys

Targeted threatened species surveys were undertaken within the OIA. The relevant targeted threatened species are summarised in Table 6. The following sections detail the targeted fauna survey methodology.

Table 6: Relevant threatened species and listing status.

Species Name	Common Name	Status	
		EPBC Act	NC Act
Mammal			
Petauroides volans volans	Greater glider (southern and central)	E	E
Phascolarctos cinereus	Koala	E	E
Reptile			
Denisonia maculata	Ornamental snake	V	V
Birds			
Geophaps scripta scripta	Squatter pigeon	V	V

3.6.1 Targeted Greater Glider Surveys

Greater glider surveys involved nocturnal spotlight surveys, focusing on riparian corridors, particularly in areas with large hollow bearing trees. Spotlighting is an effective method for direct survey of greater gliders which are easily detectable due to prominent eye-shine and slow movement (Lindenmayer, 2001). Additionally, greater gliders are known to have high site fidelity with relatively small home ranges and there are no specific seasonal considerations for this species (DCCEEW, 2022).

3.6.2 Targeted Koala Surveys

Targeted spotlight koala surveys were undertaken primarily in riparian corridors that koalas generally use as climate refugia habitat in Central QLD (Youngentob, K.N, Marsh, K.F., Skewes, J., A, 2021) (Kerswell A, 2020). Spotlight surveys are an effective method for direct survey of koalas when compared to diurnal searches, as koalas are large, slow speed mammals within intense eye-reflectance (Wilmott Lachlan, 2019).

Koala spotlight surveys were undertaken concurrently with greater glider spotlight surveys and involved slowly walking / driving through areas of suitable vegetation within spotlights and binoculars to identify species.

3.6.3 Spot Assessment Technique

To further inform the abundance and presence of koalas within the OIA, the Koala Spot Assessment Technique (KSAT) and scratch surveys were undertaken. This method was undertaken at each AU, illustrated in Figure 2.

The KSAT (Phillips & Callaghan, 2011) is a point-based, tree sampling methodology that utilises the presence/absence of koala fecal pellets within a prescribed search area around the base of trees to

derive a measure of koala activity, which is expressed as the percentage of the proportion of surveyed trees. The technique is as follows:

1) Locate a tree that consists of:
   a) A tree where koala faeces have been identified
   b) A tree where a koala has been observed, and/or
   c) A tree known to be important to koalas (food tree).
2) Search for koala fecal pellets or possible koala scratches at the initial tree and 29 other trees. A 1 m search radius around the base of each tree is required and approximately 2 minutes of survey effort is dedicated to each tree.

3.6.4 Targeted Ornamental Snake Surveys

No survey method is known to reliably detect the ornamental snake during dry or cool weather. The species is most likely to be detected by searching suitable gilgai habitat while frogs are active. Driving roads at night, particularly after wet weather when frogs are active, may be necessary if wet weather limits access to suitable gilgai habitat (Veary, 2011).

Suitable habitat was identified though desktop assessment, GTRE mapping and nocturnal spotlight surveys were undertaken. Targeted ornamental snake surveys involved slowly traversing gilgais and wetlands with concentrated effort in areas with residual water and active frogs.

3.6.5 Targeted Squatter Pigeon Surveys

The squatter pigeon occurs in dry grassy woodlands and open forest with limited ground cover, generally on sandy/gravelly areas close to water (DCCEEW, 2024). Further, the species is often located detected along roads and tracks, especially those near water sources. Survey effort for the squatter pigeon was undertaken at each BioCondition site, whilst traversing to sites, while driving on tracks and roads, as well as concentrated searches along waterways.

3.6.6 Bird Survey and Active Searches

Bird species were recorded at each site as well as opportunistic while traversing the OIA. Additionally, active searches were undertaken at each BioCondition site and whilst traversing the OIA. Active searches focused on coarse woody debris (CWD), large log, rocks and basking areas with CWD that reptiles may utilise.

3.7 Habitat Quality Assessment and Scoring

Habitat quality assessments for the ornamental snake, koala, greater glider and squatter pigeon were undertaken and scored in accordance with the '*Guide to determining terrestrial habitat quality A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy Version 1.2*' (DEHP, 2017) (hereafter called The Guide).

Final habitat quality scores were derived following the EPBC Act offsets assessment guide (Australian Government, 2012). The OAG has been developed in order to give effect to the requirements of the EPBC Act Environmental Offsets Policy (Australian Government, 2012) utilising a balance sheet

approach to measure impacts and offsets. It applies where the impacted protected matter is a threatened species or ecological community. The OAG is a tool that has been developed for expert users in the department to assess the suitability of offsets proposal.

3.7.1 Habitat Quality Surveys

The purpose of monitoring habitat quality scores is to understand the quality of habitat over time. Scores are produced in accordance with the Guide (DES, 2020).

Habitat survey sites were undertaken at BioCondition sites illustrated in illustrated in Figure 2.

Data collected for threatened fauna habitat consist of BioCondition data and the following:

Site Condition:

- Quality and availability of food and foraging habitat
- Quality and availability of shelter habitat.

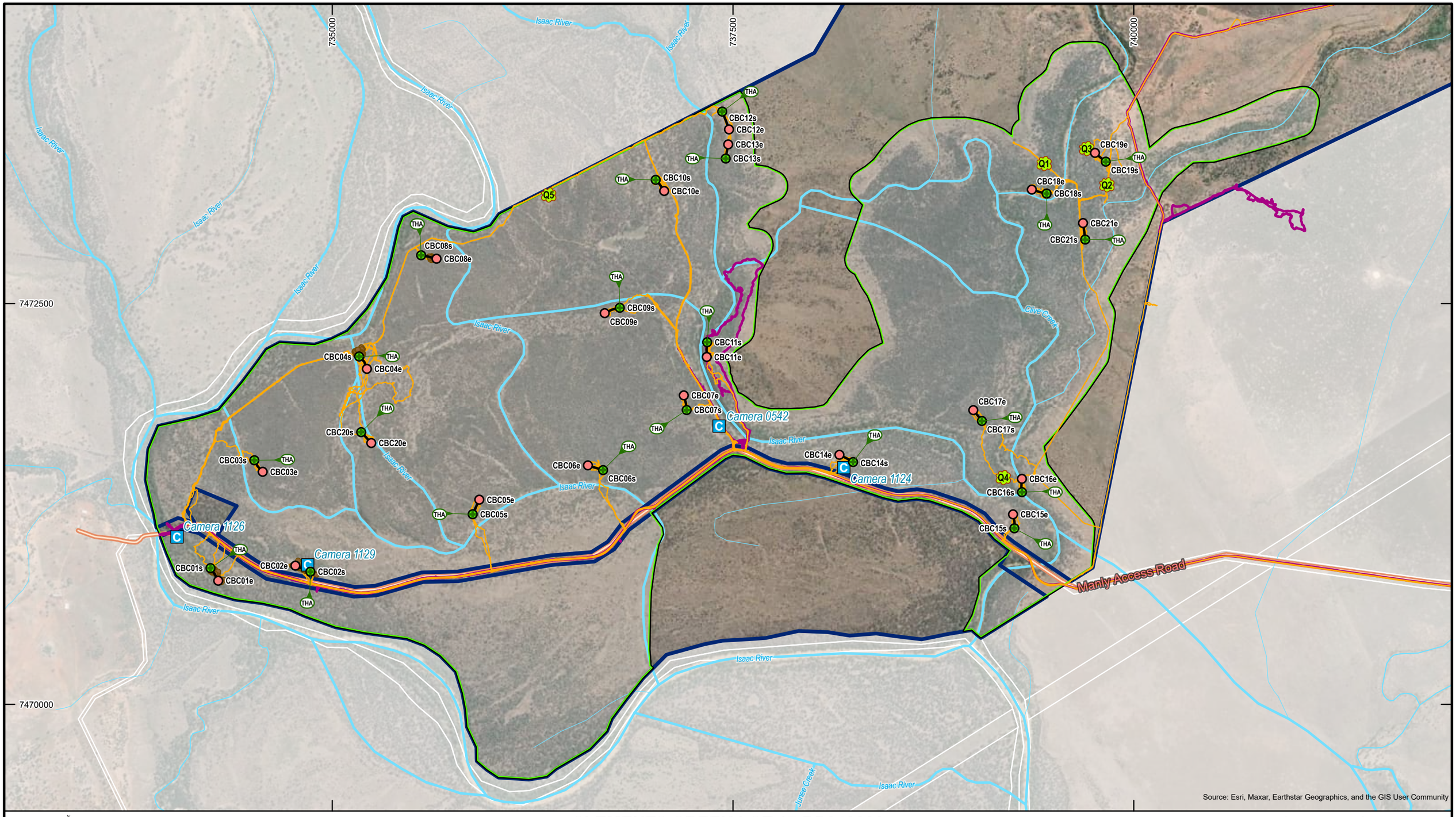
Site Context:

- Size of patch
- Connectedness
- Context
- Role of site to overall populations
- Threats
- Mobility captivity.

Species Stocking Rate:

- Presence on or adjacent to site
- Species usage of suite
- Density
- Importance of population.

Figure 2: Survey Effort.



CLEMENTS CREEK LOT 17 RP848822

Offset Investigation

GDA2020, MGA Zone 55

0 0.5 1 km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse
- Track
- Spotlight Survey
- BioCondition Survey Site - End
- BioCondition Survey Site - Start
- BioCondition Transect
- KSAT Site (see Figure 2-1, 2-2)
- Target Species Terrestrial Habitat Assessment (Ornamental Snake, Koala, Greater Glider, Squatter Pigeon)

Data sources:
©State of Queensland, Department of Resources





LYNGCO ENVIRONMENTAL CONSULTING

Figure 2
Survey Effort

Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	11/12/2024
	RTPL_CLCk001_MAP0011_A

Path: S:\Plans\Project_Specific\LyngcoEnvironmental\Clements Creek\RTPL_CLCk001_MAP0011_A A3L Survey Effort.aprx

CBC01s
CBC01e
CBC02e
CBC02s
Camera 1129

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

GDA2020, MGA Zone 55

CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

0 10 20 30 40 50
m

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Watercourse
- Track
- BioCondition Survey Site - End
- BioCondition Survey Site - Start
- BioCondition Transect
- KSAT Site

Mackay
Rockhampton
Bundaberg
Brisbane

Data sources:
©State of Queensland, Department of Resources

LYNGCO ENVIRONMENTAL CONSULTING

Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	11/12/2024

Figure 2-1
Survey Effort
KSAT Detail
CBC01 and CBC02

RTPL_CLCk001_MAP0011_A

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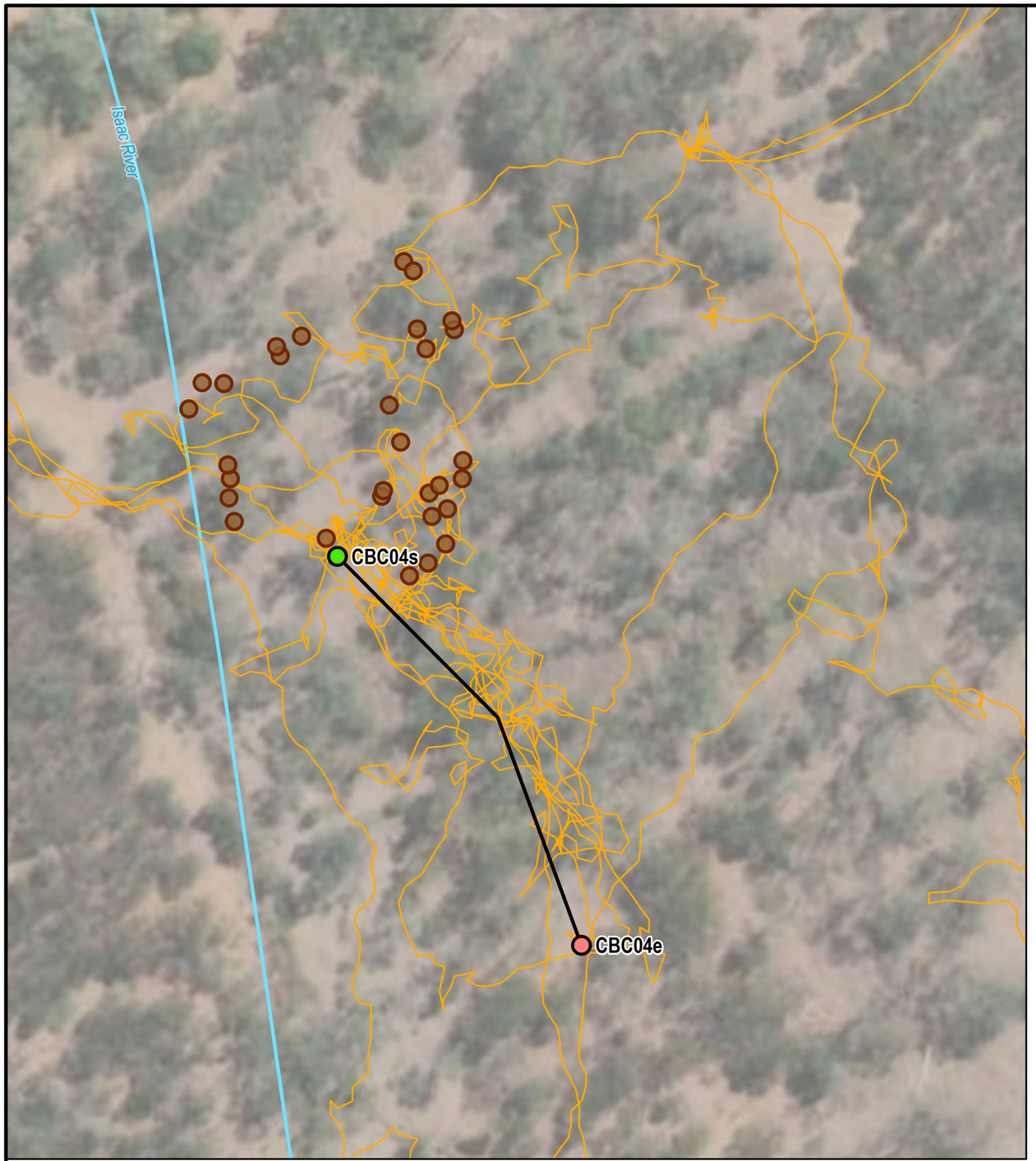




N

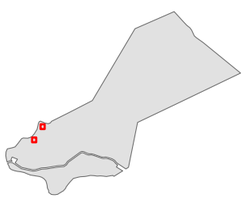
GDA2020, MGA Zone 55

CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

0 10 20 30 40 50
m

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Watercourse
- Track
- BioCondition Survey Site - End
- BioCondition Survey Site - Start
- BioCondition Transect
- KSAT Site

Data sources:
©State of Queensland, Department of Resources





LYNGCO ENVIRONMENTAL CONSULTING

Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	11/12/2024

Figure 2-1
Survey Effort
KSAT Detail
CBC04 and CBC08

RTPL_CLCk001_MAP0011_A

Path: S:\Plans\Project_Specific\LyngcoEnvironmental\Clements Creek\RTPL_CLCk001_MAP0011_A A3L Survey Effort.aprx

Figure 3: Updated GTRE Mapping

735000
737500
740000
7472500
7470000
Isaac River
Clive Creek
Junee Creek
Manly Access Road
11.3.1
11.3.2
11.3.3
11.3.25
11.3.27f
Non-remnant
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

GDA2020, MGA Zone 55

0 0.5 1
km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse

GTRE
- 11.3.1
- 11.3.2
- 11.3.3
- 11.3.25
- 11.3.27f
- Non-remnant

Data sources:
©State of Queensland, Department of Resources

Mackay
Rockhampton
Bundaberg
Brisbane

LYNGCO ENVIRONMENTAL CONSULTING

Figure 3
Field Verified
Regional Ecosystems

Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	11/12/2024
	RTPL_CLCk001_MAP0012_A

Path: S:\Plans\Project_Specific\LyngcoEnvironmental\Clements Creek\RTPL_CLCk001_MAP0012_A A3L GTRE.aprx

4.0 Results

The results the Clements Creek EAR are summarised below as it relates to the desktop assessment (Section 4.1- 4.2), regional ecosystems and fauna habitats (Section 4.3- 4.6), BioCondition and habitat quality (Section 4.7-4.12).

The field verified GTRE informed by LEC (2023) and updated as part of this ecological assessment are illustrated in Figure 3.

The field verified Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC is illustrated in Figure 4

A summary of the AUs and associated GTRE and threatened species habitats have been provided in Table 7, and are illustrated in Figure 6.

A full list of flora and fauna species identified during the field survey is provided in Appendix B

The overall habitat quality score, habitat quality score by MNES, MSES, Assessment Unit and Regional Ecosystem within the OIA is summarised in Table 19.

Detailed BioCondition data returned for the OIA is provided in Appendix C.

The criteria and metric utilised for the habitat quality assessment are detailed in Appendix E.

Table 7: Assessment unit, regional ecosystem, associated threatened species, threatened species habitat usage and total area (Ha).

AU	RE and short description	Threatened species and habitat usage	TEC	Total area (ha)
AU1	RE 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Ornamental snake – marginal-	Brigalow	510.16
AU2	RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Koala -climate refugia	N/A	128.94
		Greater glider – breeding, foraging and dispersal		
		Squatter pigeon – foraging and dispersal		
AU3	RE 11.3.27f - *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	Ornamental snake – suitable	N/A	7.52
		Koala – climate refugia		
		Greater glider – denning, foraging and dispersal (excluding some disconnected patches associated with the brigalow RE11.3.1)		6.11
AU4	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with frequent large gilgai and small patches <1ha of brigalow	Ornamental snake – preferred	N/A	62.97
		Koala – breeding and foraging		
		Greater glider – foraging and dispersal		
		Squatter pigeon - foraging and dispersal		
AU5	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains – with infrequent gilgai/clay cracks.	Ornamental snake - marginal	N/A	259.37
		Koala – breeding and foraging		
		Greater glider – foraging and dispersal		
		Squatter pigeon - foraging and dispersal		
AU6		Koala - breeding and foraging	N/A	2.43

AU	RE and short description	Threatened species and habitat usage	TEC	Total area (ha)
	RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains	Greater glider – foraging and dispersal		
		Squatter pigeon - dispersal		
Non-remnant (not assessed)			N/A	388.91
Total				1,360.29

4.1 Desktop Results

4.1.1 Regional ecosystem

The results of the desktop assessment and literature review returned regional ecosystems mapped on Clements Creek property (Lot 17 on RP848822) detailed in Table 8. Further detail from the desktop assessment is provided in Appendix A.

Table 8: Desktop assessment and literature (LEC, 2023) mapped regional ecosystems, associated status and potential TEC.

Regional Ecosystem	Short description	VMA Class	Biodiversity status	Potential TEC
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Endangered	Endangered	Brigalow TEC
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Least concern	Of concern	N/A
11.3.27f	*Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps.	Least concern	Of concern	N/A
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains with gilgai	Of concern	Of concern	N/A
Non-remnant		N/A		

4.1.2 Matters of National Environmental Significance (MNES)

Results of the desktop assessment, performed under the EPBC Act Protected Matters Search Tool (PMST) and literature review (LEC, 2023) is summarised in Table 9. Further detail is provided in Appendix A.

Table 9: PMST and literature review MNES summary.

Threatened Ecological Community	Status
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered
Poplar Box Grassy Woodland on Alluvial Plains	Endangered
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered
Threatened or Migratory Species	Description
Threatened fauna	25 species

Threatened flora	10 species
Migratory species	11 species

4.1.3 Matters of State Environmental Significance (MSES)

MSES mapped within the OIA by the Queensland government are summarised below in Table 10 and further detail is provided in Appendix A.

Table 10: MSES mapped within the OIA.

Matters of State Environmental Significance
Threatened (endangered or vulnerable) wildlife habitat
Special least concern animal habitat
Regulated Vegetation - Endangered/Of concern in Category B
Regulated Vegetation - Category R (GBR riverine regrowth)
Regulated Vegetation - Essential habitat
Regulated Vegetation - intersecting a watercourse

4.1.4 Likelihood of Occurrence

The likelihood of occurrence for threatened fauna and flora that have potential to occur within the OIA is summarised in Table 11. No threatened flora species have been determined to occur within the OIA. Table 12 summarises the likelihood of each TEC with potential to occur within the OIA.

The full likelihood of occurrence assessment is provided Appendix G and the full criteria used for the assessment is provided in Table 2.

Table 11: Fauna species determined to be likely to occur or known to occur within the OIA.

Species Name	Common Name	Description	Status		Likelihood of Occurrence within the OIA
			EPBC Act	NC Act	
Birds					
Geophaps scripta scripta	Squatter Pigeon	Occurs from the Burdekin-Lynd Divide in north Queensland to the Border Rivers in northern New South Wales and inland to Hughenden to Charleville. They are found in remnant, regrowth and modified open-forest and wooded communities dominated by Eucalyptus, Corymbia, Acacia or Callitris species and within 3 km of water bodies. They require patchy understory with tussocks where vegetation is generally below 33% on well-draining, gravelly, sandy, or loamy soils. Breeding occurs within 1km of a suitable, permanent waterbody (DCCEEW, 2023).	V	V	Known – this species was detected multiple times throughout the OIA during the field assessment. Additionally, this species detected in previous works throughout Clements Creek (Earthtrade, 2024).
Hirundapus caudacutus	White-throated Needletail	Occurs from northern Queensland through to south-eastern Australia and inland to the west of the Great Dividing Range, and in Tasmania. The species is nearly exclusively aerial. They are found above a variety of ecosystems, though there appears to be preference for open forests, rainforest, and heathlands, and less often over woodland and treeless areas. The species spends the non-breeding season (spring and summer) in Australia (DCCEEW, 2023).	V, M	V	Known – records within OIA (ALA, 2024) and OIA contains suitable habitat.

Species Name	Common Name	Description	Status		Likelihood of Occurrence within the OIA
			EPBC Act	NC Act	
Apus pacificus	Fork-tailed Swift	Occurs across all Australia, though the species is nearly exclusively aerial. The species generally occur over inland plains, sometimes coastal areas. The species spends the non-breeding season (spring and summer) in Australia (DCCEEW, 2023).	M, Ma	SL	Likely – records are within 10 km of the OIA and the OIA contains suitable habitat.
Mammals					
Petauroides volans volans	Greater Glider (southern and central)	Occurs from Proserpine in Queensland south through New South Wales to Blackwood in Victoria in Eucalypt forests and woodlands below 1200 m above sea level. Tall, montane and moist forests tend to be preferred, though they can be found in drier habitats, and they favour forests with a diversity of Eucalypt species with seasonal growth variation for year-round foraging. They require large, old trees with hollows for dens (DCCEEW, 2023).	E	E	Known – species was detected multiples times throughout the OIA during the field assessment, primarily in riparian areas. Additionally, this species detected in previous works throughout Clements Creek (LEC, 2023) (Earthtrade, 2024).
Phascolarctos cinereus	Koala (combined populations of Queensland, New South Wales and the	For the combined population considered here, occurs from the Wet Tropics in Queensland south to the New South Wales and Victoria border, and inland to up to approximately 600 km, including the Australian Capital	E	E	Known – species was detected multiples times throughout the OIA

Species Name	Common Name	Description	Status		Likelihood of Occurrence within the OIA
			EPBC Act	NC Act	
	Australian Capital Territory)	Territory. The distribution is not continuous, and isolated populations are often in low density. The species is restricted to Eucalypt sclerophyll forest and woodlands where preferred food trees occur (*Eucalyptus, Lophostemon, Melaleuca, Angophora, Corymbia* sp). They prefer habitats with higher tree species richness in proximity to creek lines (DCCEEW, 2023).			during the field assessment, primarily in riparian areas. Additionally, this species detected in previous works throughout Clements Creek in RE 11.3.3 (LEC, 2023) (Earthtrade, 2024)
Reptiles					
Denisonia maculata	Ornamental snake	The species is known only from the Brigalow Belt North and parts of the Brigalow Belt South biogeographical regions. The core of the species' distribution occurs within the drainage system of the Fitzroy and Dawson Rivers. The Ornamental Snake's preferred habitat is within, or close to, habitat that is favoured by its prey - frogs. The species is known to occur in RE 11.4.3, 11.4.6, 11.4.8, 11.4.9, 11.3.3, and 11.5.16 (Department of the Environment 2015).	V	V	Known – this species has been detected by Grant Paterson (Earthtrade, 2024)

Table 12: TEC likelihood of occurrence assessment.

Threatened Ecological Community	Threatened Category	Likelihood of Occurrence within the Offset Investigation Area
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	Known - RE 11.3.1 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains has been field verified within the OIA.
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Likely - RE 11.3.2 - *Eucalyptus populnea* woodland on alluvial plains is mapped within the OIA. While RE 11.3.2 was determined to be within the OIA, its condition did not meet the criteria for the TEC, refer to Section 4.4.2.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Unlikely - RE as described by the relevant conservation advice were not field verified within the OIA.
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Unlikely - While the QLD state government has mapped RE 11.3.21 within the OIA, field verification has determined that this vegetation community is not within the OIA.

4.2 Threatened fauna profiles

The following provides a summary of the threatened species targeted for this assessment. Detailed information on the relevant threatened species, including habitat quality assessment and criteria for each species is provided in Appendix E.

4.2.1 Ornamental snake profile

The ornamental snake is listed as Vulnerable under the EPBC Act and NC Act. This cryptic snake has a small, well-defined distribution range, located only in mid-eastern Queensland, and confined to the Brigalow Belt, primarily within the Fitzroy River drainage system (Cogger, 2018).

The ornamental snake is known to inhabit brigalow (*Acacia harpophylla*) forest growing on cracking gilgai clays, riverside woodland, and open forest growing on natural levees (Wilson, 2020). This habitat preference was believed to reflect the relative abundance of its primary food source – native frogs (Cogger, 2018). At a brigalow woodland site near Nebo, snakes were only found in the vicinity of a complex of flooded gilgai, where there was an abundance of frog prey, however snakes were not found in nearby riparian and floodplain woodland vegetation (Veary, 2011). Activity levels, and hence highest potential for ornamental snake detection, are typically restricted to periods following suitable summer rainfall events which create optimum conditions for its favoured prey to be most active and concentrated around frog breeding sites. The above suggest the opportunity to detect the ornamental snake is highly constrained by gilgai habitat with cracking clays and wet weather conditions (Veary, 2011).

During the day, the snake shelters, in cracking clays, litter and fallen timber (Cogger, 2000), becoming active only at night. Suggesting that coarse woody debris may also be an important component of good quality ornamental snake habitat (Veary, 2011).

4.2.2 Koala profile

In Queensland koalas can be found from the Atherton Tablelands west of Cairns, south to the NSW/QLD border and inland to central and western Queensland. Koalas near the western edge of their range are often associated with watercourses though are not restricted to them (Melzer A. &., 2014) (Sullivan, Baxter, & Lisle, 2003). Within the Brigalow Belt they occur at low densities, approximately 0.005 koalas/ha and have thought to have declined by 30-40% in the last 20 year (DAWE, 2021).

The species forages, shelters and breeds in the same habitat, and high value habitat is largely predicated on eucalypt density; however, not all eucalypts are of equal value, with some species favoured over others. Patterns in tree preference are largely driven by the nutritional quality of the trees in a given area (Youngentob, K.N, Marsh, K.F., Skewes, J., A, 2021). There are likely other tree qualities such as tree size, canopy cover and bark type that drive koala usage for resting and or thermoregulation (Youngentob, K.N, Marsh, K.F., Skewes, J., A, 2021). In the Brigalow Belt, favoured tree species include *Eucalyptus melanophloia, E. orgadophila, E. tereticornis, E. crebra, E. coolabah, E. chloroclada and E. populnea*, with several other *Eucalyptus* spp. as well as juvenile trees utilised at lower frequencies (Melzer A. &., 2014). A select few *Corymbia* spp. have been recorded as feed trees

in the Brigalow Belt; however, the frequency of these trees in the diet is low, typically no more than 4.2% of intact (Melzer A. &., 2014). Koalas have not been reported feeding on *Angophora* spp. from this region.

Locally important koala trees (LIKT) have been defined by Yongentob *et al* 2021 as:

> "*a tree from a species that is regularly browsed by koalas in a particular KMB* (koala management bioregion)*, such that it could be considered a substantial portion of the koalas diet.*"

Species listed as LIKT's in the Brigalow Belt are detailed in "A Review of Koala Habitat Assessment Criteria and Methods" (Youngentob, K.N, Marsh, K.F., Skewes, J., A, 2021), which has been used to heavily to assess koala habitat within Clements Creek.

4.2.3 Greater glider profile

The greater glider is an arboreal nocturnal marsupial that is predominately solitary and largely restricted to eucalypt forests and woodlands of eastern Australia. It is generally found in highest abundance within taller moist eucalypt forest on fertile soils, with relatively old trees and abundant hollows.

Greater gliders are described as having a strictly 'eucalyptus' diet but will also occasionally take flowers and rarely Acacia phyllodes and mistletoe leaves (Lindenmayer, 2002) (Kavanagh and Wheeler, 2004). Studies have found a preference for young leaves or particular eucalypt species, with selection likely related to leaf nutrient concentration (Lindenmayer, 2002) (Eyre, 2006). Dietary selection in the southern Brigalow Belt is poorly understood with a single study finding foraging animals most often in *E. moluccana, E. fibrosa* and *Corymbia citriodora* (Smith, 2007) (Eyre, Smth, Venz, Mathieson, Hoga, Starr, Winter, Mcdonald, 2022). A study of greater gliders across the broader southeast Queensland region (including the Brigalow Belt Bioregion) also identified *E. tereticornis* and *E. citriodora* as predictors of greater glider presence in drier forests (Eyre, 2006). In contrast found greater gliders showing a preference for *E. acmenoides* over other eucalypts, which included *E. tereticornis* and *C. citriodora*, despite other eucalypts having higher nutrient content (Comport, 1996).

4.2.4 Squatter pigeon

Squatter pigeons occur in open forest to sparse open woodlands which are dominated by *Eucalyptus, Corymbia*, *Acacia* and or *Callitris* species, within 3 km of permanent or seasonal water (DCCEEW, 2024). This includes open forests to sparse open woodlands and scrub that are in remnant or regrowth condition and partly modified vegetation communities (DCCEEW, 2024). Foraging habitat generally consist of but is not restricted to well-draining sandy or gravel based soils that support open forest to woodland communities with patchy tussock grassy understories within 3km of a permanent or seasonal waterbody (DCCEEW, 2024). Squatter pigeons mainly forage on fallen seeds from low vegetation, including grasses, herbs and shrubs (DCCEEW, 2024). Breeding habitat occurs on stony rises with sandy or gravel soils within 1 km of a permanent waterbody (DCCEEW, 2024).

Both foraging and breeding habitat:

- Generally, consists of, but not restricted to low to gently sloping, flat to undulating plains and foothills (Regional Ecosystem Land Zone 5) and lateritic (duplex) soils on low jump-ups and escarpments (Regional Ecosystem Land Zone 7) (DCCEW, 2024).
- Typically, a ground cover layer that is considerably patchy consisting of native, perennial tussock grasses or a mix of perennial tussock grasses and low shrubs or forbs. This patchy ground cover layer rarely exceeds 33%. The remaining ground surface consists of bare patches of gravelly or dusty soil and leaf litter (DCCEW, 2024).

4.3 Field verified vegetation communities and regional ecosystems

A total of 971.38 ha remnant and 388.9 ha non-remnant vegetation has been mapped in the OIA (Figure 3).

A total of 93 flora species were recorded during the vegetation survey with a complete list of all plant species recorded within each vegetation community / regional ecosystem provided in Appendix B.

No threatened flora species were recorded during the survey.

Species recorded at BioCondition sites have been provided for all sites in Appendix D along with other BioCondition site results.

Table 13 lists the ground truthed regional ecosystems and areas recorded in the OIA.

Table 13: Field verified regional ecosystems within the OIA.

Regional Ecosystem	Short description	VMA Class	Biodiversity status	Remnant Status	Hectares
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Endangered	Endangered	Remnant	510.161
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Least concern	Of concern	Remnant	128.94
11.3.27f	*Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps.	Least concern	Of concern	Remnant	7.52
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains with gilgai	Of concern	Of concern	Remnant	322.33

11.3.2	*Eucalyptus populnea* woodland on alluvial plains	Of Concern	Of Concern	Remnant	2.43
Non-remnant					388.91

4.3.1 Brigalow forests on alluvium - RE 11.3.1

The field survey returned brigalow regional ecosystems associated with RE 11.3.1 in the OIA. The brigalow communities in the OIA appear to be on slightly elevated alluvium that sits approximately 1-3 m above the adjacent floodplains that support coolabah open woodlands and riparian forests. Much of the brigalow forest appeared to have been disturbed, evidenced by a low tree height, high density of smaller trees, a lack of large trees and low species richness in the shrub and ground layers, illustrated in Photo 1. The BioCondition benchmark height for RE 11.3.1 is 14 m and tree canopy cover is 29% (Queensland Government, 2023). The average median height of the EDL for the brigalow vegetation was 12.83 m ranging from 5 – 20 m across all sites which is >85% of the benchmark, whereas the average tree canopy cover across all sites was 65.6% which is > 150% of the benchmark. These results indicate the brigalow has likely been subject to historical disturbance as evidenced by the lower tree height and higher canopy cover and density of younger trees.

An analysis of historical aerial imagery of the brigalow within the OIA was undertaken to assist in determining if sections of the brigalow had perhaps been historically cleared (refer Photo 2and Photo 3 sourced from QImagery). The results of the review of historical aerial imagery indicated some historical disturbance has occurred, however no clear felling was evident. The field survey recorded evidence of selective clearing with the brigalow patch south of Manly Access Road adjacent to the Isaac River. This area appears to have been selectively cleared as evidenced by large brigalow trees on the ground and a lower portion of brigalow in the canopy.

Based on the lack of evidence of clear felling from historical imagery and the results of the field survey, the brigalow in the OIA has been mapped as remnant RE 11.3.1. It is however important to note that some sections of the brigalow, particularly the patch on the southern side of Manly Access Rd along the Isaac River floodplain, are in low to moderate ecological condition and would require a change in management practice to improve ecological condition over time.



Photo 1: Brigalow regional ecosystems in the OIA with high density smaller trees.

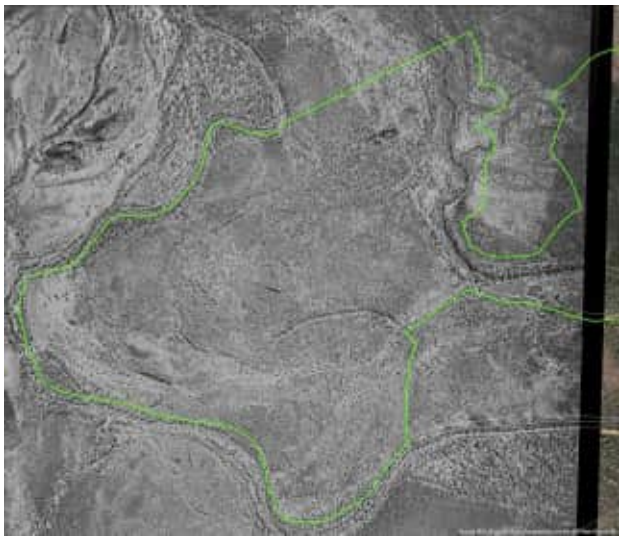


Photo 2: Areal image of western portion of OIA in 1956 (source QImagery)



Photo 3: Aerial image of OIA in 2006 (source QImagery)

4.3.2 Coolabah open woodlands on alluvium – RE 11.3.3

The coolabah open woodlands in the OIA align to RE 11.3.3. They occur on alluvial floodplains directly adjacent to major rivers and creeks adjacent and the brigalow forests, illustrated in Photo 4

and Figure 3. The coolabah open woodlands that occur directly adjacent to the brigalow forest contain large gilgai and flood runners providing suitable habitat for frogs and potential habitat for the target species ornamental snake as discussed in Section 4.5.4.

The coolabah woodlands on the broader floodplains directly adjacent to major rivers lacks the larger gilgai as those adjacent to the brigalow forests.



Photo 4: *Eucalyptus coolabah* open woodlands in the OIA align with RE 11.3.3.

4.3.3 Freshwater palustrine wetlands – 11.3.27f

Freshwater palustrine wetlands associated with RE 11.3.27f occur within the OIA on closed depressions on floodplains associated with old drainage courses that are intermittently flooded in both the brigalow forests (RE 11.3.1) and coolabah woodlands (RE 11.3.3) (illustrated in Photo 5). These palustrine wetlands were fringed with coolabah with or without river red gum (*E. camaldulensis*) fringing swamps. Ground layers and treeless areas ranged from open water +/- aquatics and ground emergents such as *Eleocharis* spp. and *Cyperus* spp (i.e. *C. exaltatus* and *C. difformis*). Claypans with only sparse vegetation present occurred in some wetlands.



Photo 5: Eucalyptus coolabah fringing freshwater palustrine wetlands in the OIA align with RE 11.3.27f.

4.3.4 Riparian Forests – 11.3.25

The riparian forests along the Isaac River and McKenzie Rivers and unnamed tributaries have been mapped as RE 11.3.25 with large hollow bearing *E. camaldulensis* and *E. coolabah* with and understory *Melaleuca trichostachya* (illustrated in Photo 6).



Photo 6: Riparian forests in the OIA align with RE 11.3.25.

4.3.5 Poplar Box open woodlands on alluvium RE 11.3.2

One patch of vegetation dominated by *Eucalyptus populnea* woodland on alluvial plains has been mapped as RE 11.3.2. The vegetation community contained limited large or hollow bearing and the ground layer was dominated by exotic pasture grasses includes buffel grass (*Cenchrus ciliaris*) and/or Indian bluegrass (*Bothriochloa pertusa*). The ground layer dominated by exotic pasture grasses is likely due to the vegetation community's proximity to non-remnant cleared areas.



Photo 7: Poplar Box open woodlands in the OIA align with RE 11.3.2.

4.3.6 Non-remnant areas

The is approximately 388 hectare of non-remnant vegetation that has been previously cleared predominantly adjacent to the Manly Access Road (Figure 3). The non-remnant vegetation was dominated with a ground layer of exotic pasture grasses includes buffel grass (*Cenchrus ciliaris*) and/or Indian bluegrass (*Bothriochloa pertusa*) and included regrowth brigalow and/or coolabah and *Acacia* spp. The pre-clearing regional ecosystem mapping (refer to Appendix A) indicates prior to clearing the non-remnant areas were mapped as a heterogenous polygon consisting of REs 11.3.3/11.3.1/11.3.21/11.3.27 at a ratio or 70/10/10/10 percent. Field survey results indicate the non-remnant areas are likely to return to a mosaic of REs 11.3.3/11.3.1/11.3.27. It is unlikely that RE11.3.21 occurs in the non-remnant areas.

4.3.7 Invasive plants

Invasive plants listed under the Biosecurity Act 2014 recorded in the OIA included;

- Rubber vine (*Cryptostegia grandiflora*)
- Harrisia cactus (*Harrisia martinii*)
- Tree pears (*Opuntia* sp.)
- Parkinsonia (*Parkinsonia aculeata*)
- Parthenium weed (*Parthenium hysterophorus*)

- Passion fruit vine (*Passiflora foetida*).

Parkinsonia was recorded in high density in coolabah woodlands (RE 11.3.3.) and rubber vine was common in riparian forest (RE 11.3.25).

4.4 Threatened Ecological Communities

The results of the field survey confirmed the presence of one TEC associated with the brigalow TEC, illustrated in Figure 4.

No other TECs have been detected or identified within the OIA.

4.4.1 Brigalow (*Acacia harpophylla* dominant and co-dominant)

An assessment of the brigalow forest RE 113.1 within the OIA against the Approved Conservation Advice for the Brigalow TEC is detailed below in Table 14.

The results of the field assessment returned the majority of patches of field verified RE 11.3.1 meet the key diagnostic characteristics and condition thresholds to be considered the Brigalow TEC.

The small patch of RE11.3.1 mapped on the southern side of Manly Access Rd adjacent to the Isaac River has evidence of past disturbance with selective clearing of brigalow. This disturbance has somewhat altered the dominance of brigalow in this patch and opened up the ground layer to invasion of exotic pasture species (i.e. buffel grass and Indian blue grass) comprising >50% of the ground layer. This area has therefore not been mapped as the Brigalow TEC.

A total of 510.16 ha of Brigalow TEC has been mapped in the OIA.

Table 14: Brigalow TEC assessment within the OIA.

Diagnostics Characteristics and Conditions	Comment	Complies (Y/N)
The presence of *Acacia harpophylla* as one of the most abundant tree species in the patch	*Acacia harpophylla* is the dominant tree species in each patch of RE 11.3.1.	Yes
In Queensland - the patch is in the Brigalow Belt Bioregion and it meets the description of one of 16 Qld REs determined at the time of the national listing of the Brigalow ecological community under the EPBC Act, including RE11.3.1	Each patch assessed for the TEC has been mapped as 11.3.1 – one of the 16 QLD RE's required for the Brigalow TEC.	Yes
The vegetation in the patch is brigalow regrowth with species composition and structural elements broadly typical of one of the identified Qld RE's. This can be assumed to be the case where it has been at least 15 years since it was last comprehensively cleared (not just thinned); unless direct evidence proves otherwise.	As detailed in Section 4.3.1, brigalow vegetation has not been cleared for over 15 years.	Yes

Diagnostics Characteristics and Conditions	Comment	Complies (Y/N)
The patch is 0.5 ha or more in size	Each patch is greater than 0.5 ha	Yes
Exotic perennial plants comprise less than 50% of the total vegetation cover of the patch, as assessed over a minimum sample area of 0.5 ha (100 m by 50 m), that is representative of the patch.	BioCondition data has determined that each sample area contains more than 50% native vegetation.	Yes
Outcome – the majority of patches of field verified RE11.3.1 meet the key diagnostic characteristics and condition thresholds to be considered the brigalow TEC.		

4.4.2 Poplar Box Grassy Woodland on Alluvial Plains

An assessment of the Poplar box woodland on alluvium RE 11.3.2 patch within the OIA against the Approved Conservation Advice for the Poplar Box TEC is detailed below in Table 15.

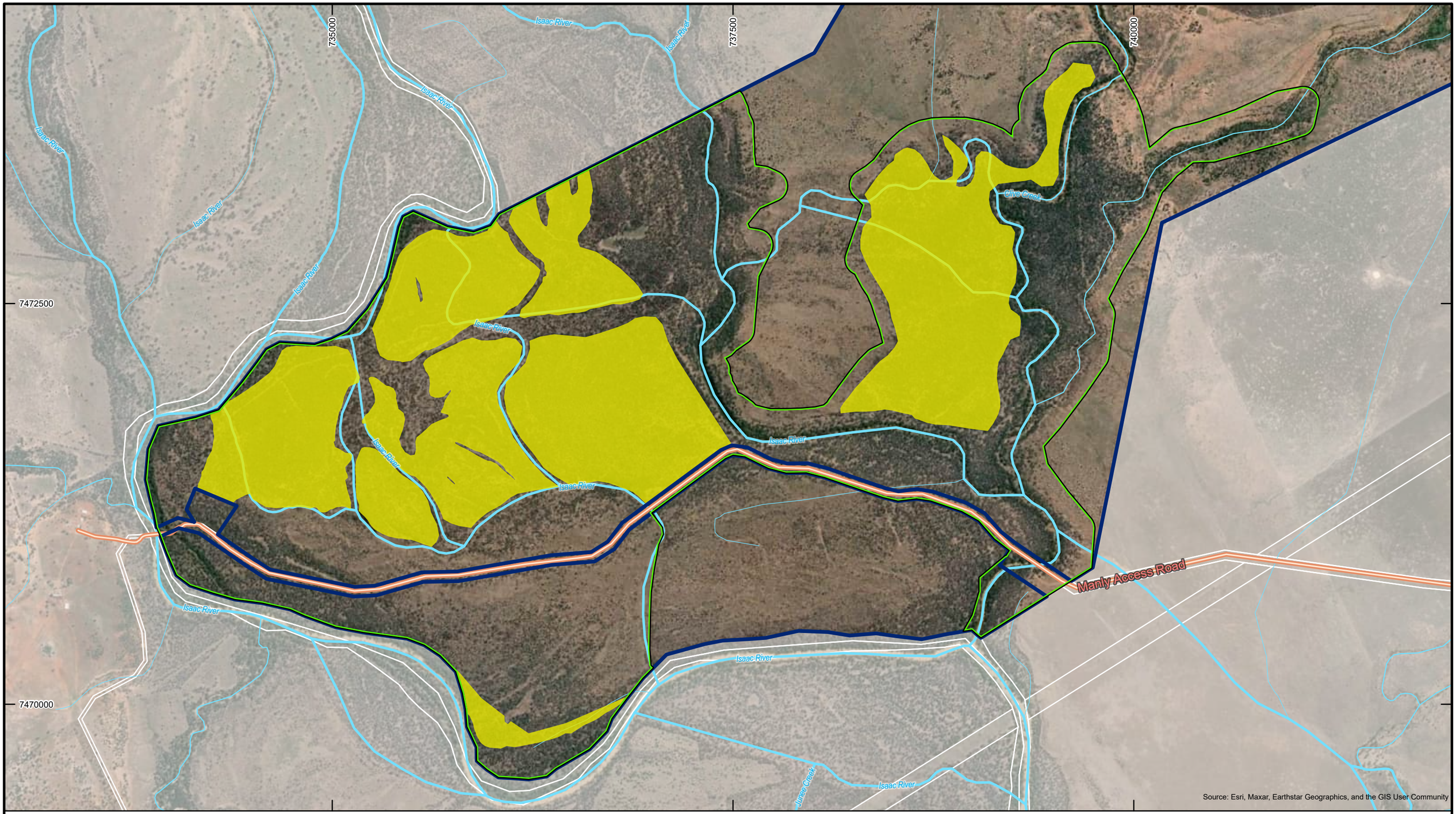
The results of the field assessment returned the patch field verified RE 11.3.2 did not meet the key diagnostic characteristics and condition thresholds to be considered the Poplar Box TEC.

Table 15: Poplar box TEC assessment within the OIA.

Diagnostics Characteristics and Conditions	Comment	Complies (Y/N)
Eucalyptus populnea woodland on alluvial plains (RE 11.3.2)	Patch mapped as RE 11.3.2	Complies
Occurs in the Brigalow belt (north and south), Cobar Peneplains, Darling Riverine Plains, NSW Southwestern Slopes, Riverina, and Murray Darling Depression bioregions	Site is within Brigalow belt	Complies
Associated with ancient and recent depositional alluvial plains, with clay, clay loam, loam and sandy loam, non-sodic soils.	Occurs on land zone 3 – alluvial soils	Complies
A grassy woodland to grassy open woodland with a tree crown cover of 10% or more at patch scale	T1 dominated by poplar box is 61%	Complies
Eucalyptus populnea must be present in the canopy and is the dominant tree species	Dominant tree species in T1 and T2 layer is *Eucalyptus populnea*	Complies
Mid layer crown cover (1-10m) crown cover of shrubs to small trees is low (<31%)	S1 and T2 layer is less than 15% combined	Complies
Ground layer <1 m mostly dominated across patch by native grasses, other herbs and occasionally chenopods, ranging from sparse to thick.	Ground layer is dominated by exotic	Does not comply

Diagnostics Characteristics and Conditions	Comment	Complies (Y/N)
	grass *Cenchrus ciliaris* ~28%	
Outcome - The patch of field verified RE11.3.2 do not meet the key diagnostic characteristics and condition thresholds to be considered the poplar box TEC.		

Figure 4: Field verified Brigalow TEC.



GDA2020, MGA Zone 55

CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

0 0.5 1
km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse
- Brigalow (*Acacia harpophylla*) – Threatened Ecological Community

Data sources:
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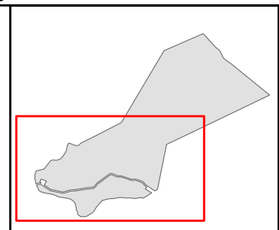



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Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	11/12/2024

Figure 4
Brigalow (*Acacia harpophylla*) - Threatened Ecological Community

RTPL_CLCk001_MAP0013_A

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4.5 Fauna habitat types

4.5.1 Threatened fauna habitat rules

Habitat definitions for the following threatened species in the OIA are summarised Table 16:

- Ornamental snake (*Denisonia maculata*)
- Koala (*Phascolarctos cinereus*)
- Greater glider (central and southern) (*Petauroides volans volans*)
- Squatter pigeon (*Geophaps scripta scripta*).

Habitat rules detailed in Table 16 provide context to how the targeted threatened fauna species potentially utilise the fauna habitat types detailed below. Habitat rules for the ornamental snake, koala and greater glider have been built from previous work at Clements Creek (LEC, 2023), habitat definitions that reflect SPRAT or other Commonwealth supported information (Listing Advice, Conservation Advice or published studies), related projects (Umwelt, 2024) and other scientific literature. The list of REs is not exhaustive. Those currently included are based on RE identified within the OIA and determined as suitable. If future ecological works identify further RE that meet the broad habitat definition, the rules listed in Table 16 should be updated.

Table 16: Threatened fauna habitat rules.

Threatened Fauna	Broad habitat type	Utilisation	Identified Potential Habitat within OIA		Assumptions, Exclusions and Site-Specific Considerations
			Vegetation Condition	Associated REs	
Ornamental snake (*Denisonia maculata*)	Vegetation generally comprises of woodlands and open forest, but also on non-remnant areas, associated with landscapes that hold water after rain. Critical components of ornamental snake habitat include gilgai and soil depressions that contain a network of complex deep soil clay cracks. Importantly, these must hold water after rain, to facilitate the entire lifecycle of prey items – frogs. Coarse woody debris has also been factored as a habitat quality required for the ornamental snake.	Preferred	Remnant	11.3.3 (with gilgai and complex cracking clays)	Critical components of preferred ornamental snake habitat must include – gilgai and complex cracking clays that hold water after rain. These habitat types may require survey effort after suitable rainfall to map accurately.
	The above, where gilgai and soil depressions are not as complex/frequent and do not hold water after rain. Includes fringing wetland habitat vegetation along watercourses where substitute refuge microhabitat is supported (ground timber and exposed roots) Vegetation functionally connected to moist areas or watercourses that have low-levels, absent or impacted refuge microhabitat may also be suitable if the areas provide temporary foraging resources (frog habitat) and/or facilitate movement to other suitable habitat.	Suitable and Marginal	Remnant	11.3.1, 11.3.3 11.3.27f	As above.

Threatened Fauna	Broad habitat type	Utilisation	Identified Potential Habitat within OIA		Assumptions, Exclusions and Site-Specific Considerations
			Vegetation Condition	Associated REs	
Koala (*Phascolarctos cinereus*)	Eucalypt forest or woodlands on alluvium soil associated with permanent water features (wetlands and or watercourses) that are resilient drying conditions, likely to provide a cooler refuge during periods of bushfires and heatwaves.	Climate Refugia	Remnant	11.3.25, 11.3.27f	Only riparian forests associated with the Isaac River, Clements Creek and Clive Creek and wetlands mapped as 11.3.27f have been determined as climate refugia habitat for the koala.
	Any forest or woodland that contains LIKTs and it not climate refugia.	Breeding and foraging	Remnant	11.3.2, 11.3.3	
Greater glider (central and southern) (*Petauroides volans volans*)	Eucalypt forest and woodlands that may support hollow bearing or large trees comprising of REs determined as habitat or potential habitat as per the Guide to Greater Glider habitat in QLD (Eyre, Smth, Venz, Mathieson, Hoga, Starr, Winter, Mcdonald, 2022).	Breeding	Remnant	11.3.25, 11.3.27f	Greater glider breeding habitat is seemingly restricted to habitat associated with permanent water. While RE 11.3.27f is not determined as greater glider habitat under the Guide to Greater Glider habitat in QLD (Eyre, Smth, Venz, Mathieson, Hoga, Starr, Winter, Mcdonald, 2022), select patches are included as Breeding habitat due to its vegetation structure, hollow abundance and proximity to foraging habitat, and

Threatened Fauna	Broad habitat type	Utilisation	Identified Potential Habitat within OIA		Assumptions, Exclusions and Site-Specific Considerations
			Vegetation Condition	Associated REs	
					breeding habitat within the OIA. Patches of RE 11.3.27f that are isolated from greater glider foraging or breeding habitat have been excluded.
	Eucalyptus forests and woodlands that do not support large or hollow bearing trees but in close.	Foraging and dispersal	Remnant	11.3.2 and 11.3.3	While RE 11.3.2 is not determined as greater glider habitat under the Guide to Greater glider habitat in QLD (Eyre, Smth, Venz, Mathieson, Hoga, Starr, Winter, Mcdonald, 2022), it is currently included as foraging and dispersal habitat due to its proximity to watercourses within the OIA and sparse *Eucalyptus camaldulensis* that greater gliders utilise heavily in mapped breeding habitat.
Squatter pigeon (*Geophaps scripta scripta*)	Open forest to sparse open woodlands which are dominated by *Eucalyptus, Corymbia, Acacia* and or *Callitris* species, within 1 km of permanent or seasonal water ground cover layer that is considerably patchy consisting of native, perennial tussock grasses or a mix of	Breeding	Remnant	N/A	This habitat type does not exist within the OIA. There is no low to gently sloping to undulating plains and foots hills on Land zone 5 or 7

Threatened Fauna	Broad habitat type	Utilisation	Identified Potential Habitat within OIA		Assumptions, Exclusions and Site-Specific Considerations
			Vegetation Condition	Associated REs	
	perennial tussock grasses and low shrubs or forbs. This patchy ground cover layer rarely exceeds 33%. The remaining ground surface consists of bare patches of gravelly or dusty soil and leaf litter. Generally, it consists of, but not restricted to low to gently sloping, flat to undulating plains and foothills (Regional Ecosystem Land Zone 5) and lateritic (duplex) soils on low jump-ups and escarpments (Regional Ecosystem Land Zone 7)				
	Open forest to sparse open woodlands which are dominated by *Eucalyptus, Corymbia, Acacia* and or *Callitris* species, within 3 km of permanent or seasonal water ground cover layer that is considerably patchy consisting of native, perennial tussock grasses or a mix of perennial tussock grasses and low shrubs or forbs. This patchy ground cover layer rarely exceeds 33%. The remaining ground surface consists of bare patches of gravelly or dusty soil and leaf litter	Foraging and dispersal	Remnant	11.3.2, 11.3.3. and 11.3.25	This habitat type is common throughout the OIA, however, areas may potentially be used seasonally by the squatter pigeon. RE 11.3.25 contains areas of sandy banks allowing squatter pigeon utilization, however, this will only be possible during times of low water flow. Additionally, RE 11.3.2 and 11.3.3 while having the foraging resources (native grasses and forbs), some areas contain vegetated

Threatened Fauna	Broad habitat type	Utilisation	Identified Potential Habitat within OIA		Assumptions, Exclusions and Site-Specific Considerations
			Vegetation Condition	Associated REs	
					ground cover greater than 33%. Areas within RE 11.3.2 and 11.3.3 that contain suitable ground cover are patchy.

4.5.2 Brigalow Forest

The Brigalow Forest habitat within the OIA is comprised of RE 11.3.1 and consist of generally relatively short brigalow and high stem density (see Photo 8). Additionally, the Brigalow Forest contained limited emergent eucalyptus trees. The ground cover was sparse and generally consisting of brigalow grass (*Paspalidium caespitosum*). The habitat type had a high degree of coarse woody debris. Other habitat features included limited termite mounds (both arboreal and terrestrial), gilgais with shallow cracks and trees with exfoliating bark.

Previous post wet season works (LEC, 2023) within Brigalow Forest demonstrated that gilgai with shallow cracks did not hold water after rain. As such, Brigalow Forests did not provide suitable habitat for the complete life cycle of terrestrial frogs – a critical component of ornamental snake habitat. Subsequently, Brigalow Forests have been determined as marginal habitat for the ornamental snake (refer to Table 16 and Table 17). Due to its proximity to Linear Gilgai with Coolabah Woodland, the presence of shallow cracks and the high abundance of coarse woody debris it is probable that the ornamental snake utilises this habitat while dispersing or when environmental factors allow.

Further, spotlighting and active searches demonstrated a high degree of herpetofauna use in the Brigalow Forest, illustrating the importance of coarse woody debris and exfoliating bark, illustrated by Photo 9.

While Brigalow Forest contained emergent eucalyptus trees, many of these are in a state of senescence and or are isolated from patches of eucalyptus woodland habitats. Due to the limited environmental values of these isolated eucalyptus trees and lack of eucalyptus diversity it is unlikely that Brigalow Forest associated with RE 11.3.1 is utilised by the koala or greater glider (refer to Table 16 and Table 17).

Squatter pigeons generally inhabit open forests to sparse open woodlands, with sandy to gravelly based soils. Conversely, the Brigalow Forest within the OIA has a relatively a high stem density, canopy cover (>150% of the RE benchmark) and heavy clay-based soil that is not well draining, limiting its potential utilisation by the squatter pigeon.



Photo 8: Brigalow Forest habitat



Photo 9: Brown tree snake *(Boiga irregularis)*

4.5.3 Coolabah Woodland

The Coolabah Woodland habitat (refer to Photo 10) within the OIA is consistent with RE 11.3.3. The habitat type is generally situated adjacent to water courses and brigalow forest. While mature *Eucalyptus coolabah* and sparse *Eucalyptus camaldulensis* within the habitat type contain moderate hollows, this habitat type and regional ecosystem has not been identified as suitable for breeding habitat for the greater glider, refer to Table 16 and Table 17.

The Guide to Greater Glider habitat in Queensland (Eyre, Smth, Venz, Mathieson, Hoga, Starr, Winter, Mcdonald, 2022) demonstrates that *Eucalyptus coolabah,* which is dominant throughout the habitat type, has not been recorded as a denning or foraging tree species for the greater glider in the brigalow belt. The habitat type contains some *E. camaldulensis* that have been the dominant tree greater gliders have been detected in during field assessments within Clements Creek, and is a likely a greater glider foraging resource. Additionally, greater gliders, whilst having relatively small home ranges may potentially use this habitat type to disperse to suitable breeding habitat including Wetlands and Riparian Forest, where large hollow bearing *E. camaldulensis* are common.

Therefore, Linear Gilgai with Coolabah Woodland habitat within RE 11.3.3 has been determined as greater glider foraging and dispersal habitat, as summarised in Table 16 and Table 17.

The mixed ages of two LIKT - *E. coolabah* and *E. camaldulensis* provide ample foraging and sheltering habitat for the koala (Youngentob, K.N, Marsh, K.F., Skewes, J., A, 2021) (refer to Table 16 and Table 17).

Arboreal termite mounds provide detected in the habitat type provide resources for large varanids, kingfishers and other common birds. Scattered thick ground cover provides habitat for small to medium sized mammals, including the Rufous Bettong (*Aepyprymnus rufescens*).

Due to the seasonal flood waters, coarse woody debris is continually washed though the Coolabah Woodland habitat, providing breeding places for a number of herpetofauna.

Previous post wet season works (LEC, 2023) within Coolabah Woodlands demonstrated that gilgai with shallow cracks did not hold water after rain, illustrated in Photo 11. As such, Coolabah Woodlands did not provide suitable habitat for the complete life cycle of terrestrial frogs – a critical component of ornamental snake habitat. Subsequently, Coolabah Woodlands has been determined as marginal habitat for the ornamental snake. Due to its proximity to Linear Gilgai with Coolabah Woodland and the presence of shallow cracks, it is probable that the ornamental snake utilises this habitat while dispersing or when environmental factors allow (refer to Table 16 and Table 17).

Given that the low-lying areas that are seasonally inundated with have limited ground cover (refer to Photo 11) and the proximity of the Coolabah Woodland habitat to suitable water bodies, the Coolabah Woodland habitat has also been identified as Squatter Pigeon foraging and dispersal habitat (refer to Table 16 and Table 17). Due to its lack of sandy or gravelly soils or rocky jump up environments, it is not considered squatter pigeon breeding habitat.



Photo 10: Coolabah woodland.



Photo 11: Limited clay cracks and low ground cover vegetation.

4.5.4 Linear Gilgai with Coolabah Woodland

The Linear Gilgai with Coolabah Woodland habitat within the OIA is consistent with RE 11.3.3 (refer to Photo 12). Similarly, to the Coolabah Woodland habitat it is generally situated adjacent to water courses and brigalow forest. However, it contains a network of lineal gilgai that are 0.5 – 1 metres deep with large, complex clay cracks (refer to Photo 12 and Photo 13). This network of linear gilgai provides preferred habitat for the ornamental snake, as summarised in Table 16 and Table 17 and illustrated in Photo 12 and Photo 13. Despite the cool evening temperatures and lack of breeding behaviour, multiple frog species (refer to Appendix B) were detected during spotlight surveys utilising these cracking clays. Previously, the diurnal Eastern Brown Snake (*Psuedonaja textillis*) was detected utilising lineal gilgai, sheltering in the cracking clays when disturbed (LEC, 2023). Demonstrating that these complex and deep cracking clays are suitable for a number of herpetofauna.

The Guide to Greater Glider habitat in Queensland (Eyre, Smth, Venz, Mathieson, Hoga, Starr, Winter, Mcdonald, 2022) demonstrates that *Eucalyptus coolabah,* which is dominant throughout the habitat type, has not been recorded as a denning or foraging tree species for the greater glider in the brigalow belt. The habitat type contains *E. camaldulensis* that have been the dominant tree greater gliders have been detected in during field assessments within Clements Creek, and is a likely greater glider foraging resource. Additionally, greater gliders, whilst having relatively small home ranges, young greater gliders may potentially use this habitat type to disperse to suitable breeding habitat including Wetlands and Riparian Forest, where large hollow bearing *E. camaldulensis* are common.

Therefore, Linear Gilgai with Coolabah Woodland habitat within RE 11.3.3 has been determined as greater glider foraging and dispersal habitat, as summarised in Table 16 and Table 17.

The mixed ages of two LIKT - *E. coolabah* and *E. camaldulensis* provide ample foraging and sheltering habitat for the koala (Youngentob, K.N, Marsh, K.F., Skewes, J., A, 2021) (refer to Table 16 and Table 17).

Given that the low-lying areas have limited ground cover and the proximity of the Coolabah Woodland habitat to suitable water bodies, the Coolabah Woodland habitat has also been identified as Squatter Pigeon foraging and dispersal habitat, as summarised in Table 16 and Table 17. Due to its lack of sandy or gravelly soils or rocky jump up environments, it is not considered squatter pigeon breeding habitat.



Photo 12: Linear Gilgai with Coolabah woodland habitat.



Photo 13: Gilgai and limited ground cover within Linear Gilgai with Coolabah Woodland habitat.

4.5.5 Wetlands

Wetlands associated with RE 11.3.27f occur within the OIA. These wetlands are shallow depression that are likely associated with larger water courses (refer to Photo 14). These wetlands can provide suitable habitat for the ornamental snake when are cracking clays present, as summarised in Table 16 and Table 17 and illustrated in Photo 16. Additionally, frog populations which act as foraging

resources for the ornamental snake, were exceedingly common in Wetland habitats. Likely due to the lack of large predatory fish generally found in higher stream orders.

The margins of the Wetland habitat consist of large *Eucalyptus coolabah* and *E. camaldulensis* that contain moderate to large hollows suitable for greater glider breeding habitat, summarised in Table 16 and Table 17. This is further supported by the detection of a deceased greater glider found on barbed wire fencing on the margins of a wetland in 2023 (refer *Photo 17*) (LEC, 2023). However, patches of Wetland habitat (RE 11.3.27f) that are not surrounded by Coolabah Woodland, Linear Gilgai with Coolabah Woodland or Riparian Forest have been not determined as greater glider habitat due to the species small home range size.

Wetlands associated with RE 11.3.27f contain mixed ages of two LIKTs - *E. coolabah* and *E. camaldulensis* on the margins with permanent water that are resilient to drying conditions and are likely to act as important climate refugia habitat to the koala during periods of bushfire, heatwaves and drought (refer to Table 16 and Table 17). The presence of koala within the Wetland habitat is further support by potential koala scratches, as illustrated in Photo 15.

Wetland habitat contains soils that are not well draining, heavy clay based and generally hold water throughout most of the year. Subsequently, Wetland habitat associated with RE 11.3.27f is unlikely to be utilised by squatter pigeons (refer to Table 16 and Table 17).



Photo 14: Wetland habitat fringed with *Eucalyptus coolabah* and *E. camaldulensis*



Photo 15: Potential koala scratches in Wetland habitat

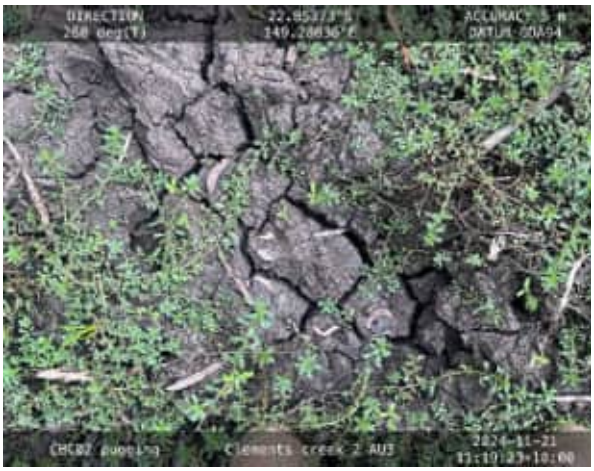

Photo 16: Cracking clay within Wetland habitat



Photo 17: Deceased greater glider next to Wetland habitat *(LEC, 2023)*

4.5.6 Riparian Forest

The Riparian Forest habitat fringing the Isaac and McKenzie Rivers and their associated tributaries consist of large hollow bearing *E. camaldulensis* and *E. coolabah* with and understory *Melaleuca trichostachya*.

A total of seven greater gliders, two koalas and numerous other arboreal mammals including brush tail possums (*Trichosurus vulpecula*) and sugar gliders (*Petaurus breviceps*) have been detected in the Riparian Forest habitat (LEC, 2023) (Earthtrade, 2024) (illustrated in Photo 18 and Photo 19). The concentrated detection rate of threatened mammals in Riparian Forest demonstrates the vegetation communities value to the koala and greater glider. Due to the abundance of the greater glider and large hollow bearing trees, this habitat type has been determined as breeding, foraging and dispersal habitat for the greater glider (refer to Table 16 and Table 17).

As Riparian Forest is synonymous with the Isaac River, Clements Creek and Clives Creek and the habitat type contains multiple LIKTs, it has been determined as climate refugia for the koala (refer to Table 16 and Table 17).

Further, the Riparian Forest banks contain sandy well-draining soils with limited ground cover potentially allow the Squatter Pigeon these utilise as foraging habitat during low flow periods (refer to Table 16 and Table 17). Additionally, the Riparian Forest contained large amounts of flowering trees and shrubs providing food resources for multiple bird species and nomadic little red flying foxes.

Conversely, the lack of cracking clays, suitable cover and deep flowing bodies of water associated with the Isaac and McKenzie Rivers that potentially act as a barrier limit the ornamental snake to utilise Riparian Forest as habitat (refer to Table 16 and Table 17).



Photo 18: Koala detected in Riparian Forest



Photo 19: Great glider detected in Riparian Forest *(LEC, 2023)*

4.5.7 Poplar Box Woodland

A single patch of Poplar Box Woodland, associated with RE 11.3.2 was dominated by *Eucalyptus populnea*, contained limited hollow bearing trees and the ground layer was dominated by exotic pasture grass (buffel grass and Indian bluegrass).

The patch of Poplar Box Woodland habitat contained limited coarse woody debris (120m/ha, < 50% of the RE benchmark) and no cracking clays. Subsequently, the Poplar Box Woodland habitat has not been determined as ornamental snake habitat (refer to Table 16 and Table 17).

The habitat type contains three LIKT species – *Eucalyptus camaldulensis, E. coolabah and E. populnea*, providing ample foraging and shelter habitat for the koala (refer to Table 16 and Table 17). Further, the patch is bounded to the east and west by Riparian Forest, which has been determined as koala climate refugia. Subsequently, it is likely that the koala utilises the patch of Poplar Box Woodland as foraging and shelter habitat.

The habitat type contains no large trees, hollowing bearing trees or hollowing bearing stags that may act as breeding/denning habitat for the greater glider. However, due to the presence *Eucalyptus camaldulensis* throughout the patch of Poplar Box Woodland habitat and given the patch is bounded to the east and west by Riparian Forest, it has been determined as foraging and dispersal habitat for the greater glider (refer to Table 16 and Table 17).

The Poplar Box Woodland habitat consists of clay based soils that are not sandy or gravelly, that are required for squatter pigeon breeding habitat. However, the habitat type has been determined as foraging and dispersal habitat for the squatter pigeon as the ground layer is relatively sparse (<30% vegetated) (refer to Table 16 and Table 17).

4.5.8 Non-remnant Areas

The non-remnant areas of the OIA were not assessed under the BioCondition method or for threatened species habitat.

The non-remnant sections of the OIA contain limited to no large trees with hollows, moderate density of regrowth *Acacia* spp. and dense ground cover, providing no to limited habitat to any threatened species highlighted in this report and has not been assessed. However, the non-remnant and cleared forest habitat provides habitat for a number of least concern species, including but not limited to, the eastern grey kangaroo (*Macropus giganteus*), rufous bettong (*Aepyprymnus rufescens*), tawny frog-mouth (*Podargus strigoides*) and multiple reptiles and amphibians.

Table 17: Summary of fauna habitat types, associated RE, short description, associated threatened species and habitat usage and total area (ha)

Fauna habitat type	RE and short description	Threatened species and habitat usage	Total area (ha)
Brigalow Forest	RE 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Ornamental snake – marginal-	510.16
Riparian Forest	RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Koala -climate refugia	128.94
		Greater glider – breeding, foraging and dispersal	
		Squatter pigeon – foraging and dispersal	
Wetlands	RE 11.3.27f - *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	Ornamental snake – suitable	7.52
		Koala – climate refugia	
		Greater glider – breeding, foraging and dispersal	6.11
Lineal Gilgai with Coolabah Woodland	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with frequent large gilgai and small patches <1ha of brigalow	Ornamental snake – preferred	62.97
		Koala – breeding and foraging	
		Greater glider – foraging and dispersal	
		Squatter pigeon - foraging and dispersal	
Coolabah Woodland	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains – with infrequent gilgai/clay cracks.	Ornamental snake - marginal	259.37
		Koala – breeding and foraging	
		Greater glider – foraging and dispersal	
		Squatter pigeon - foraging and dispersal	
Poplar Box Woodland	RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains	Koala - breeding and foraging	2.43
		Greater glider – foraging and dispersal	

Fauna habitat type	RE and short description	Threatened species and habitat usage	Total area (ha)
		Squatter pigeon – foraging and dispersal	
Non-remnant (not assessed)			388.91
Total			**1,360.29**

4.6 Fauna survey results

A total of 84 fauna species were detected during the field assessment consisting of:

- 12 amphibians, including:
    - 11 native frogs
    - one exotic species
- 51 bird species
- 12 reptile species
- nine mammal species.

4.6.1 Threatened fauna

The results of the desktop assessment and field survey have identified the following threatened species detected within the OIA:

- Six records of the squatter pigeon
    - four identified by LEC in this field assessment
    - two identified by Earthtrade 2024.
- Four records of the koala
    - two identified by LEC in this field assessment
    - one identified by LEC 2023
    - one identified by Earthtrade 2024
    - additional potential koala scratches and scats by LEC in 2024 and 2023.
- Seven records of the greater glider
    - two identified by LEC in this field assessment
    - four identified by LEC 2023
    - one identified by Earthtrade 2024
- Two records of the ornamental snakes by Earthtrade 2024.

Threatened fauna records within the OIA have been illustrated in Figure 5.

Figure 5: Threatened species results.

735000
737500
740000
7472500
7470000
Isaac River
Clive Creek
Junee Creek
Manly Access Road
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

GDA2020, MGA Zone 55

0 0.5 1
km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse
- Ornamental Snake Observation, Earthtrade 2024
- Koala Observation, Earthtrade - 2024
- Koala Observation, LEC - 2023
- Koala Observation, LEC - 2024
- Koala Scat, LEC - 2023
- Koala Scratch, LEC - 2024
- Squatter Pigeon Observation, Earthtrade - 2024
- Squatter Pigeon Observation, LEC - 2024
- Greater Glider Observation, Earthtrade - 2024
- Greater Glider Observation, LEC - 2023
- Greater Glider Observation, LEC - 2024

Data sources:
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Mackay
Rockhampton
Bundaberg
Brisbane

LYNGCO ENVIRONMENTAL CONSULTING

Drawn By: C Schlebusch
Requested by: S Lyngcoln
Date: 13/12/2024

Figure 5
Threatened Species Results

RTPL_CLCk001_MAP0014_B

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4.7 BioCondition results and assessment units

The BioCondition results for each survey site have been provided in Appendix C. The BioCondition photos is provided in Appendix D.

The results have been scored for each site against the relevant or representative benchmark as listed in the Qld BioCondition Benchmarks (Queensland Government, 2023). Where multiple sites were assessed in the same assessment unit, a weighted average has been calculated based on the area within each unit.

The assessment units and corresponding field verified RE, relevant threatened species and area (ha) have provided in Table 18 and illustrated in Figure 6.

Table 18: Assessment units, corresponding field verified regional ecosystems and short description, relevant threatened species, threatened species habitat usage and area (ha).

Assessment Units	RE and short description	Fauna habitat type	Threatened species and habitat usage	Area (ha)
AU1	RE 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Brigalow Forest	Ornamental snake – marginal-	510.16
AU2	RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	Riparian Forest	Koala -climate refugia	128.94
			Greater glider – breeding, foraging and dispersal	
			Squatter pigeon – foraging and dispersal	
AU3	RE 11.3.27f - *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	Wetlands	Ornamental snake – suitable	7.52
			Koala – climate refugia	
			Greater glider – breeding, foraging and dispersal	6.11
AU4	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with frequent large gilgai and small patches <1ha of brigalow	Lineal Gilgai with Coolabah Woodland	Ornamental snake – preferred	62.97
			Koala – breeding and foraging	
			Greater glider – foraging and dispersal	
			Squatter pigeon - foraging and dispersal	
AU5	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains – with infrequent gilgai/clay cracks.	Coolabah Woodland	Ornamental snake - marginal	259.37
			Koala – breeding and foraging	
			Greater glider – foraging and dispersal	
			Squatter pigeon - foraging and dispersal	
AU6		Poplar Box Woodland	Koala - breeding and foraging	2.43

Assessment Units	RE and short description	Fauna habitat type	Threatened species and habitat usage	Area (ha)
	RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains		Greater glider – foraging and dispersal	
			Squatter pigeon - dispersal	

Figure 6: Assessment Units

735000
737500
740000
7472500
7470000
Isaac River
Clive Creek
Manly Access Road
Jungai Creek
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

GDA2020, MGA Zone 55

CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

0 0.5 1
km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse

Assessment Unit
- AU1
- AU2
- AU3
- AU4
- AU5
- AU6

Data sources:
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Drawn By: C Schlebusch
Requested by: S Lyngcoln
Date: 13/12/2024

Figure 6
Assessment Units

RTPL_CLCk001_MAP0020_B

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4.8 Habitat quality

Habitat quality is discussed in the following sections as it relates to the following targeted MNES and MSES recorded in the OIA:

- Regional Ecosystem 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains - listed as Of Concern under the Queensland Vegetation Management Act 1999 (VM Act).
- Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community (Brigalow TEC) associated with Regional Ecosystem 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains - listed as endangered under the VM Act.
- Regional Ecosystem 11.3.2 *Eucalyptus populnea* woodland on alluvial plains – listed as Of Concern under the VM Act.
- Ornamental snake (*Denisonia maculata*) – listed as vulnerable under the EPBC Act and NC Act
- Koala (*Phascolarctos cinereus*) – listed as endangered under the EPBC Act and NC Act
- Greater glider (central and southern) (*Petauroides volans volans*) – listed as endangered under the EPBC Act and NC Act
- Squatter pigeon (*Geophaps scripta scripta*) – listed as vulnerable under the EPBC Act and NC Act.

Habitat quality scores have also been provided for the following matters recorded during the field assessment:

- Regional Ecosystem 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines – listed as Least Concern under the VM Act.
- Regional Ecosystem 11.3.27f *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps listed as Least Concern under the VC Act.

Habitat quality sheets are provided in Appendix F and results are summarised below in Table 19

Table 19: Habitat quality scores, assessment unit and hectares of each MSES and MNES matter within the OIA.

Matter	Assessment Unit	Hectares	Habitat Quality Score
RE 11.3.3	AU4 and AU5	322.33	7.60
Brigalow TEC (RE 11.3.1)	AU1	510.16	7.56
RE 11.3.2	AU6	2.43	6.09
Ornamental snake	AU1, AU3, AU4, AU5	840.01	5.54
Koala	AU2, AU3, AU4, AU5, AU6	461.22	6.80
Greater glider	AU2, AU3, AU4, AU5, AU6	459.82	6.68
Squatter pigeon	AU2, AU4, AU5, AU6	453.71	6.07
RE 11.3.25	AU2	128.94	7.58

RE 11.3.27f	AU3	7.52	7.21

4.9 Habitat Quality - Ornamental Snake

Results of the ornamental snake habitat quality are discussed in the following sections. Results of the desktop and field assessment have been used to determine the likely presence and abundance of the ornamental snake and the results of the literature review have been used to quantify the key habitat features used to determine the habitat quality score for the ornamental snake.

4.9.1 Occurrence on site

The results of the literature review indicate that ornamental snakes have previously been recorded within the OIA by Earthtrade, 2024. Given the OIA habitat qualities and connectivity to suitable habitat in Clements Creek, it is determined that the OIA supports a low density ornamental snake population.

The ornamental snake population has been estimated as a low density as no further evidence of ornamental snakes have been detected by LEC. Further, ornamental snakes, while cryptic for the majority of the year, can quite abundant during wet weather events, such as those when LEC surveyed Clements Creek post wet season. In unrelated projects, LEC have undertaken in suitable habitat in wet weather events, detecting up to 15 ornamental snakes within two hours. However, Earthtrade ornamental snake records have been identified within the OIA (Earthtrade, 2024) and the OIA contains suitable ornamental snake habitat, as illustrated in Figure 7. Subsequently, it is likely the OIA supports a low-density ornamental snake population.

4.9.1 Estimating species attributes

Appendix E provides a detailed description of the ornamental snake's habitat quality attributes, including scoring criteria and metrics.

Table 20 describes the habitat quality attributes used to determine habitat quality for the ornamental snake.

Ornamental snake habitat quality data is provided in Appendix F.

Table 20: Ornamental habitat quality attributes summary.

Habitat quality attributes	Description
Quality of foraging habitat	The availability and complexity of gilgai with abundant deep cracking clays that floods seasonally acting as frog habitat.
Quality shelter and breeding habitat	The availability and complexity of gilgai habitat with deep cracking clays that flood seasonally.
	Abundance of coarse woody debris (lineal metres per hectare).

Quality of mobility habitat (as above)	The availability and complexity of gilgai habitat with deep cracking clays that flood seasonally.
	Abundance of coarse woody debris (lineal metres per hectare).
Absence of threats	Currant habitat clearing.
	Habitat destruction caused by cattle and pigs by trampling and pugging of gilgai and cracking clays.

4.9.2 Habitat quality score

BioCondition scores were coupled with ornamental snake habitat assessments to produce the overall habitat quality score in accordance with the Guide to determining terrestrial habitat quality (DES, 2020).

The overall weighted habitat quality score and total area by AU and RE within the OIA is summarised in Table 21.

The detailed BioCondition data is provided in Appendix C.

The criteria and metrics utilised for the habitat quality assessment is detailed in Appendix E.

Table 21: Assessment unit, regional ecosystem, habitat quality score and total area of ornamental snake habitat (ha).

Assessment Unit	RE and short description	Habitat Quality Score	Total area (ha)
AU1	RE 11.3.1 *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	5.46	510.16
AU3	RE 11.3.27f - *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	5.31	7.52
AU4	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with frequent large gilgai and small patches <1ha of brigalow	6.18	62.97
AU5	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains – with infrequent gilgai/clay cracks	5.55	259.37
Overall habitat quality score		**5.54**	**840.02**

4.9.2.1 Species Stocking Rate

The species stocking rate was given a score of 1.71 (out of 4) and was determined as per the scoring criteria, detailed in Table 22 and Table 23. As the species has been detected on site by Earthtrade (2024), it was given the highest score for presence. However, multiple surveys have been conducted targeting the ornamental snake, where one survey has detected presence. Subsequently, it is likely

that the OIA contains a low density population of the ornamental snake. Therefore, density was given the lowest possible score. While it has been determined that there is preferred habitat within the OIA, the majority of mapped ornamental snake consist of marginal and suitable habitat with limited deep cracking clays for ornamental snake reproduction. As discussed earlier, limited ornamental snake records have been detected, despite considerable survey effort. Therefore, species usage of the overall OIA has been given the lowest possible score.

The importance/role of the species population on site has been given the lowest possible score due to the following:

- the population is not a key source breeding population – as there is relatively little breeding habitat and there it has been determined that the population is low density.
- the population does provide the overall population in the wider landscape with a source of dispersal within the landscape.
- As there is limited breeding resources for the species, and the species is generally limited by cracking clay habitat connectivity, it is likely that the population within the OIA is not necessary for maintaining genetic diversity within the landscape.
- The population within the OIA is not near the limit of the species range, with records north, east, south and west of the OIA.

Table 22: Species Stocking Rate – ornamental snake.

Species Stocking Rate (SSR)	**Score and Range**				**Score**
Presence detected on or adjacent to site (neighboring property with connecting habitat)	**No**	**Yes – Adjacent**	**Yes on site**		10
	0	5	10		
Species usage of the site (habitat type & evidenced usage)	**Not habitat**	**Dispersal**	**Foraging**	**Breeding**	5
	0	5	10	15	
Approximate density (per ha)	**0%**			**100%**	10
	0	10	20	30	
Role/importance of species population on site – see SSR supplementary table scores (see Table 23)	**0**	**5 - 15**	**16-20**	**>21**	5
	0	5	10	15	
Total SRR score (out of 70)					**30**
SRR Score (out of 4)					**1.71**

Table 23: Supplementary SRR for the ornamental snake.

Supplementary SRR	Score Range and Criteria		Score
Key source population for breeding	**No**	**Yes/Possibly**	0
	0	10	
Key source population for dispersal	**No**	**Yes/Possibly**	5
	0	5	
Necessary for maintaining genetic diversity	**No**	**Yes/Possibly**	0
	0	15	
Near the limit of species range	**No**	**Yes/Possibly**	0
	0	15	
Total			**5**

Figure 7: Ornamental snake habitat and records.

735000
737500
740000
7472500
7470000
Isaac River
Clive Creek
Manly Access Road
Junee Creek
S
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

GDA2020, MGA Zone 55

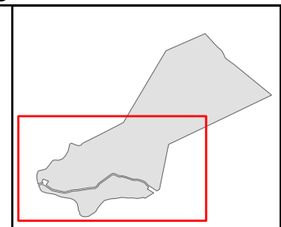
CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

0 0.5 1
km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse

Ornamental Snake Habitat
- Preferred (AU4)
- Suitable (AU3)
- Marginal (AU1, AU5)
- Ornamental Snake Observation, Earthtrade - 2024

Data sources:
©State of Queensland, Department of Resources





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Requested by:	S Lyngcoln
Date:	22/04/2025

Figure 7
Ornamental Snake Habitat

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4.10 Habitat Quality – Koala

Results of the koala habitat quality are discussed in the following sections. Results of the desktop and field assessment have been used to determine the likely presence and abundance of the koala and the results of the literature review have been used to quantify the key habitat features used to determine the habitat quality score for the koala.

4.10.1 Occurrence on site

The field assessment detected two koalas on the central and western side of the OIA within AU2 RE 11.3.25, which has been mapped as koala climate koala refugia, as illustrated in Figure 8 (LEC, 2023) (Earthtrade, 2024). Further, koala scat and potential scratches have been detected throughout the OIA, as illustrated in Figure 8. Additionally, previous field assessments have detected individual koalas within the OIA in mapped koala habitat AU5 11.3.3 (Figure 8) (LEC, 2023) (Earthtrade, 2024).

The results of the ecological assessment and previous ecological work, indicate that OIA contains a breeding population of koalas that use climate refugia (AU2 RE 11.3.25 and AU3 RE 11.3.27f) and AU4, AU5 and AU6 as foraging and dispersal habitat. The OIA has multiple tracts of Riparian Forests (AU2 RE 11.3.25) that likely act as corridors for the koala.

4.10.2 Estimating species attributes

Appendix E provides a detailed description of the koala's habitat quality attributes, including scoring criteria and metrics. Koala habitat quality attributes have been adapted from Umwelt, 2024, to ensure consistency across related projects.

Table 24 describes the habitat quality attributes used to determine habitat quality for the koala.

Koala habitat quality data is provided in Appendix F.

Table 24: Koala habitat quality attributes summary (Umwelt, 2024).

Habitat quality attributes	Description
Quality of foraging habitat	Presence of preferred food tree species
	Size of habitat patch
Quality shelter and breeding habitat	Availability of shelter trees respective to the regional ecosystem
	Availability and proximity of the patch to areas of refuge such as drainage lines where koalas could retreat to during time of drought and/ or fire.
Quality of mobility habitat (as above)	Size of habitat patch relative to the species foraging requirements. Greater than 1000 ha is considered the maximum condition.
	Proximity of the site to vegetated watercourses that facilitate koala movement through the landscape.
Absence of threats	Habitat clearing

Habitat quality attributes	Description
	Wildlife damage
	Feral animal predation and / or control
	Inappropriate fire regime

4.10.3 Habitat quality score

BioCondition scores were coupled with koala habitat assessments to produce the overall habitat quality score in accordance with the Guide to determining terrestrial habitat quality (DES, 2020).

The overall weighted habitat quality score and total area by AU and RE within the OIA is summarised in Table 25.

The detailed BioCondition data is provided in Appendix C.

The criteria and metrics utilised for the habitat quality assessment is detailed in Appendix E.

Table 25: Assessment unit, regional ecosystem, habitat quality score and total area of koala habitat (ha).

Assessment Unit	RE and short description	Habitat Quality Score	Total area (ha)
AU2	RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	6.85	128.94
AU3	RE 11.3.27f - *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	6.83	7.52
AU4	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with frequent large gilgai and small patches <1ha of brigalow	6.91	62.97
AU5	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains – with infrequent gilgai/clay cracks	6.75	259.37
AU6	RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains	6.22	2.43
Overall habitat quality score		**6.80**	**461.22**

4.10.3.1 Species Stocking Rate

The species stocking rate was given a score of 2.86 (out of 4) and was determined as per the scoring criteria, detailed in Table 26 and Table 27.

As the species has been detected multiple times within the OIA it was given the highest score for presence. The site contains multiple assessment units that contain climate refugia and all mapped koala habitat has been determined as koala breeding habitat. Therefore, the OIA has been given the highest score for species usage of the site. Detections and signs of activity have been found in

multiple assessment units and there is limited evidence of hard barriers to the species within the OIA. However, targeted surveys have not measured relative abundance over multiple years. Subsequently, koala density is a difficult attribute to accurately determine. As such, a conservative approach has been taken and the population within the OIA has been given a low score for approximate density.

The importance/role of the species population on site has been given the highest possible score due to the following:

- The population is likely a key source breeding population – the OIA contains climate refugia that allows the population to persist in periods of drought and bushfire. Additionally, the OIA contains mapped koala breeding habitat.
- The population is likely a key source for dispersal – the OIA contains climate refugia along Riparian Forest – AU2 11.3.25. These Riparian Forest likely act as corridors that extend past the OIA, aiding in koala dispersal, even in periods of drought and bushfire.
- The population is likely necessary for maintaining genetic diversity – as above, Riparian Forest likely act as corridors for the koala that extend past the OIA. Allowing for genetic diversity to move in and out of the OIA.
- However, population within the OIA is not near the limit of the species range, with records north, east, south and west of the OIA.

Table 26: Species Stocking Rate – koala.

Species Stocking Rate (SSR)	**Score and Range**				**Score**
Presence detected on or adjacent to site (neighboring property with connecting habitat)	No		Yes – Adjacent	Yes on site	10
	0		5	10	
Species usage of the site (habitat type & evidenced usage)	Not habitat	Dispersal	Foraging	Breeding	15
	0	5	10	15	
Approximate density (per ha)	0%			100%	10
	0	10	20	30	
Role/importance of species population on site – see SSR supplementary table scores (see Table 27)	0	5 - 15	16-20	>21	15
	0	5	10	15	
Total SRR score (out of 70)					**50**
SRR Score (out of 4)					**2.86**

Table 27: Supplementary SRR for the koala.

Supplementary SRR	Score Range and Criteria		Score
Key source population for breeding	No	Yes/Possibly	10
	0	10	
Key source population for dispersal	No	Yes/Possibly	5
	0	5	
Necessary for maintaining genetic diversity	No	Yes/Possibly	15
	0	15	
Near the limit of species range	No	Yes/Possibly	0
	0	15	
Total			**30**

Figure 8: Koala habitat and records.

735000
737500
740000
7472500
7470000
Isaac River
Clive Creek
Junee Creek
Manly Access Road
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

GDA2020, MGA Zone 55

CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

0 0.5 1
km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse

Koala Habitat
- Climate refugia
- Breeding, foraging and dispersal

- Koala Observation, Earthtrade - 2024
- Koala Observation, LEC - 2023
- Koala Observation, LEC - 2024
- Koala Scat, LEC - 2023
- Koala scratch, LEC - 2024

Data sources:
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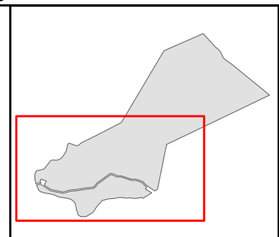



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Figure 8
Koala Habitat

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4.11 Habitat Quality - Greater glider

Results of the greater glider habitat quality are discussed in the following sections. Results of the desktop and field assessment have been used to determine the likely presence and abundance of the greater glider and the results of the literature review have been used to quantify the key habitat features used to determine the habitat quality score for the greater glider.

4.11.1 Occurrence on site

The field assessment detected greater gliders on the central portion of the OIA, along the Isaac River within AU2 RE 11.3.25, which has been mapped as greater glider breeding habitat, as illustrated in Figure 9. Additionally, previous field assessments have detected individual greater gliders within the OIA in mapped greater glider habitat – Riparian Forest AU2 11.3.25 and selected patches of Wetlands AU3 11.3.27f as illustrated in Figure 9 (LEC, 2023) (Earthtrade, 2024).

The results of the ecological assessment and previous ecological work, indicate that OIA contains a breeding population of the greater glider that is concentrated along Riparian Forest (AU2 RE 11.3.25) and selected patches of Wetland AU3 RE 11.3.27f. Assessment units AU4, AU5 and AU6 have been determined as foraging and dispersal habitat for the greater glider due to their vegetation structure and location within the OIA (in low lying areas/flood plains immediately adjacent to Riparian Forest (AU2 RE 11.3.25).

4.11.2 Estimating species attributes

Appendix E provides a detailed description of the greater glider's habitat quality attributes, including scoring criteria and metrics.

Table 28 describes the habitat quality attributes used to determine habitat quality for the greater glider.

Greater glider habitat quality data is provided in Appendix F.

Table 28: Greater glider habitat quality attributes summary.

Habitat quality attributes	Description
Quality of foraging habitat	Number of large eucalyptus trees (%) compared to the benchmark
Quality shelter and breeding habitat	Trees (including stags) containing hollows >20cm diameter (total/ha)
Quality of mobility habitat (as above)	Canopy cover (T1) %
Absence of threats	Habitat loss and subsequent fragmentation
	Inappropriate fire regime

Habitat quality attributes	Description
	Barbed wire fencing entanglement

4.11.3 Habitat quality scores

BioCondition scores were coupled with greater glider habitat assessments to produce the overall habitat quality score in accordance with the Guide to determining terrestrial habitat quality (DES, 2020).

The overall weighted habitat quality score and total area by AU and RE within the OIA is summarised in Table 29.

The detailed BioCondition data is provided in Appendix C.

The criteria and metrics utilised for the habitat quality assessment is detailed in Appendix E.

Table 29: Assessment unit, regional ecosystem, habitat quality score and total area of greater glider habitat (ha).

Assessment Unit	RE and short description	Habitat Quality Score	Total area (ha)
AU2	RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	6.68	128.94
AU3	RE 11.3.27f - *Eucalyptus coolabah* and/or *E. tereticornis* open woodland to woodland fringing swamps	6.56	6.11
AU4	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with frequent large gilgai and small patches <1ha of brigalow	7.01	62.97
AU5	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains – with infrequent gilgai/clay cracks	6.61	259.37
AU6	RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains	5.99	2.43
Overall habitat quality score		**6.68**	**459.82**

4.11.3.1 Species Stocking Rate

The species stocking rate was given a score of 2.86 (out of 4) and was determined as per the scoring criteria, detailed in Table 30 and Table 31.

As the species has been detected multiple times within the OIA it was given the highest score for presence. The site contains multiple assessment units that contain breeding habitat and multiple assessment units that contain mapped foraging habitat. Therefore, the OIA has been given the highest score for species usage of the site. Detections have been found in multiple assessment units within the OIA. However, targeted surveys have not measured relative abundance over multiple

years. Subsequently, greater glider density is a difficult attribute to accurately determine. As such, a conservative approach has been taken and the population within the OIA has been given a low score for approximate density.

The importance/role of the species population on site has been given the highest possible score due to the following:

- The population is likely a key source breeding population – the OIA contains breeding habitat centred in Riparian Forest – AU2 RE 11.3.25 that allows the population to persist in periods of drought and bushfire.
- The population is likely a key source for dispersal – the OIA contains breeding habitat along Riparian Forest – AU2 11.3.25. These Riparian Forest likely act as corridors that extend past the OIA, aiding in greater glider dispersal, even in periods of drought and bushfire.
- The population is likely necessary for maintaining genetic diversity – as above, Riparian Forest likely act as corridors for the greater glider that extend past the OIA. Allowing for genetic diversity to move in and out of the OIA.
- However, population within the OIA is not near the limit of the species range, with records north, east, south and west of the OIA.

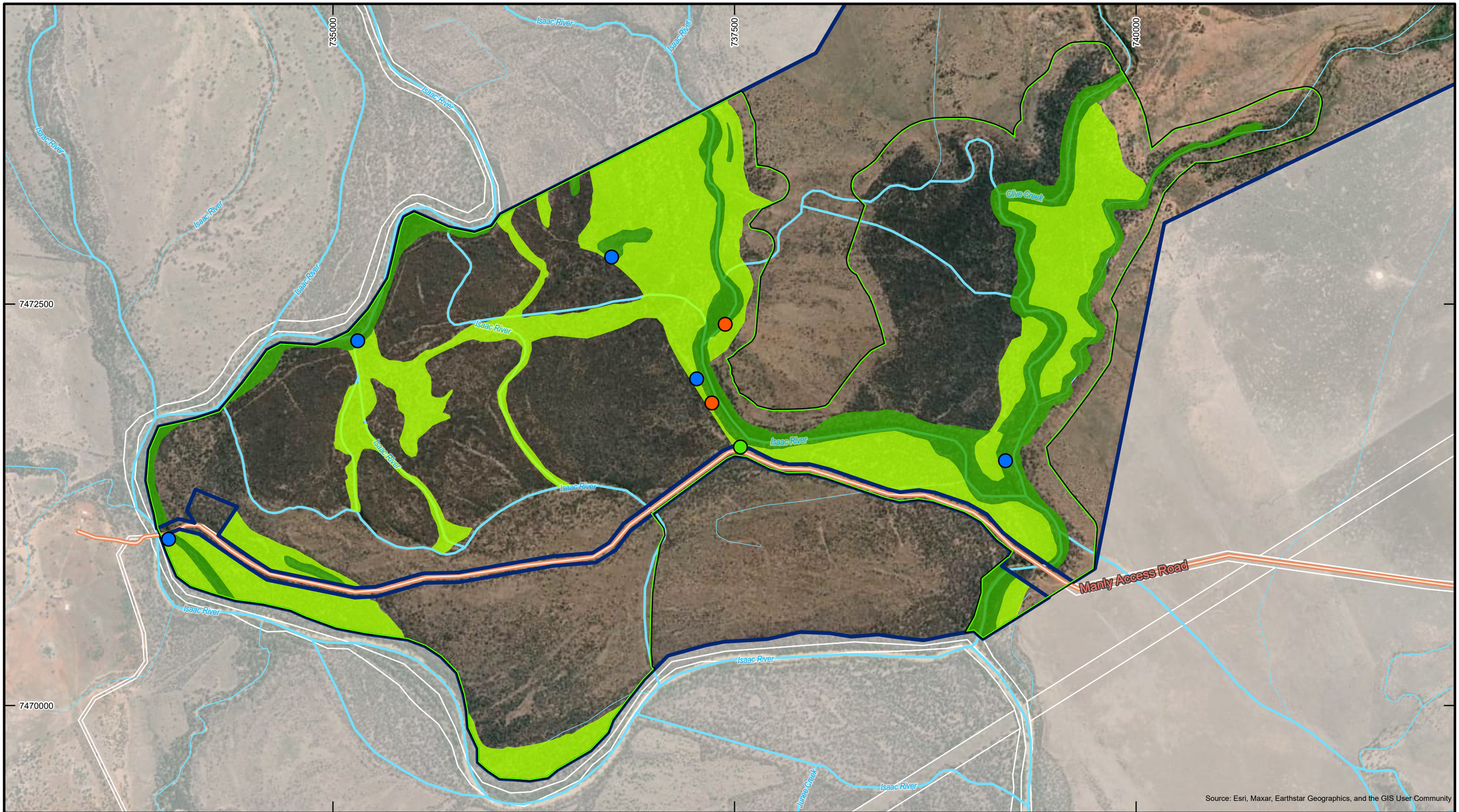
Table 30: Species Stocking Rate – greater glider.

Species Stocking Rate (SSR)	**Score and Range**				**Score**
Presence detected on or adjacent to site (neighboring property with connecting habitat)	No		Yes – Adjacent	Yes on site	10
	0		5	10	
Species usage of the site (habitat type & evidenced usage)	Not habitat	Dispersal	Foraging	Breeding	15
	0	5	10	15	
Approximate density (per ha)	0%			100%	10
	0	10	20	30	
Role/importance of species population on site – see SSR supplementary table scores (see Table 31)	0	5 - 15	16-20	>21	15
	0	5	10	15	
Total SRR score (out of 70)					**50**
SRR Score (out of 4)					**2.86**

Table 31: Supplementary SRR for the greater glider.

Supplementary SRR	Score Range and Criteria		Score
Key source population for breeding	No	Yes/Possibly	10
	0	10	
Key source population for dispersal	No	Yes/Possibly	5
	0	5	
Necessary for maintaining genetic diversity	No	Yes/Possibly	15
	0	15	
Near the limit of species range	No	Yes/Possibly	0
	0	15	
Total			30

Figure 9: Greater glider habitat and records.



CLEMENTS CREEK LOT 17 RP848822

Offset Investigation

GDA2020, MGA Zone 55

0 0.5 1
km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse

Greater Glider
- Foraging and dispersal
- Breeding, foraging and dispersal

- Greater Glider Observation, Earthtrade - 2024
- Greater Glider Observation, LEC - 2023
- Greater Glider Observation, LEC - 2024

Data sources:
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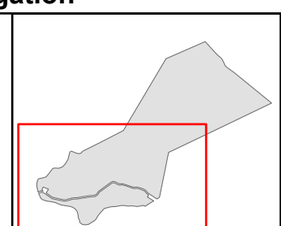



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Date:	13/12/2024

Figure 9
Greater Glider Habitat

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4.12 Habitat Quality – Squatter pigeon

Results of the squatter pigeon habitat quality are discussed in the following sections. Results of the desktop and field assessment have been used to determine the likely presence and abundance of the squatter pigeon and the results of the literature review have been used to quantify the key habitat features used to determine the habitat quality score for the squatter pigeon.

4.12.1 Occurrence on site

The field assessment detected multiple squatter pigeons on the southern portion of the OIA, within AU5 RE 11.3.3 along Manly Access Road, as illustrated in Figure 10. Further detections by Earthtrade (2024) have been made in the in close proximity to AU5 RE 11.3.3 along the north east portion of the OIA, as illustrated in Figure 10. Additional detections have been made by LEC and Earthtrade (2024) in non-remnant vegetation, which is not part of this assessment, as illustrated in Figure 10.

Squatter pigeon habitat within the OIA has been determined as foraging and dispersal habitat. No breeding habitat has been identified within the OIA, due to the lack of Land zone 5 and Land zone 7, which is required for squatter pigeon habitat (DCCEEW, 2024).

4.12.2 Estimating species attributes

Appendix E provides a detailed description of squatter pigeon habitat quality attributes, including scoring criteria and metrics.

Table 32 describes the habitat quality attributes used to determine habitat quality for the squatter pigeon.

Squatter pigeon habitat quality data is provided in Appendix F

Table 32: Squatter pigeon habitat quality attributes summary.

Habitat quality attributes	Description
Quality of foraging habitat	Amount of bare ground and leaf litter.
	Availability of food in the form of native grass and legumes.
	Soil type – is the soil well draining, sandy, or gravelly on low gently sloping, flat to undulating plains and foothills or lateritic soils on low jump ups and escarpment.
Quality shelter and breeding habitat	Canopy cover (T1 + T2) %
	Soil type - is the soil well draining, sandy, or gravelly on low gently sloping, flat to undulating plains and foothills or lateritic soils on low jump ups and escarpment.
Quality of mobility habitat]	Distance from water
Absence of threats	Habitat loss and subsequent fragmentation
	Degradation of habitat from domesticated herbivores.

Habitat quality attributes	Description
	Degradation of habitat by exotic weeds.
	Predation from native and exotic predators.

4.12.3 Habitat quality scores

BioCondition scores were coupled with squatter pigeon habitat assessments to produce the overall habitat quality score in accordance with the Guide to determining terrestrial habitat quality (DES, 2020).

The overall weighted habitat quality score and total area by Assessment Unit and Regional Ecosystem within the offset area is summarised in Table 33.

The detailed BioCondition data is provided in Appendix C.

The criteria and metrics utilised for the habitat quality assessment is detailed in Appendix E.

Table 33: Assessment unit, regional ecosystem, habitat quality score and total area of squatter pigeon habitat (ha).

Assessment Unit	RE and short description	Habitat Quality Score	Total area (ha)
AU2	RE 11.3.25 *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	6.04	128.94
AU4	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains with frequent large gilgai and small patches <1ha of brigalow	6.38	62.97
AU5	RE 11.3.3 *Eucalyptus coolabah* woodland on alluvial plains – with infrequent gilgai/clay cracks	6.02	259.37
AU6	RE 11.3.2 *Eucalyptus populnea* woodland on alluvial plains	5.56	2.43
Overall habitat quality score		**6.07**	**453.71**

4.12.3.1 Species Stocking Rate

The species stocking rate was given a score of 2.00 (out of 4) and was determined as per the scoring criteria, detailed in Table 34 and Table 35.

As the species has been detected multiple times within the OIA it was given the highest score for presence. The site contains multiple assessment units that contain mapped foraging habitat. Therefore, the OIA has been given a moderate score for species usage of the site. Detections have been found in multiple regions within the OIA. However, targeted surveys have not measured relative abundance over multiple years. Subsequently, squatter pigeon density is a difficult attribute to accurately determine. As such, a conservative approach has been taken and the population within the OIA has been given a low score for approximate density.

The importance/role of the species population on site has been given the lowest possible score due to the following:

- The population is likely not a key source breeding population – the OIA contains not squatter pigeon breeding habitat. Squatter pigeon breeding habitat is typically located on Land Zone 5 and Land Zone 7 – the OIA is entirely Land Zone 3.
- The population is likely a key source for dispersal – the OIA contains large portions of dispersal and foraging habitat in multiple assessment units. It is likely that species utilises this area primarily for foraging and allowing young to move to areas outside of the OIA that contain breeding habitat.
- The population is likely not necessary for maintaining genetic diversity – whilst the population likely uses the site for foraging and dispersal. Squatter pigeons can be found foraging and dispersal in non-remanent habitat, that surrounds the OIA. It is unlikely that the population within the OIA is necessary for maintaining genetic diversity.
- The population within the OIA is not near the limit of the species range, with records north, east, south and west of the OIA.

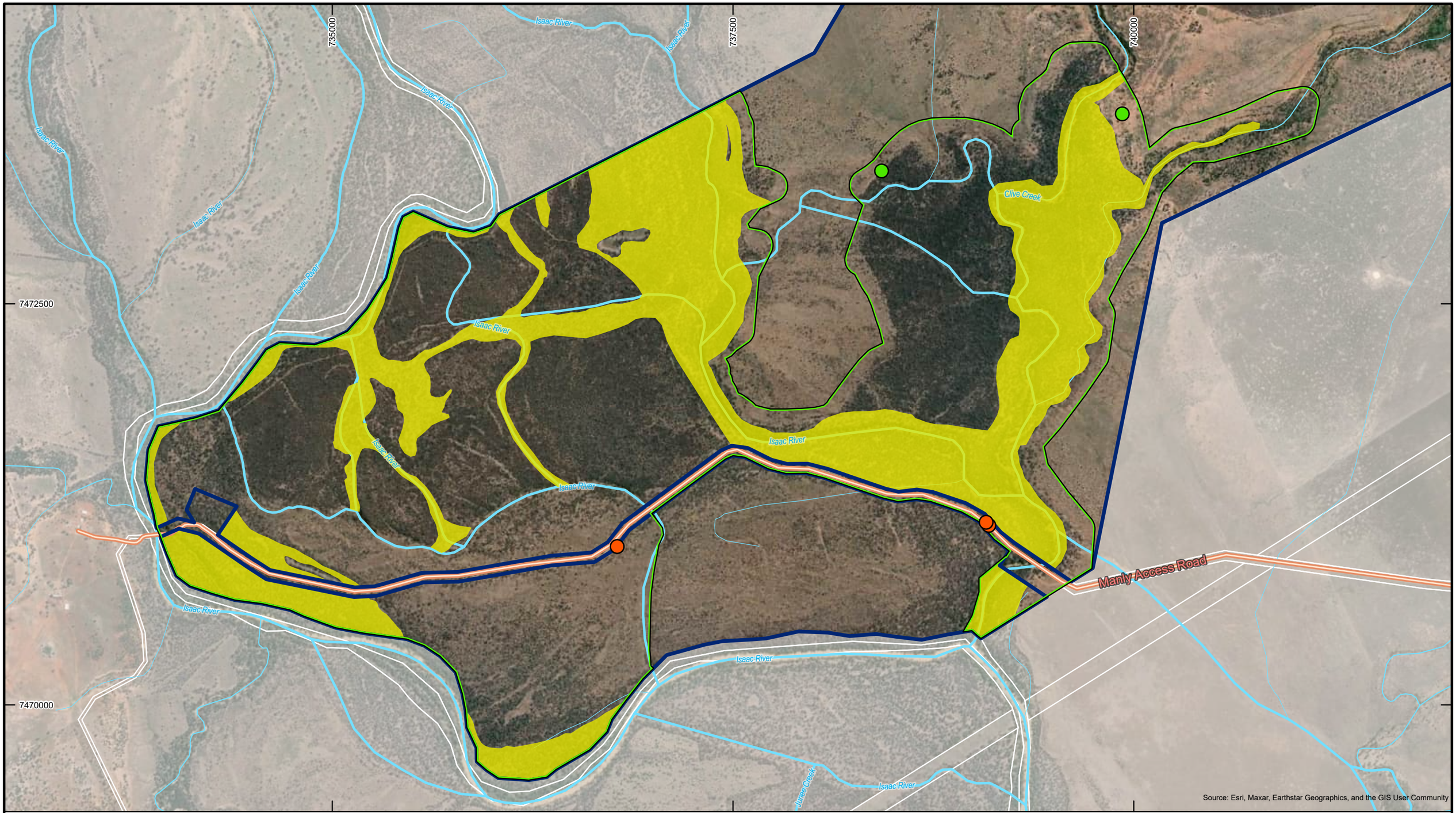
Table 34: Species Stocking Rate – squatter pigeon.

Species Stocking Rate (SSR)	**Score and Range**				**Score**
Presence detected on or adjacent to site (neighboring property with connecting habitat)	No		Yes – Adjacent	Yes on site	10
	0		5	10	
Species usage of the site (habitat type & evidenced usage)	Not habitat	Dispersal	Foraging	Breeding	10
	0	5	10	15	
Approximate density (per ha)	0%			100%	10
	0	10	20	30	
Role/importance of species population on site – see SSR supplementary table scores (see Table 35)	0	5 - 15	16-20	>21	5
	0	5	10	15	
Total SRR score (out of 70)					**35**
SRR Score (out of 4)					**2.00**

Table 35: Supplementary SRR for the squatter pigeon.

Supplementary SRR	Score Range and Criteria		Score
Key source population for breeding	No	Yes/Possibly	0
	0	10	
Key source population for dispersal	No	Yes/Possibly	5
	0	5	
Necessary for maintaining genetic diversity	No	Yes/Possibly	0
	0	15	
Near the limit of species range	No	Yes/Possibly	0
	0	15	
Total			**5**

Figure 10: Squatter pigeon habitat and records.



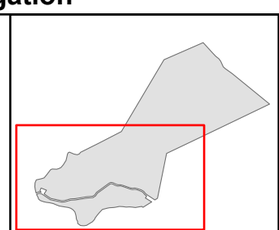
N

GDA2020, MGA Zone 55

CLEMENTS CREEK LOT 17 RP848822
Offset Investigation

0 0.5 1
km

- Cadastral Boundary
- Lot 17 RP848822
- Clements Creek Offset Investigation Area
- Main Road
- Local Road
- Watercourse
- Squatter Pigeon Habitat - Foraging and dispersal
- Squatter Pigeon Observation, Earthtrade - 2024
- Squatter Pigeon Observation, LEC - 2024





Data sources:
©State of Queensland, Department of Resources

LYNGCO ENVIRONMENTAL CONSULTING

Drawn By:	C Schlebusch
Requested by:	S Lyngcoln
Date:	13/12/2024

Figure 10
Squatter Pigeon Habitat

RTPL_CLCk001_MAP0018_B

Path: S:\Plans\Project_Specific\LyngcoEnvironmental\Clements Creek\RTPL_CLCk001_MAP0018_B A3L Squatter Pigeon Habitat.aprx

5.0 Conclusion

Results of the ecological and habitat quality assessment on Clements Creek OIA are summarised in Table 36 as it relates to the MNES and MSES values and overall habitat quality scores.

Table 36: Summary of MNES, MSES, Status under the EPBC Act, NC Act and or VM Act, area (ha) and habitat quality score.

MNES	Status and Act		Hectares	Habitat Quality Score
	EPBC Act	NC Act		
Brigalow TEC (RE 11.3.1)	E	E	510.16	7.56
Ornamental snake	V	V	840.01	5.54
Koala	E	E	461.22	6.80
Greater glider	E	E	459.82	6.68
Squatter pigeon	V	V	453.71	6.07
MSES	**VM Act**		**Hectares**	**Habitat Quality Score**
RE 11.3.3	Of Concern		322.33	7.60
RE 11.3.2	Of Concern		2.43	6.09
RE 11.3.25	Least Concern		128.94	7.58
RE 11.3.27f	Least Concern		7.52	7.21

Threatened fauna values returned in the OIA are summarised in Table 37.

Table 37: Summary of threatened fauna detected within the OIA.

Species Name	Common Name	Status and Act		Outcome
		EPBC Act	NC Act	
Denisonia maculata	Ornamental snake	V	V	Two individual ornamental snakes have been detected by Earthtrade (2024) in Coolabah Woodland – AU5 RE 11.3.3 and non-remnant vegetation immediately adjacent to Brigalow Forest – AU RE 11.3.1.
Phascolarctos cinereus	Koala	E	E	Multiple individuals have detected throughout the OIA. Records are concentrated within Riparian Forest – AU2 RE 11.3.25. Multiple koalas have been detected along Manly Access Road (Earthtrade, 2024) (LEC, 2023). Further, evidence of koalas including scat and

Species Name	Common Name	Status and Act		Outcome
		EPBC Act	NC Act	
				potential scratches have been identified in the following: • Riparian Forest – AU2 RE 11.3.25. • Wetlands – AU3 RE 11.3.27f • Linear Gilgai with Coolabah Woodland – AU4 RE 11.3.3.
Petauroides volans volans	Greater glider	E	E	Multiple individuals have detected throughout the OIA. Records are concentrated within or adjacent to Riparian Forest – AU2 RE 11.3.25. Further, direct evidence of the greater glider (deceased individual) has been identified in Wetland habitat – AU3 11.3.27f (LEC, 2023).
Geophaps scripta scripta	Squatter pigeon	V	V	Multiple individuals have detected throughout the OIA during the field assessment. Records are concentrated along Manly Access Road, primarily in Coolabah Woodland – AU5 RE 11.3.3. A single squatter pigeon was identified in non-remnant vegetation, immediately adjacent to Coolabah Woodland – AU5 RE 11.3.3 (Earthtrade, 2024). Further, a squatter pigeon was identified in non-remnant habitat that has not been assessed (Earthtrade, 2024)

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7.0 Appendix A

Desktop Assessment

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Queensland status: All
Records: All
Date: Since 1980
Latitude: -22.8461
Longitude: 149.3069
Distance: 10
Email: laura@lyngcoenvironmental.com.au
Date submitted: Wednesday 13 Nov 2024 12:08:33
Date extracted: Wednesday 13 Nov 2024 12:10:06

The number of records retrieved = 151

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		1
animals	amphibians	Limnodynastidae	*Limnodynastes tasmaniensis*	spotted grassfrog		C		7
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		1
animals	birds	Acanthizidae	*Acanthiza nana*	yellow thornbill		C		1
animals	birds	Acanthizidae	*Gerygone olivacea*	white-throated gerygone		C		3
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		3
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		2
animals	birds	Accipitridae	*Haliaeetus leucogaster*	white-bellied sea-eagle		C		3
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		5
animals	birds	Accipitridae	*Hieraaetus morphnoides*	little eagle		C		1
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		1
animals	birds	Alcedinidae	*Dacelo leachii*	blue-winged kookaburra		C		5
animals	birds	Alcedinidae	*Dacelo novaeguineae*	laughing kookaburra		C		9
animals	birds	Alcedinidae	*Todiramphus macleayii*	forest kingfisher		C		6
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		3
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		4
animals	birds	Anatidae	*Aythya australis*	hardhead		C		4
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		2
animals	birds	Anatidae	*Cygnus atratus*	black swan		C		1
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		2
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		1
animals	birds	Ardeidae	*Egretta novaehollandiae*	white-faced heron		C		5
animals	birds	Ardeidae	*Nycticorax caledonicus*	nankeen night-heron		C		1
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		2
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		2
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		1
animals	birds	Artamidae	*Gymnorhina tibicen*	Australian magpie		C		4
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		1
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		9
animals	birds	Cacatuidae	*Eolophus roseicapilla*	galah		C		2
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		2
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		3
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		1
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		4
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		2
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		C		3
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		2
animals	birds	Columbidae	*Geopelia placida*	peaceful dove		C		2
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	2
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		2
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		10
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		3
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		1
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		7
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		10

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		5
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		5
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		3
animals	birds	Estrildidae	*Neochmia phaeton*	crimson finch		C		1
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		4
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		1
animals	birds	Eurostopodidae	*Eurostopodus mystacalis*	white-throated nightjar		C		1
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		2
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		2
animals	birds	Falconidae	*Falco longipennis*	Australian hobby		C		1
animals	birds	Gruidae	*Antigone rubicunda*	brolga		C		2
animals	birds	Hirundinidae	*Hirundo neoxena*	welcome swallow		C		1
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		1
animals	birds	Locustellidae	*Cincloramphus mathewsi*	rufous songlark		C		1
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		11
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		4
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		1
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		1
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		6
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		2
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		4
animals	birds	Meliphagidae	*Myzomela sanguinolenta*	scarlet honeyeater		C		2
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		3
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		9
animals	birds	Meliphagidae	*Stomiopera flava*	yellow honeyeater		C		1
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		1
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		6
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		3
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		3
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		1
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		3
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		2
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		3
animals	birds	Pachycephalidae	*Colluricincla megarhyncha*	little shrike-thrush		C		1
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		2
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		4
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		3
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		3
animals	birds	Phalacrocoracidae	*Phalacrocorax sulcirostris*	little black cormorant		C		3
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		1
animals	birds	Phasianidae	*Coturnix pectoralis*	stubble quail		C		1
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		4
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		4
animals	birds	Psittaculidae	*Aprosmictus erythropterus*	red-winged parrot		C		3
animals	birds	Psittaculidae	*Platycercus adscitus*	pale-headed rosella		C		4
animals	birds	Psittaculidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		5

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Psittaculidae	*Trichoglossus moluccanus*	rainbow lorikeet		C		11
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		2
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		3
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		1
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		2
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		2
animals	birds	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis		C		1
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		1
animals	mammals	Canidae	*Canis familiaris*	dog	Y			1
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		2
animals	mammals	Emballonuridae	*Taphozous australis*	coastal sheathtail bat		NT		1
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		1
animals	mammals	Molossidae	*Chaerephon jobensis*	northern freetail bat		C		2
animals	mammals	Molossidae	*Mormopterus lumsdenae*	northern free-tailed bat		C		2
animals	mammals	Molossidae	*Mormopterus ridei*	eastern free-tailed bat		C		2
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		E	E	13
animals	mammals	Pteropodidae	*Pteropus alecto*	black flying-fox		C		1
animals	mammals	Vespertilionidae	*Chalinolobus gouldii*	Gould's wattled bat		C		2
animals	mammals	Vespertilionidae	*Chalinolobus morio*	chocolate wattled bat		C		1
animals	mammals	Vespertilionidae	*Chalinolobus nigrogriseus*	hoary wattled bat		C		2
animals	mammals	Vespertilionidae	*Chalinolobus picatus*	little pied bat		C		2
animals	mammals	Vespertilionidae	*Myotis macropus*	large-footed myotis		C		1
animals	mammals	Vespertilionidae	*Nyctophilus sp.*			C		1
animals	mammals	Vespertilionidae	*Scotorepens balstoni*	inland broad-nosed bat		C		1
animals	mammals	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat		C		2
animals	mammals	Vespertilionidae	*Vespadelus baverstocki*	inland forest bat		C		2
animals	mammals	Vespertilionidae	*Vespadelus sp.*			C		1
animals	mammals	Vespertilionidae	*Vespadelus troughtoni*	eastern cave bat		C		1
animals	ray-finned fishes	Ariidae	*Neoarius graeffei*	blue catfish				1
animals	ray-finned fishes	Clupeidae	*Nematalosa erebi*	bony bream				1
animals	ray-finned fishes	Eleotridae	*Hypseleotris galii*	firetail gudgeon				1
animals	ray-finned fishes	Hemiramphidae	*Arrhamphus sclerolepis*	snubnose garfish				1
animals	ray-finned fishes	Melanotaeniidae	*Melanotaenia splendida splendida*	eastern rainbowfish				2
animals	ray-finned fishes	Osteoglossidae	*Scleropages leichardti*	southern saratoga				1
animals	ray-finned fishes	Terapontidae	*Amniataba percoides*	barred grunter				1
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		1
animals	reptiles	Chelidae	*Emydura macquarii krefftii*	Krefft's river turtle		C		1
animals	reptiles	Chelidae	*Wollumbinia latisternum*	saw-shelled turtle		C		1
animals	reptiles	Colubridae	*Tropidonophis mairii*	freshwater snake		C		2
animals	reptiles	Diplodactylidae	*Oedura monilis sensu lato*	ocellated velvet gecko		C		1
animals	reptiles	Gekkonidae	*Gehyra dubia*	dubious dtella		C		8
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		11
animals	reptiles	Scincidae	*Carlia rubigo*	orange-flanked rainbow skink		C		2
animals	reptiles	Scincidae	*Carlia sp.*			C		1
animals	reptiles	Scincidae	*Cryptoblepharus pulcher pulcher*	elegant snake-eyed skink		C		5
animals	reptiles	Scincidae	*Cryptoblepharus sp.*			C		4

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Scincidae	*Ctenotus sp.*			C		1
animals	reptiles	Scincidae	*Lygisaurus foliorum*	tree-base litter-skink		C		1
animals	reptiles	Scincidae	*Morethia taeniopleura*	fire-tailed skink		C		1
plants	land plants	Chenopodiaceae	*Dysphania carinata*			C		1/1
plants	land plants	Chenopodiaceae	*Einadia hastata*			C		1/1
plants	land plants	Cyperaceae	*Cyperus lucidus*			C		1/1
plants	land plants	Euphorbiaceae	*Claoxylon tenerifolium subsp. tenerifolium*			C		1/1
plants	land plants	Euphorbiaceae	*Excoecaria dallachyana*	scrub poison tree		C		1/1
plants	land plants	Malvaceae	*Hibiscus vitifolius*			C		1/1
plants	land plants	Sapindaceae	*Cardiospermum halicacabum var. halicacabum*		Y			1/1
plants	land plants	Sterculiaceae	*Brachychiton australis*	broad-leaved bottle tree		SL		1/1
plants	land plants	Verbenaceae	*Verbena gaudichaudii*			C		1/1
plants	land plants	Zygophyllaceae	*Roepera apiculata*			C		1/1

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 (EX), Extinct in the Wild (PE), Critically Endangered (CR), Endangered (E), Vulnerable (V), Near Threatened (NT), Special Least Concern (SL) and Least Concern (C).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999.*
The values of EPBC are Extinct (EX), Extinct in the Wild (XW), Critically Endangered (CE), Endangered (E), Vulnerable (V) and Conservation Dependent (CD).

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Australian Government

Department of Climate Change, Energy, the Environment and Water

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. Please see the caveat for interpretation of information provided here.

Report created: 13-Nov-2024

Summary

Details

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

Caveat

Acknowledgements

Summary

Matters of National Environment 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 (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	35
Listed Migratory Species:	11

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 https://www.dcceew.gov.au/parks-heritage/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 Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	20
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	9
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	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.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area	In feature area
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Community likely to occur within area	In feature area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area	In feature area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat likely to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area
[Geophaps scripta scripta](#) Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Grantiella picta](#) Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Neochmia ruficauda ruficauda](#) Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area
[Poephila cincta cincta](#) Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area	In feature area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
[Stagonopleura guttata](#) Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area	In feature area
MAMMAL			
[Dasyurus hallucatus](#) Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
[Macroderma gigas](#) Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Nyctophilus corbeni](#) Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Petauroides volans			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
Petaurus australis australis			
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
PLANT			
Cadellia pentastylis			
Ooline [9828]	Vulnerable	Species or species habitat may occur within area	In feature area
Cycas ophiolitica			
[55797]	Endangered	Species or species habitat may occur within area	In feature area
Denhamia megacarpa			
Large-fruited Denhamia [91342]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Dichanthium queenslandicum			
King Blue-grass [5481]	Endangered	Species or species habitat may occur within area	In feature area
Dichanthium setosum			
bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus raveretiana			
Black Ironbox [16344]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Leichhardtia brevifolia listed as Marsdenia brevifolia			
[91893]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Omphalea celata [64586]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Polianthion minutiflorum [82772]	Vulnerable	Species or species habitat may occur within area	In feature area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area	In feature area
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area
Elseya albagula Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat may occur within area	In feature area
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Endangered	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Marine Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Crocodylus porosus](#) Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In buffer area only
Migratory Terrestrial Species			
[Cuculus optatus](#) Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
[Hirundapus caudacutus](#) White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area overfly marine area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Symposiachrus trivirgatus as Monarcha trivirgatus](#)			
Spectacled Monarch [83946]		Species or species habitat may occur within area overfly marine area	In buffer area only
Reptile			
[Crocodylus porosus](#)			
Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area	In buffer area only

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Action clearly unacceptable				
Galilee Coal Project including development of coal mine, 495km railway, port and	2008/4366	Action Clearly Unacceptable	Completed	In buffer area only
Controlled action				
Arrow Bowen Pipeline (CSG), QLD	2012/6459	Controlled Action	Post-Approval	In feature area
Clarke Creek Wind Farm, Qld	2018/8141	Controlled Action	Post-Approval	In feature area
Not controlled action				
Broadsound Solar Farm	2019/8559	Not Controlled Action	Completed	In feature area
Clarke Creek Solar Farm, 17 km south of Clarke Creek, Qld	2019/8386	Not Controlled Action	Completed	In feature area
Clarke Creek Solar Farm, Qld	2018/8150	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Transmission line construction	2001/460	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
275kV transmission line	2002/795	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data is available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on the contents of this report.

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions when time permits.

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded breeding sites; and
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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

Department of Environment, Science and Innovation

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

Lot: 17 Plan: RP848822

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and a field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.



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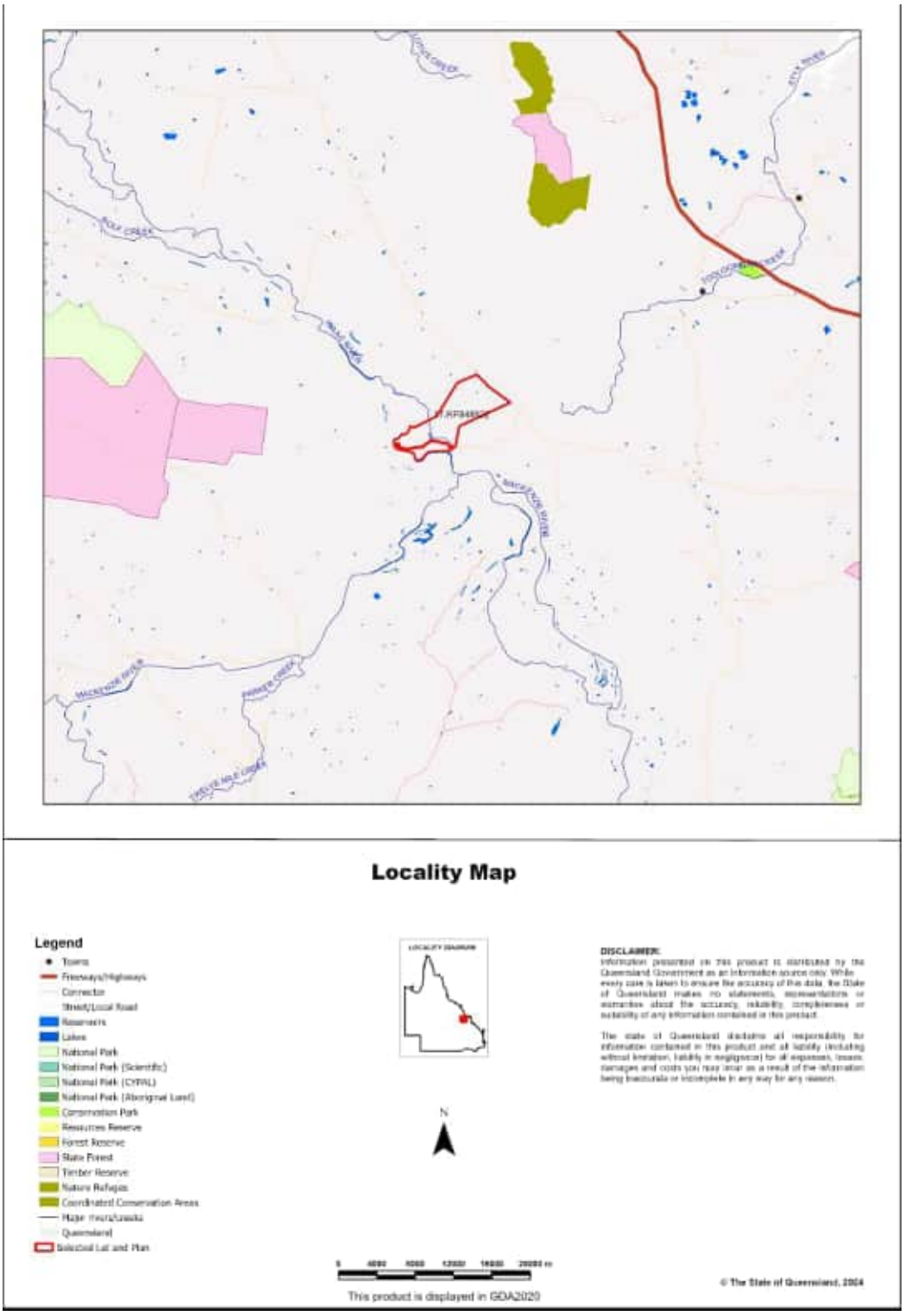
Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI: Lot: 17 Plan: RP848822, with area 3637.32 ha

Local Government(s)	Catchment(s)	Bioregion(s)	Subregion(s)
Isaac Regional	Fitzroy	Brigalow Belt	Isaac - Comet Downs
		Brigalow Belt	Nebo - Connors Ranges



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992;*

- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the Marine Parks Act 2004 ;

- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;

- *Threatened wildlife under the Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;

- Regulated vegetation under the *Vegetation Management Act 1999* that is:

  - Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;
  - Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;
  - Category R areas on the regulated vegetation management map;
  - Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;
  - Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;

- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;

- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;
- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0 ha	0.0%
1b Protected Areas- nature refuges	0 ha	0.0%
1c Protected Areas- special wildlife reserves	0 ha	0.0%
2 State Marine Parks- highly protected zones	0 ha	0.0%
3 Fish habitat areas (A and B areas)	0 ha	0.0%
4 Strategic Environmental Areas (SEA)	0 ha	0.0%
5 High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values	0 ha	0.0%
6a High Ecological Value (HEV) wetlands	0 ha	0.0%
6b High Ecological Value (HEV) waterways	0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	251.38 ha	6.9%
7b Special least concern animals	115.91 ha	3.2%
7c i Koala habitat area - core (SEQ)	0 ha	0.0%
7c ii Koala habitat area - locally refined (SEQ)	0 ha	0.0%
7d Sea turtle nesting areas	0 km	Not applicable
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	974.37 ha	26.8%
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0 ha	0.0%
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0.17 ha	0.0%
8d Regulated Vegetation - Essential habitat	251.36 ha	6.9%
8e Regulated Vegetation - intersecting a watercourse	51.8 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	0 ha	0.0%
9a Legally secured offset areas- offset register areas	0 ha	0.0%
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0 ha	0.0%

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(No results)

1b. Protected Areas - nature refuges

(No results)

1c. Protected Areas - special wildlife reserves

(No results)

2. State Marine Parks - highly protected zones

(No results)

3. Fish habitat areas (A and B areas)

(No results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

(No results)

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Values are present

7b. Special least concern animals

Values are present

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

7d. Wildlife habitat (sea turtle nesting areas)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
Boronia keysii	Keys boronia	V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	Core
Euastacus bindal	Mount Elliot crayfish	CR	None
Euastacus binzayedi		CR	None
Euastacus eungella		E	None
Euastacus hystricosus		E	None
Euastacus jagara	Jagara hairy crayfish	CR	None
Euastacus maidae		CR	None
Euastacus monteithorum		E	None
Euastacus robertsi		E	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Macadamia integrifolia		V	None
Melaleuca irbyana	swamp tea-tree	E	None
Macadamia ternifolia		V	None
Macadamia tetraphylla	bopple nut	V	None
Petrogale penicillata	brush-tailed rock-wallaby	V	None
Petrogale coenensis	Cape York rock-wallaby	E	None
Petrogale purpureicollis	purple-necked rock-wallaby	V	None
Petrogale sharmani	Sharmans rock-wallaby	V	None
Petrogale xanthopus celeris	yellow-footed rock-wallaby (Qld subspecies)	V	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Phascolarctos cinereus	Koala - outside SEQ*	E	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Xeromys myoides	Water Mouse	V	None

*For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.

Threatened (endangered or vulnerable) wildlife species records

Scientific name	Common name	NCA status	EPBC status	Migratory status
Phascolarctos cinereus	koala	E	E	None

Special least concern animal species records

Scientific name	Common name	Migratory status
Ornithorhynchus anatinus	platypus	None

Shorebird habitat (critically endangered/endangered/vulnerable)

Not applicable

Shorebird habitat (special least concern)

Not applicable

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

https://www.qld.gov.au/environment/plants-animals/species-list/

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** and **Map 3c - MSES - Wildlife habitat (sea turtle nesting areas)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:

https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:

https://environment.ehp.qld.gov.au/regional-ecosystems/

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Regional ecosystem	Vegetation management polygon	Vegetation management status
11.11.10	O-dom	rem_oc
11.3.1	E-dom	rem_end
11.3.1/11.3.27	E-dom	rem_end
11.3.21/11.3.3/11.3.1/11.3.27	E-subdom	rem_end
11.3.3/11.3.1/11.3.21/11.3.27	E-subdom	rem_end
11.3.3/11.3.21/11.3.1	E-subdom	rem_end
11.4.1	E-dom	rem_end
11.4.2/11.3.3/11.3.1	E-subdom	rem_end
11.4.8/11.4.2	E-dom	rem_end

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Regulated vegetation map category	Map number
R	8752

8d. Regulated Vegetation - Essential habitat

Values are present

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Not applicable

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets

9a. Legally secured offset areas - offset register areas

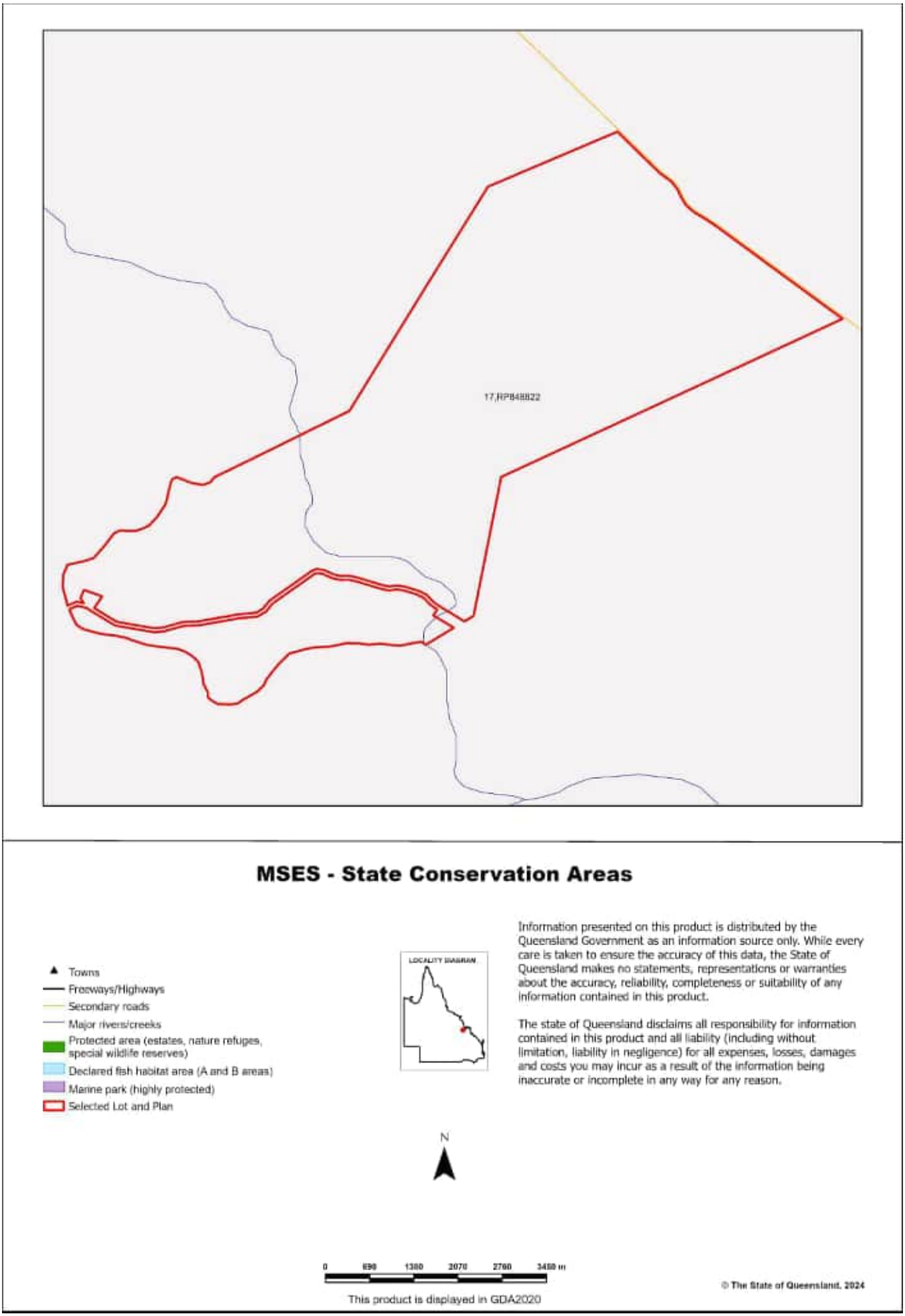
(No results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

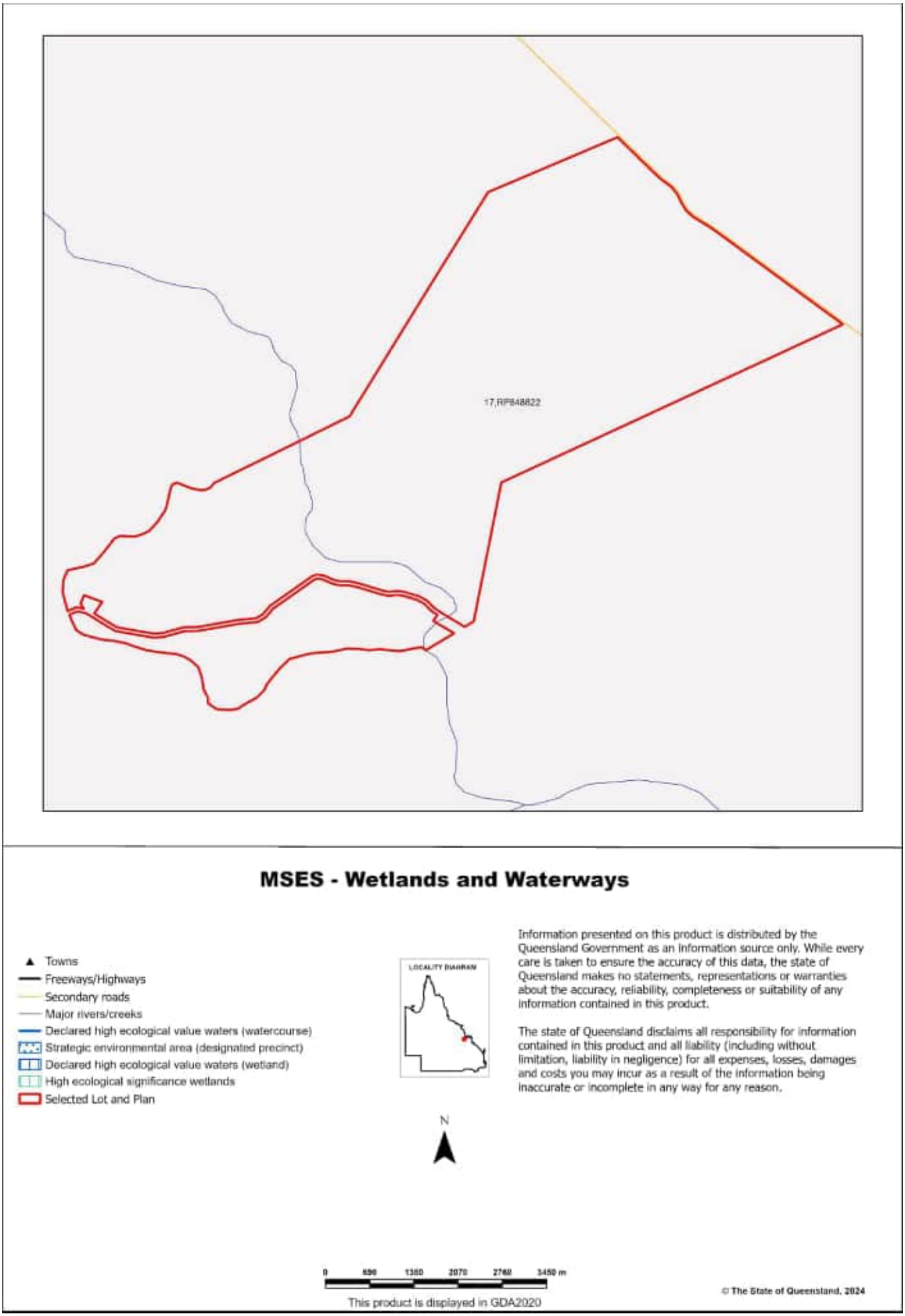
(No results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

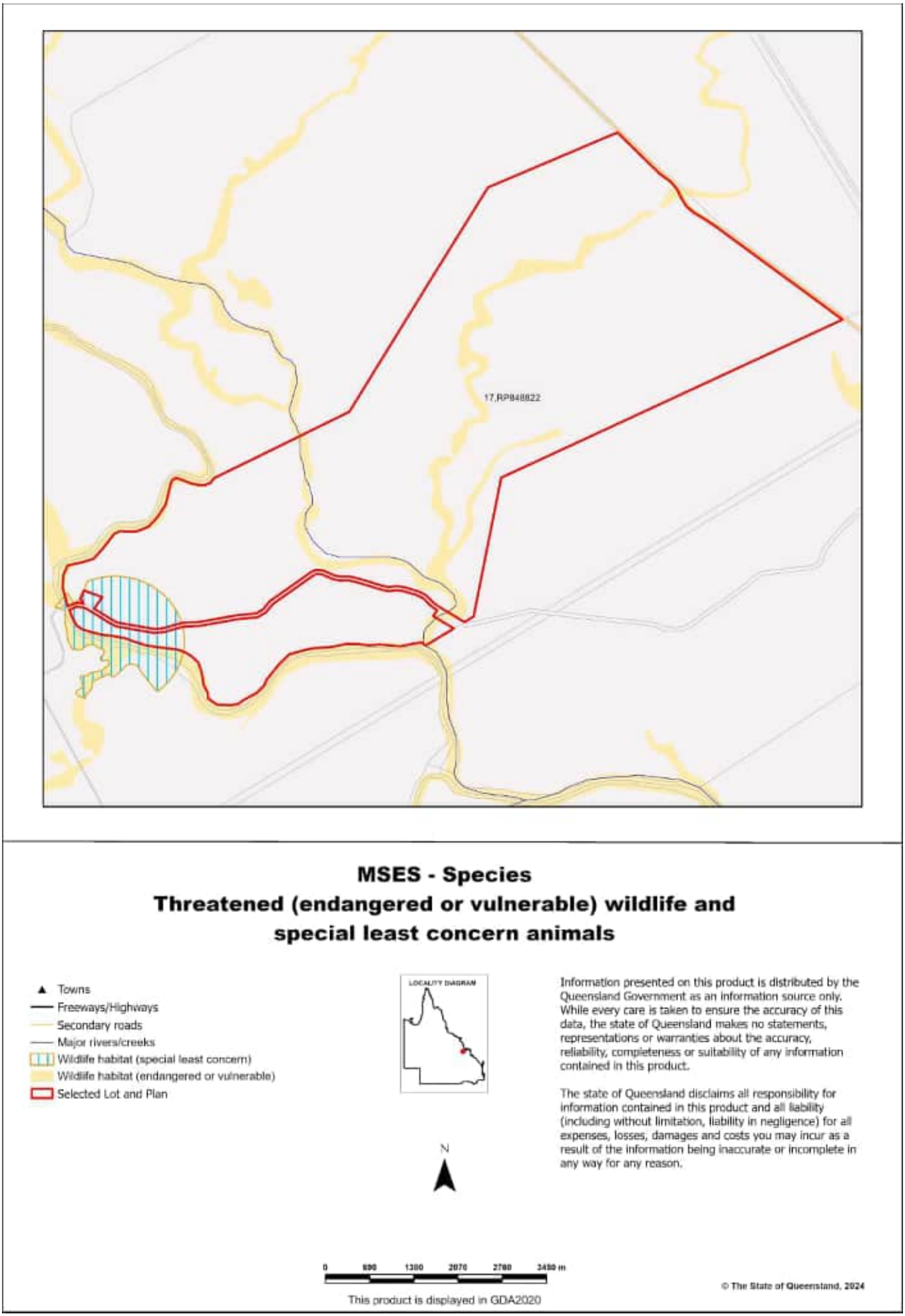
Map 1 - MSES - State Conservation Areas



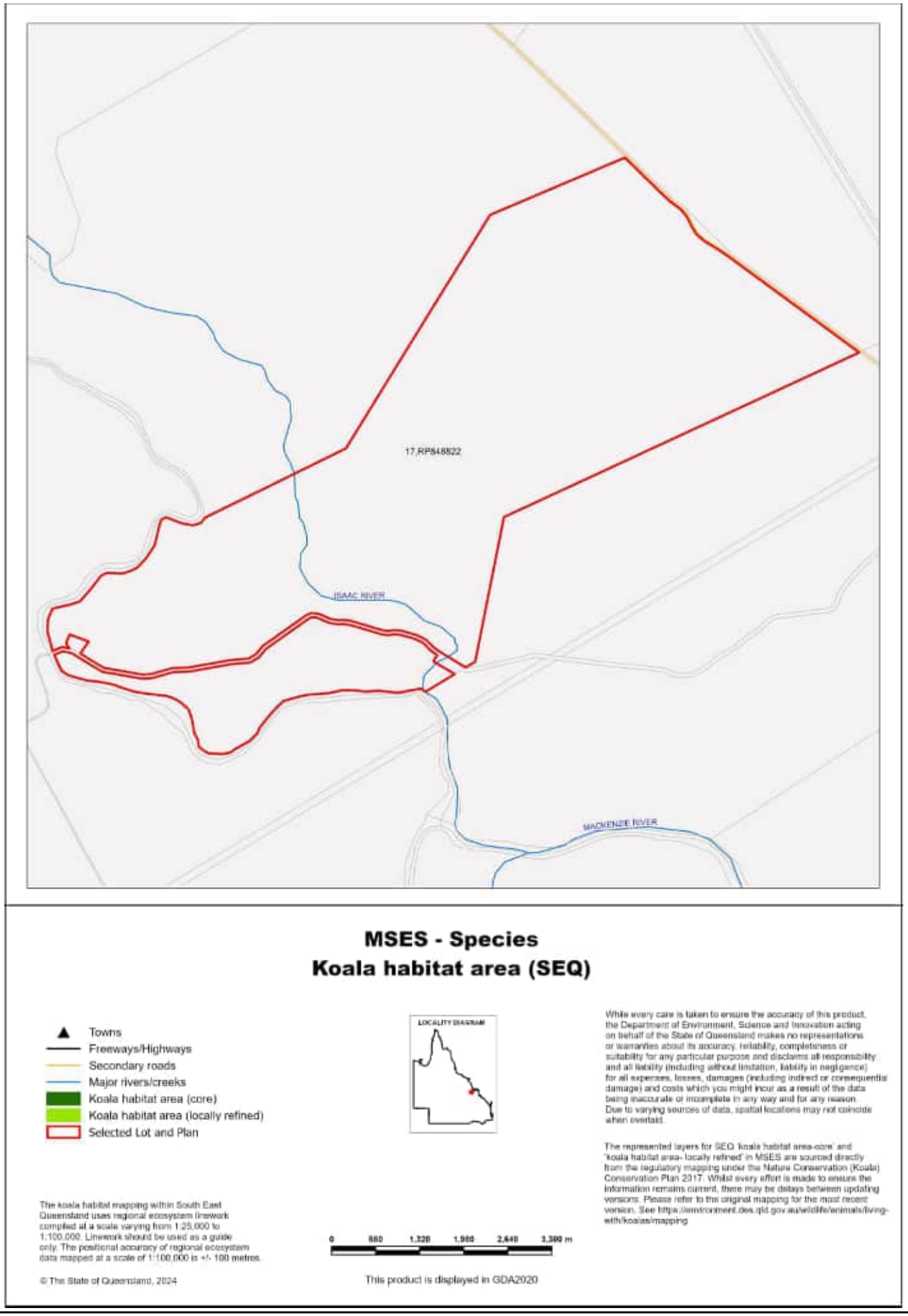
Map 2 - MSES - Wetlands and Waterways



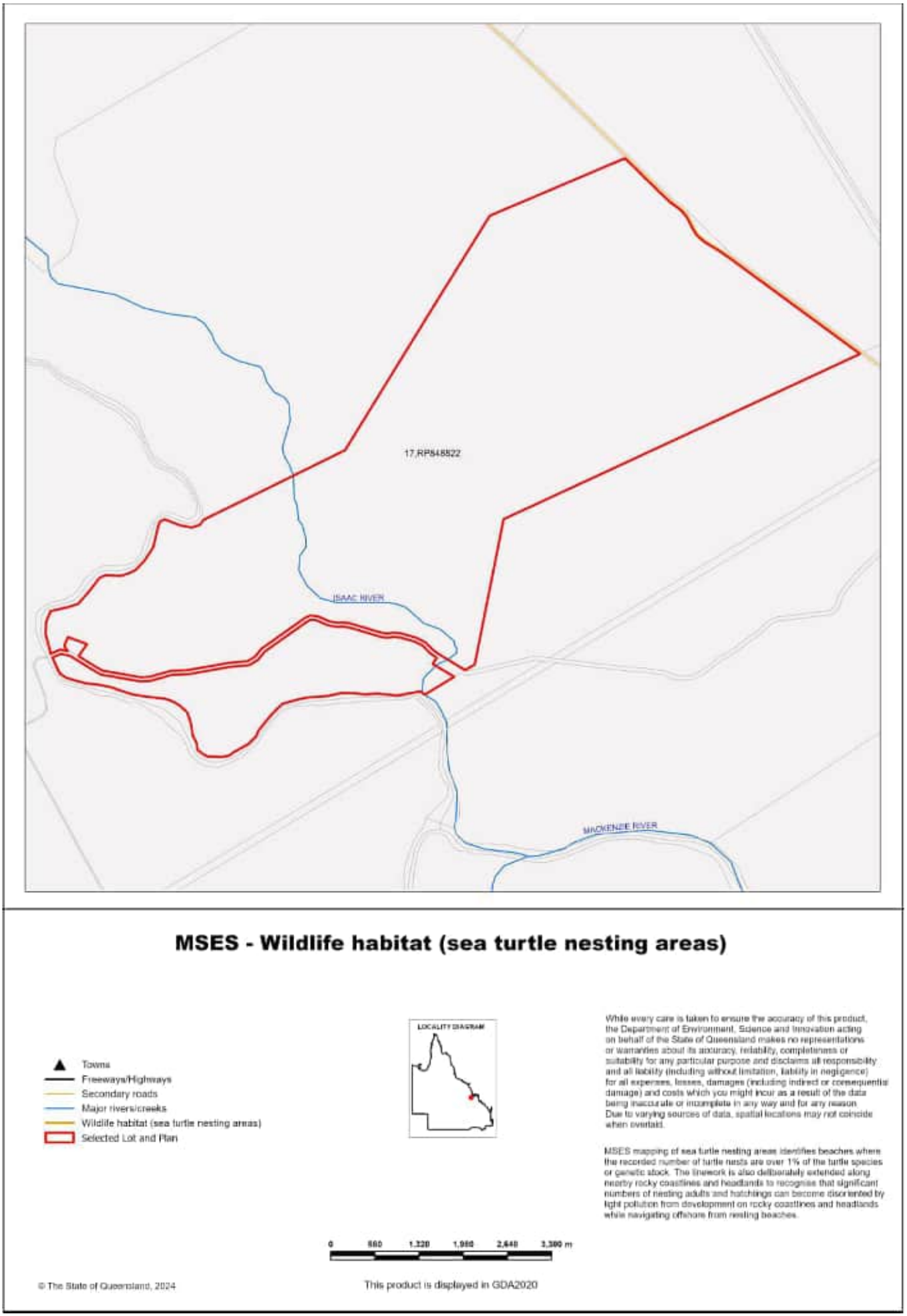
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals



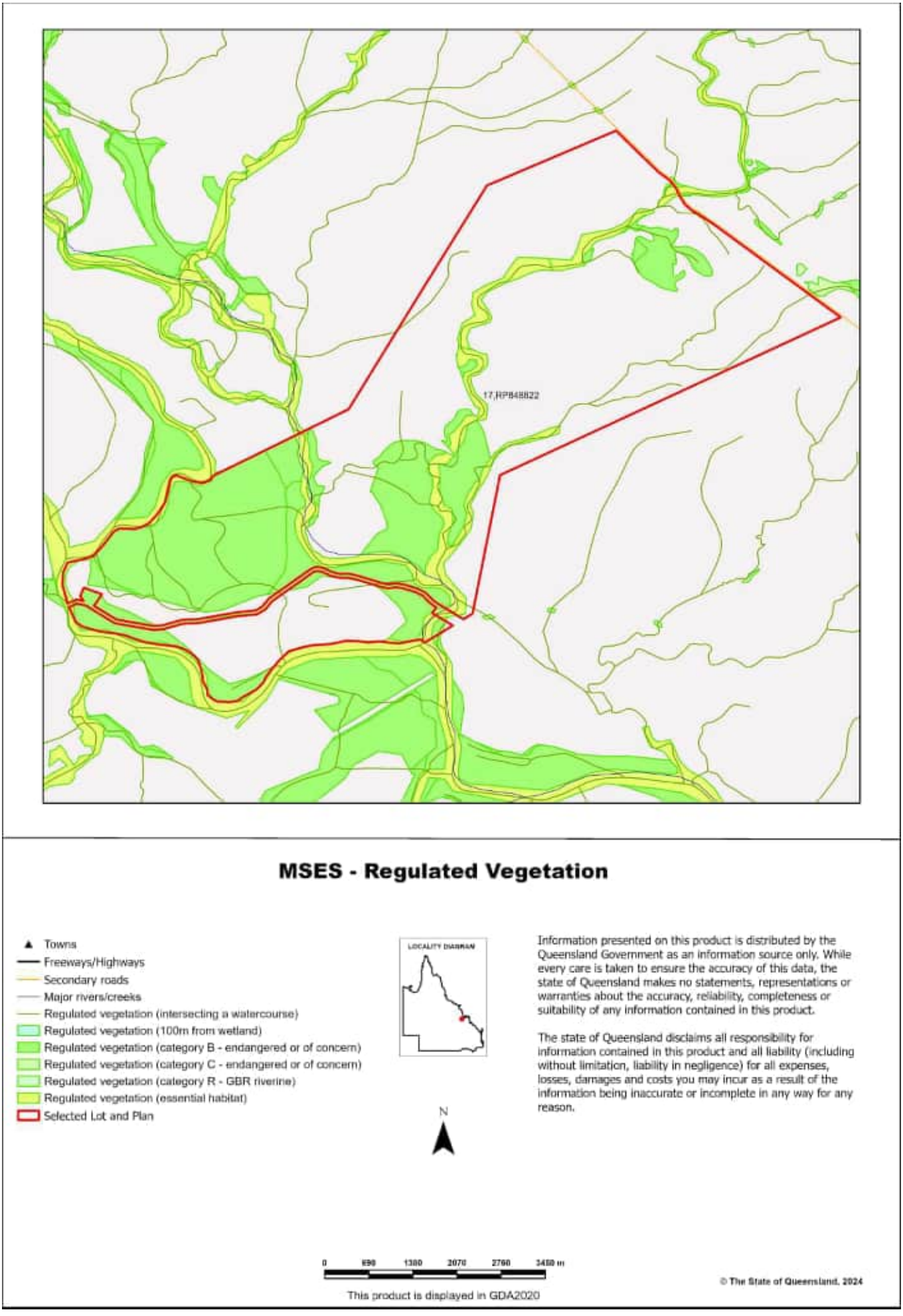
Map 3b - MSES - Species - Koala habitat area (SEQ)



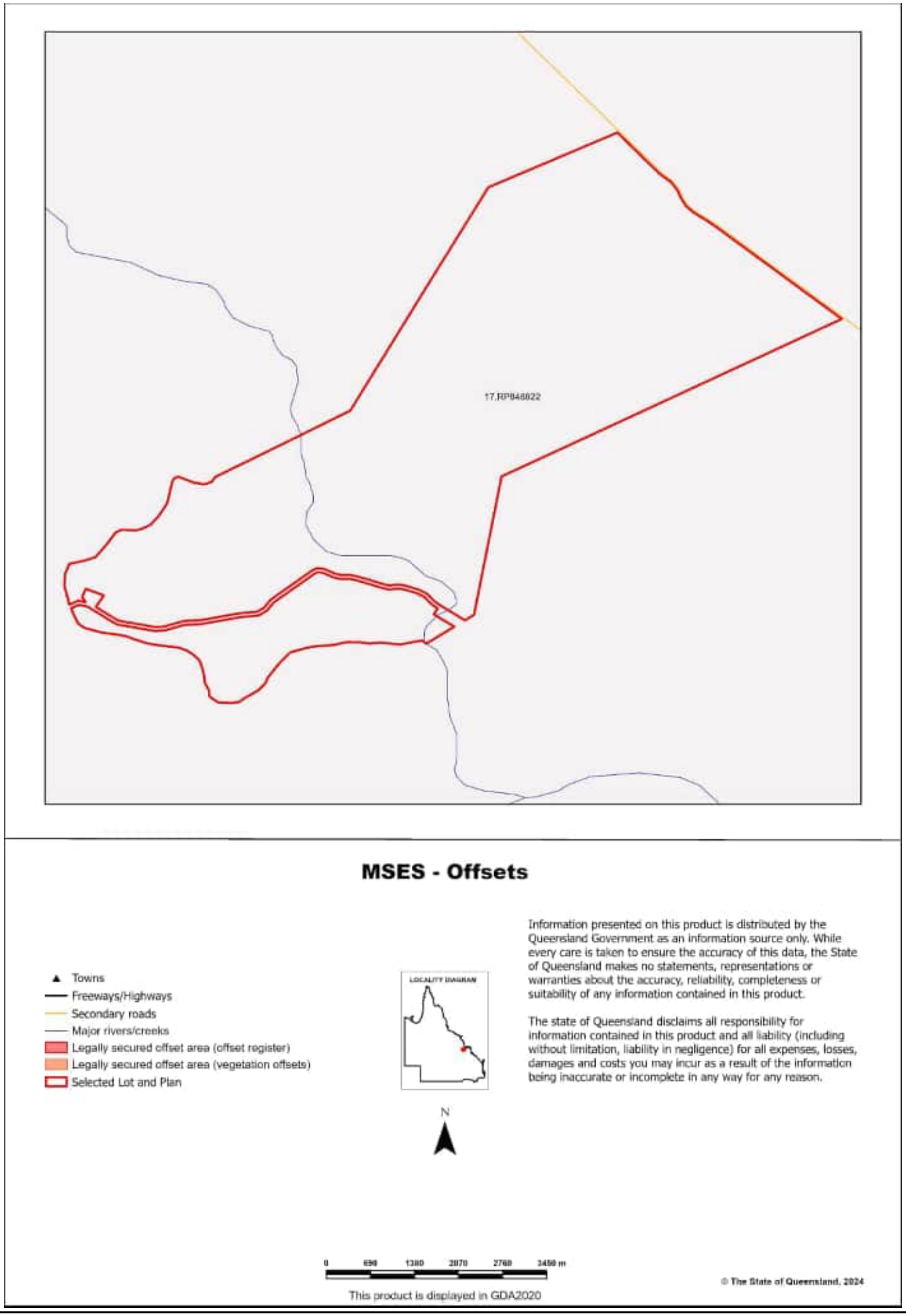
Map 3c - MSES - Species - Wildlife habitat (sea turtle nesting areas)



Map 4 - MSES - Regulated Vegetation



Map 5 - MSES - Offset Areas



Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). Its primary purpose is to support implementation of the SPP biodiversity policy.

MSES mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations.

MSES mapping does not determine whether state or local development assessment is required. For state assessment triggers refer to the Development Assessment Mapping System (DAMS). For local assessment triggers, refer to the relevant local planning scheme.

The Queensland Government's "Method for mapping - matters of state environmental significance can be downloaded from:

http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html .

Appendix 2 - Source Data

The datasets listed below are available on request from:

http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

- Matters of State environmental significance

Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	**current QSpatial data (http://qspatial.information.qld.gov.au)**
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DESI	- Department of Environment, Science and Innovation
EP Act	- Environmental Protection Act 1994
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- Nature Conservation Act 1992
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- Vegetation Management Act 1999

8.0 Appendix B

Fauna and Flora list

Species Name	Common Name	NC Act Listing	EPBC Act Listing
Birds			
Anthus novaeseelandiae	Australasian Pipit	LC	LC
Aprosmictus erythropterus	Red-winged Parrot	LC	LC
Ardeotis australis	Australian Bustard	LC	LC
Cacatua galerita	Sulphur-crested Cockatoo	LC	LC
Centropus phasianinus	Pheasant Coucal	LC	LC
Chenonetta jubata	Australian Wood Duck	LC	LC
Coracina novaehollandiae	Black-faced Cuckoo-shrike	LC	LC
Cormobates leucophaea	White-throated Treecreeper	LC	LC
Corvus orru	Torresian Crow	LC	LC
Cracticus tibicen	Australian Magpie	LC	LC
Cuculus optatus	Oriental Cuckoo	M	SL
Dacelo leachii	Blue-winged Kookaburra	LC	LC
Dacelo novaeguineae	Laughing Kookaburra	LC	LC
Dromaius novaehollandiae	Emu	LC	LC
Egretta novaehollandiae	White-faced Heron	LC	LC
Elseyornis melanops	Black-fronted Dotterel	LC	LC
Entomyzon cyanotis	Blue-faced Honeyeater	LC	LC
Eudynamys orientalis	Eastern Koel	LC	LC
Eurystomus orientalis	Dollarbird	LC	LC
Falco cenchroides	Nankeen Kestrel	LC	LC
Geopelia humeralis	Bar-shouldered Dove	LC	LC
Geophaps scripta	**Squatter Pigeon**	**V**	**V**
Gerygone albogularis	White-throated Gerygone	LC	LC

Species Name	Common Name	NC Act Listing	EPBC Act Listing
Grallina cyanoleuca	Magpie-lark	LC	LC
Haliastur sphenurus	Whistling Kite	LC	LC
Lichmera indistincta	Brown Honeyeater	LC	LC
Malurus elegans	Red-winged Fairy-wren	LC	LC
Manorina melanocephala	Noisy Miner	LC	LC
Merops ornatus	Rainbow Bee-eater	LC	LC
Myiagra cyanoleuca	Satin Flycatcher	M	SL
Ninox novaeseelandiae	Southern Boobook	LC	LC
Ocyphaps lophotes	Crested Pigeon	LC	LC
Pachycephala rufiventris	Rufous Whistler	LC	LC
Pandion cristatus	Eastern Osprey	LC	LC
Pardalotus striatus	Striated Pardalote	LC	LC
Pelecanus conspicillatus	Australian Pelican	LC	LC
Philemon corniculatus	Noisy Friarbird	LC	LC
Platycercus adscitus	Pale-headed Rosella	LC	LC
Podargus strigoides	Tawny Frogmouth	LC	LC
Pomatostomus superciliosus	White-browed Babbler	LC	LC
Rhipidura leucophrys	Willie Wagtail	LC	LC
Rhipidura rufifrons	Rufous Fantail	M	SL
Scythrops novaehollandiae	Channel-billed Cuckoo	LC	LC
Strepera graculina	Pied Currawong	LC	LC
Struthidea cinerea	Apostlebird	LC	LC
Tachybaptus novaehollandiae	Australasian Grebe	LC	LC
Taeniopygia bichenovii	Double-barred Finch	LC	LC

Species Name	Common Name	NC Act Listing	EPBC Act Listing
Threskiornis molucca	Australian White Ibis	LC	LC
Todiramphus macleayii	Forest Kingfisher	LC	LC
Trichoglossus haematodus	Rainbow Lorikeet	LC	LC
Tyto javanica	Eastern Barn Owl	LC	LC
Mammals			
Canis lupus scat	Dingo, Domestic Dog	LC	LC
Hydromys chrysogaster	Rakali / Water-rat	LC	LC
Macropus agilis	Agile Wallaby	LC	LC
Macropus giganteus	Eastern Grey Kangaroo	LC	LC
Petauroides volans	**Greater Glider**	**E**	**E**
Petaurus breviceps	Sugar Glider	LC	LC
Phascolarctos cinereus	**Koala**	**E**	**E**
Pteropus scapulatus	Little Red Flying-fox	LC	LC
Trichosurus vulpecula	Common Brushtail Possum	LC	LC
Reptiles			
Boiga irregularis	Brown Tree Snake	LC	LC
Carlia amax	Two-spined Rainbow Skink	LC	LC
Carlia rubigo	Orange-flanked rainbow-skink	LC	LC
Cryptoblepharus pulcher	Elegant Snake-eyed Skink	LC	LC
Gehyra dubia	Dubious Dtella	LC	LC
Lygisaurus foliorum	Tree-base Litter-Skink	LC	LC
Morelia spilota	Carpet Python	LC	LC
Oedura castelnaui	Northern Velvet Gecko	LC	LC

Species Name	Common Name	NC Act Listing	EPBC Act Listing
Pogona barbata	Eastern Bearded Dragon	LC	LC
Pseudonaja textilis	Eastern Brown Snake	LC	LC
Tropidonophis mairii	Keelback	LC	LC
Varanus tristis	Black-headed Monitor	LC	LC
Amphibians			
Crinia signifera	Clicking Froglet	LC	LC
Cyclorana alboguttata	Green-striped Burrowing Frog	LC	LC
Limnodynastes salmini	Salmon-striped Frog	LC	LC
Limnodynastes terraereginae	Scarlet-sided Pobblebonk	LC	LC
Litoria caerulea	Green Tree Frog	LC	LC
Litoria fallax	Eastern Sedge Frog	LC	LC
Litoria inermis	Bumpy Rocket Frog	LC	LC
Litoria latopalmata	Broad-palmed Rocket Frog	LC	LC
Litoria rothii	Roth's Tree Frog	LC	LC
Litoria rubella	Desert Tree Frog	LC	LC
Platyplectrum ornatum	Ornate Burrowing Frog	LC	LC
Table key: LC – Least Concern, M – Migratory, SL – Special Least Concern, V -Vulnerable, E – Endangered			

Species Name	Common Name
Acacia bidwillii	Corkwood wattle
Acacia harpophylla	Brigalow
Acacia salicina	Sally Wattle
Acacia stenophylla	Shoestring Acacia
Achyranthes aspera	Washermans Plant
Alectryon diversifolius	Holly bush
Alectryon oleifolius	Boonaree
Alphitonia excelsa	Soap ash
Alstonia constricta	Bitter bark
Apophyllum anomalum	Warrior bush
Aristida calycina	Dark wiregrass
Atalaya hemiglauca	Whitewood
Bothriochloa bladhii	Forest Blue Grass
Bothriochloa decipiens var. decipiens	Pitted Bluegrass
Bothriochloa ewartiana	Desert Bluegrass
Bothriochloa petusa	Indian Bluegrass
Brachychiton rupestris	Bottletree
Bursaria incana	Mock Orange
Calotis sp.	Burr-Daisies
Capparis arborea	Native Pomegranate
Carissa ovata	Conkerberry
Cassia brewsteri	Leichardt bean
Cassytha filiformis	Dodder laurel
Casuarina cunninghamiana	River Sheoak
Cenchrus ciliaris	Buffel grass
Chrysopogon fallax	Golden Beard grass
Corymbia tessellaris	Moreton Bay Ash
Cryptostegia grandiflora	Rubber vine
Cymbopogon bombycinus	Citronella grass
Cynodon sp.	Couch grass
Cyperus difformis	Rice sedge
Cyperus exaltatus	Tall Flat-Sedge
Denhamia cunninghami	Yellow Berry Bush

Species Name	Common Name
Dianella longifolia	Blueberry Lily
Digitaria brownii	Cotton Panic-Grass
Einadia nutans	Climbing Saltbush
Eleocharis pallens	Pale Spike-Rush
Enchylaena tomentosa	Ruby Saltbush
Enteropogon acicularis	Spider Grass
Enteropogon ramosus	Umbrella Grass
Eragrostis sp.	Love Grasses
Eriachne mucronata	Mountain Wanderrie grass
Erythroxylon australe	Dogwood
Eucalyptus camaldulensis	River Red Gum
Eucalyptus coolabah	Coolibah
Eucalyptus crebra	Narrow-leaved Ironbark
Eucalyptus populnea	Poplar Box
Eustrephus latifolius	Wombat Berry
Ficus coronata	Sandpaper Fig
Ficus obliqua	Small-leaved Fig
Flindersia australis	Crows Ash
Geijera parviflora	Wilga
Grewia latifolia	Dysentery Plant
Grewia retusifolia	Emu-Berry
Harrisa martinii	Moonlight Cactus
Heteropogon contortus	Black Speargrass
Jasminum didymum subsp lineare	Wild Jasmine
Juncus usitatus	Common rush
Lantana camara	Lantana
Leptochloa digitaria	Umbrella Cane-Grass
Leucaena leucocephala subsp. leucocephala	Lead Tree
Lomandra longifolia	Spiny-Headed Mat-Rush
Lysiphyllum carronii	Red Bauhinia
Lysiphyllum hookeri	White Bauhinia
Malvastrum americanum	Malvastrum
Marsilea drummondii	Nardoo

Species Name	Common Name
Megathyrsus maximus var. pubiglumis	Guinea Grass
Melaleuca bracteata	Black Tea Tree
Melaleuca nervosa	Paperbark
Melaleuca trichostachya	Narrow-Leaf Honey-Myrtle
Melinis repens	Red Natal Grass
Neptunia gracilis	Low Sensitive Plant
Opuntia tomentosa	Velvet Pear
Panicum effusum	Hairy Panic
Panicum queenslandicum	Coolibah Grass
Parkinsonia aculeata	Jerusalem Thorn
Parthenium hysterophorus	Parthenium
Paspalidium caespitosum	Brigalow grass
Passiflora aurantia var. aurantia	Blunt-Leaved Passionfruit
Petalostigma pubescens	Quinine bush
Plectranthus sp.	Plectranthus
Pterocaulon sphacelatum	Fruit Salad Plant
Santalum lanceolatum	Northern Sandalwood
Schizachyrium fragile	Firegrass
Sesbania cannabina	Yellow Bush pea
Sida cordifolia	Flannel weed
Sida rhombifolia	Common sida
Sporobolus caroli	Fairy Grass
Stylosanthes scabra	Stylo
Terminalia oblongata	Rosewood
Themeda triandra	Kangaroo grass
Vachellia farnesiana	Sweet Acacia
Xanthium occidentale	Noogoora Burr

9.0 Appendix C

BioCondition Site Results

Survey ID	Clements Creek 2	**Site ID:**	Cbc1	
Sample Round	1	**Date:**	21.11.24	
Orientation:	125	**Observers**	JK LH	
Coordinates:		**Site type**	Bioc	
		Slope (%)	5	
RE Code	11.3.25	**RE Condition**	**Rem**	**Site Photo**
Soil Type:	Clay	**Aspect (°):**		
Topography:	Watercourse			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU2**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	20 30	22	2 - 20%	Eucalyptus camaldulensis	D
				Eucalyptus coolabah (coolibah)	S
T2	10 15	13	2 - 20%	Melaleuca trichostachya	D
T3					
S1	0.5 5	3	0.2 - 2%	Melaleuca trichostachya	D
S2					
G	0 0.5		50 - 80%	Chrysopogon fallax	

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	12.7	12.7	T1	80.2	80.4	0.2	S1
13.2	21.9	8.7	T2	21.3	22.2	0.9	S1
36.3	37.2	0.9	T2	20.4	20.7	0.3	S1
43.2	53.6	10.4	T2	65.3	65.7	0.4	S1
69	71.5	2.5	T2	51.2	53.8	2.6	S1
78.4	100	21.6	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	34.3	**Total T2 (%)**	22.5	**Total TE(%)**	0	**Total S (%)**	**4.4**

Site ID:	Cbc1

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1			Yes	Y		Lomandra longifolia	5 - 25%	Native Forb / Other
Eucalyptus camaldulensis	T1			Yes	Y		Melaleuca trichostachya	<5% - commo	Shrub
Melaleuca trichostachya	T2			Yes	N		Xanthium occidentale	<5% - rare	Exotic Other
Casuarina cunninghamiana	T2			Yes	N		Juncus sp.	<5% - rare	Native Forb / Other
							Cyperus sp.	<5% - rare	Native Forb / Other
							Bothriochloa ewartiana	<5% - rare	Native Grass
							Chrysopogon fallax	<5% - rare	Native Grass
							Cymbopogon bombycinus	<5% - rare	Native Grass
							Dianella longifolia	<5% - rare	Native Forb / Other
							Schizachyrium fragile	<5% - rare	Native Grass

Species Richness in 50m x 10m plot			Photo No.								
Native Tree	4		Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native Shrub	1		Native perennial grass	80	75	60	50	90	71	
Native Grass	4		Native other grass	0	0	0	0	0	0	
Forbs / Other	4		Native forb & other	0	0	0	0	0	0	
Total Non-native (%)	0		Native shrub (<1m)	0	0	0	0	0	0	
Coarse Woody Debris	210		Exotic grass	0	0	0	0	0	0	
Large Trees	**Benchma**	**Total**	Exotic forb & other	0	0	0	0	0	0	
Eucs	53	5	Leaf & stick litter	20	25	40	50	10	29	
Non-Eucs	26	22	Rocks	0	0	0	0	0	0	
			Bare ground	0	0	0	0	0	0	
			Cryptogams	0	0	0	0	0	0	
			Total	100	100	100	100	100	100	

Braun Blanquet Cover Classes	
1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Plot Disturbance		Fire damage:	
Clearing (inc. logging):		Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	cattle, pigs
Stock grazing:		Other:	

Survey ID	Clements Creek 2	**Site ID:**	S1	**Site Photo**
Sample Round	1	**Date:**	21.11.24	
Orientation:	295	**Observers**	JK LH	
Coordinates:		**Site type**		
		Slope (%)	10	
RE Code	11.3.27f	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Watercourse			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU3**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	5 20	15	20 - 50%	Eucalyptus camaldulensis	A
				Eucalyptus coolabah (coolibah)	D
T2					
T3					
S1	0.5 2		0.2 - 2%	Eucalyptus coolabah (coolibah)	D
				Eucalyptus camaldulensis	A
S2					
G	0 0.5		0.2 - 2%		

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	12.9	12.9	T1	87.3	87.4	0.1	S1
13.4	17.8	4.4	T1	56.4	56.6	0.2	S1
18	21.6	3.6	T1	55.1	55.2	0.1	S1
23.9	32.9	9	T1	42.2	43.3	1.1	S1
34.5	43.1	8.6	T1	40	40.1	0.1	S1
49.6	65.5	15.9	T1	39.2	39.4	0.2	S1
72.3	81.4	9.1	T1	38.7	38.9	0.2	S1
92	100	8	T1	37.3	37.6	0.3	S1
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	71.5	**Total T2 (%)**	0	**Total TE(%)**	0	**Total S (%)**	**2.3**

| Site ID: | S1 | | |

Survey ID	Clements Creek 2	**Site ID:**	CBC3	**Site Photo**
Sample Round	1	**Date:**	21.11.24	
Orientation:	120	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	3	
RE Code	11.3.1	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU1**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	15 20	17	20 - 50%	Acacia harpophylla	D
				Eucalyptus coolabah (coolibah)	A
T2	3 10	7	2 - 20%	Lysiphyllum hookeri	D
				Acacia harpophylla	A
				Eucalyptus coolabah (coolibah)	A
T3					
S1					
S1	0.5...2		0.2 - 2%	Lysiphyllum hookeri	D
				Acacia harpophylla	A
				Alectryon diversifolius	A
G	0.5		0.2 - 2%	Paspalidium caespitosum	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
3.7	9.4	5.7	T1	94	100	6	S1
9.6	13.5	3.9	T1	89.4	90.6	1.2	S1
13.8	17	3.2	T1	80.6	81.9	1.3	S1
18.4	22.6	4.2	T1	71.5	79.5	8	S1
23.3	24.9	1.6	T1	68.7	70.5	1.8	S1
26.2	34.9	8.7	T1	58	59.4	1.4	S1
44.5	50	5.5	T1	53	53.4	0.4	S1
50.4	52	1.6	T1	37.6	38.8	1.2	S1
54.2	56.2	2	T2	35.5	36.4	0.9	S1
56.5	66.3	9.8	T1	33	34	1	S1
67.8	73.5	5.7	T1	15.5	16	0.5	S1
75	80.8	5.8	T1			0	
82	91	9	T1			0	
92	100	8	T1			0	
		0				0	
		0				0	
Total T1 (%)	72.7	**Total T2 (%)**	2	**Total TE(%)**	0	**Total S (%)**	**23.7**

Site ID:	CBC3

Tree Species	Strata			Rec.	KHT	
Acacia harpophylla	T1	T2		Yes	N	
Lysiphyllum hookeri	T1	T2		Yes	N	
Eucalyptus coolabah (coolibah)	T1	T2		Yes	Y	
Eucalyptus crebra (narrow leaved ironbark)	T1			yes	y	

Shrubs and Ground	Cover	Strata
Alectryon diversifolius	<5% - rare	Shrub
Paspalidium caespitosum	5 - 25%	Native Grass
Aristida calycina	<5% - rare	Native Grass
digitaria brownii	<5% - rare	Native Grass
Terminalia oblongata	<5% - rare	Shrub
Cenchrus ciliaris	<5% - rare	Exotic Grass
Capparis arborea	<5% - rare	Shrub
harrisia martinii	<5% - commo	Exotic Other
Plectranthus sp.	<5% - commo	ative Forb / Oth
Ficus obliqua	<5% - rare	Shrub
Carissa ovata	<5% - rare	Shrub
Santalum lanceolatum	<5% - rare	Shrub
Jasminum didymum subsp lineare	<5% - rare	ative Forb / Oth
Chrysopogon fallax	<5% - rare	Native Grass
Atalaya hemiglauca (whitewood)	<5% - rare	Shrub
Geijera parviflora	<5% - rare	Shrub
Apophyllum anomalum (warrior bush)	<5% - rare	Shrub
Sida cordifolia	<5% - rare	Exotic Other
Enteropogon acicularis	<5% - rare	Native Grass
Opuntia tomentosa	<5% - rare	Exotic Other
Sida rhombifolia (common sida*)	<5% - rare	ative Forb / Oth
Lysiphyllum carronii (red bauhinia)	<5% - rare	Shrub
Lysiphyllum hookeri (white bauhinia)	<5% - rare	Shrub
sporobolus caroli	<5% - commo	Native Grass

Species Richness in 50m x 10m plot		
Native Tree	4	
Native Shrub	11	
Native Grass	6	
Forbs / Other	3	
Total Non-native (%)	0.6	
Coarse Woody Debris	650	
Large Trees	**Benchmark**	**Total**
Eucs		
Non-Eucs	30	11

Braun Blanquet Cover Classes	
1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.							
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	30	60	30	60	10	38	
Native other grass	0	0	0	0	0	0	
Native forb & other	0	5	0	0	0	1	
Native shrub (<1m)	0	10	0	0	0	2	
Exotic grass	0	0	0	0	0	0	
Exotic forb & other	0	0	1	1	1	0.6	
Leaf & stick litter	70	25	59	29	80	52.6	
Rocks	0	0	0	0	0	0	
Bare ground	0	0	10	10	9	5.8	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance			
Clearing (inc. logging):		Fire damage:	
Cultivation (inc. pasture):		Storm damage:	
Soil erosion:		Trampling:	
Firewood collection:		Flood damage:	
Stock grazing:		Feral herbivores:	trampling cattle and pigs
		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC4	**Site Photo**
Sample Round	1	**Date:**	21.11.24	
Orientation:		**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	2	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Very tall		
AU	**AU4**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	20 30	22	2 - 20%	Eucalyptus coolabah (coolibah)	D
				Eucalyptus camaldulensis	C
T2	8 10	10			
				Melaleuca trichostachya	D
T3					
S1	0.5 3	2		Lysiphyllum hookeri	D
S2					
G					

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	9	9	T1	85	85.6	0.6	S1
11	16.5	5.5	T1	73	73.7	0.7	S1
17	22.3	5.3	T1	56	56.5	0.5	S1
23	38.9	15.9	T1	54.8	55.2	0.4	S1
41	45	4	T1	44	44.5	0.5	S1
48	55	7	T1	36.4	36.8	0.4	S1
56	74	18	T1	17	17.1	0.1	S1
75.5	82	6.5	T2			0	
97	100	3	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	67.7	**Total T2 (%)**	6.5	**Total TE(%)**	0	**Total S (%)**	**3.2**

| Site ID: | CBC4 | | |

Survey ID	Clements Creek 2	**Site ID:**	CBC5	**Site Photo**
Sample Round	1	**Date:**	21.11.24	
Orientation:	20	**Observers**	JK LH	
Coordinates:		**Site type**		
		Slope (%)	5	
RE Code	11.3.1	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**		
Vegetative Structure (formation):		Tall		
AU	**AU1**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	18 20	19	0.2 - 2%	Eucalyptus coolabah (coolibah)	D
T1	10 15	13	20 - 50%	Acacia harpophylla	D
				Lysiphyllum hookeri	A
T2					
T3					
S1	0.5 2	2	0.2 - 2%	Lysiphyllum hookeri (white bauhinia)	
				Acacia harpophylla	
S2					
G					
				Sporobolus caroli	S

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	19.7	19.7	T1	43.1	43.2	0.1	S1
23.7	32.9	9.2	T1	47	47.1	0.1	S1
34.2	46.7	12.5	Emergent			0	
46.7	50	3.3	T1			0	
50.5	56.6	6.1	T1			0	
59.1	66.6	7.5	T1			0	
67.6	89	21.4	T1			0	
90.7	96.7	6	T1			0	
98	100	2	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	75.2	**Total T2 (%)**	0	**Total TE(%)**	12.5	**Total S (%)**	**0.2**

| Site ID: | CBC5 | | |

Survey ID	Clements Creek 2	**Site ID:**	CBC6	**Site Photo**
Sample Round	1	**Date:**	21.11.24	
Orientation:	300	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	3	
RE Code	11.3.1	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**	**300**	
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU1**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	20 25	22	0.2 - 2%	Eucalyptus coolabah (coolibah)	D
T1	5 15	10	20 - 50%	Acacia harpophylla	D
				Lysiphyllum hookeri	A
T2	2 5	5	2 - 20%	Lysiphyllum hookeri	D
				Acacia harpophylla	A
T3					
S1	0.5 2	2	2 - 20%	Lysiphyllum hookeri	D
				Acacia harpophylla	A
				Terminalia oblongata	A
S2					
G	0 0.5		20 - 50%	Sida	A
				Paspalidium	

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	5.4	5.4	T1	88.3	90.8	2.5	S1
5.9	12	6.1	T1	67	68.5	1.5	S1
13.4	16.5	3.1	T1	58.2	60	1.8	S1
18.7	33.3	14.6	Emergent	42.3	44.1	1.8	S1
34.4	41.7	7.3	T1	32.8	33.6	0.8	S1
42.1	46.3	4.2	T1	26.4	28.4	2	S1
48	53.7	5.7	T1	17	17.5	0.5	S1
61.6	70.2	8.6	T2	10.5	12.5	2	S1
70.2	72.6	2.4	T1	2	2.7	0.7	S1
79.5	87.2	7.7	T1			0	
90.7	95.6	4.9	T2			0	
98	100	2	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	43.9	**Total T2 (%)**	13.5	**Total TE(%)**	14.6	**Total S (%)**	**13.6**

Site ID:	CBC6

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	Emergent			No	Y		Acacia harpophylla	<5% - rare	Shrub
Acacia harpophylla	T1			Yes	N		Lysiphyllum hookeri	5 - 25%	Shrub
Acacia harpophylla	T2			Yes	N		Sida sp.	<5% - rare	Native Forb / Other
Lysiphyllum hookeri	T1			Yes	N		Paspalidium caespitosum	5 - 25%	Native Grass
Lysiphyllum hookeri (white bauhinia)	T2			Yes	N		Terminalia oblongata	<5% - rare	Shrub
Allocasuarina cristata	Emergent			No	N		Enchylaena tomentosa	<5% - rare	Native Forb / Other
							Alectryon diversifolius	<5% - commo	Native Forb / Other
							Harrisia martinii	<5% - rare	Exotic Other
							Capparis arborea	<5% - rare	Shrub
							Opuntia sp.	<5% - rare	Exotic Other
							Sporobolus caroli	<5% - rare	Native Grass
							Erythroxylon australe (dogwood)	<5% - rare	Shrub
							Einadia nutans	<5% - rare	Native Forb / Other
							Jasminum didymum subsp lineare	<5% - rare	Native Forb / Other
							Cenchrus ciliaris	<5% - rare	Exotic Grass
							Eragrostis sp.	<5% - rare	Native Forb / Other
							Chrysopogon fallax	<5% - rare	Native Grass
							Eriachne mucronata	<5% - rare	Native Grass
							Atalaya hemiglauca (whitewood)	<5% - rare	Shrub

Species Richness in 50m x 10m plot			Photo No.							
Native Tree	6		Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native Shrub	6		Native perennial grass	70	30	5	5	30	28	
Native Grass	4		Native other grass	0	0	0	0	0	0	
Forbs / Other	6		Native forb & other	5	1	25	0	1	6.4	
Total Non-native	0		Native shrub (<1m)	0	10	0	0	0	2	
Coarse Woody De	780		Exotic grass	0	0	0	0	0	0	
Large Trees	**Benchmark**	**Total**	Exotic forb & other	0	0	0	0	0	0	
Eucs			Leaf & stick litter	20	54	60	80	64	55.6	
Non-Eucs	30	3	Rocks	0	0	0	0	0	0	
Braun Blanquet Cover Classes			Bare ground	5	5	10	15	5	8	
			Cryptogams	0	0	0	0	0	0	
1	<5% - rare		Total	100	100	100	100	100	100	
2	<5% - common		Plot Disturbance				Fire damage:			
3	5 - 25%		Clearing (inc. logging):				Storm damage:			
4	25 - 50%		Cultivation (inc. pasture):				Trampling:			
5	50 - 75%		Soil erosion:				Flood damage:		pigs and cattle, tracks and scats	
6	75 - 100%		Firewood collection:				Feral herbivores:			
			Stock grazing:				Other:			

Survey ID	Clements Creek 2	**Site ID:**	CBC07	**Site Photo**
Sample Round	1	**Date:**	20.11.24	
Orientation:	North	**Observers**	nnico Kelk, Laura Harr	
Coordinates:		**Site type**	bio cin	
		Slope (%)	3	
RE Code	11.3.1	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**	**15**	
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Mid-high		
AU1	**AU1**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	12 20	16	0.2 - 2%	Acacia harpophylla	D
			0.2 - 2%	Eucalyptus coolabah	A
T1	6 12	9	20 - 50%	acacia harp	D
			0.2 - 2%	Terminalia oblongata	S
			0.2 - 2%	Lysiphyllum hookeri	A
T2					
T3					
S1	0.5 2	2		Acacia harpophylla (brigalow)	S
				Terminalia oblongata (yellowwood)	D
				Lysiphyllum hookeri	S
S2					
G			20 - 50%	Paspalidium caespitosum	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover l = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0.1	4.6	4.5	T1			0	
4.7	16.8	12.1	T1			0	
17.7	24.7	7	T1			0	
27.8	32.1	4.3	T1			0	
33.2	37.4	4.2	T1			0	
41.5	46.1	4.6	Emergent			0	
47.2	54.3	7.1	T1			0	
55	58.7	3.7	Emergent			0	
58.4	64.1	5.7	T1			0	
65.4	69.4	4	T1			0	
70.2	73.6	3.4	T1			0	
74.8	79.6	4.8	T1			0	
45.6	50	4.4	T1			0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	61.5	**Total T2 (%)**	0	**Total TE(%)**	8.3	**Total S (%)**	**0**

Site ID:	CBC07								
Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Acacia harpophylla (brigalow)	Emergent			Yes			Terminalia oblongata	<5% - commo	Shrub
Lysiphyllum hookeri	T1			Yes			Acacia harpophylla (brigalow)	<5% - commo	Shrub
Acacia harpophylla	T1			Yes			Lysiphyllum hookeri (white bauhinia)	<5% - commo	Shrub
Acacia salicina (sally wattle)	T1			Yes			Lysiphyllum carronii (red bauhinia)	<5% - rare	Shrub
Eucalyptus coolabah (coolibah)	Emergent			Yes	y	hollows	Alectryon diversifolius	<5% - rare	Shrub
							Geijera parviflora (wilga)	<5% - rare	Shrub
							Capparis arborea	<5% - rare	Shrub
							Paspalidium caespitosum	25 - 50%	Native Grass
							Sporobolus caroli	5 - 25%	Native Grass
							digitaria brownii	5 - 25%	Native Grass
							Enchylaena tomentosa (ruby saltbush)	<5% - rare	ative Forb / Oth
							Sida sp.	<5% - rare	ative Forb / Oth
							Harrisa martini	<5% - rare	Exotic Other
							Enteropogon ramosus	<5% - rare	Native Grass

Species Richness in 50m x 10m plot			Photo No.							
Native Tree	5		Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native Shrub	7		Native perennial grass	60	40	50	55	15	44	
Native Grass	4		Native other grass	0	0	0	0	0	0	
Forbs / Other	2		Native forb & other	1	1	1	5	10	3.6	
Total Non-native (%)	0.2		Native shrub (<1m)	0	0	0	0	0	0	
Coarse Woody Debris	810		Exotic grass	0	0	0	0	0	0	
Large Trees	**Benchmark**	**Total**	Exotic forb & other	0	0	0	0	1	0.2	
Eucs	53	1	Leaf & stick litter	34	59	0	40	74	41.4	
Non-Eucs	30	4	Rocks	0	0	49	0	0	9.8	
			Bare ground	5	0	0	0	0	1	
			Cryptogams	0	0	0	0	0	0	
			Total	100	100	100	100	100	100	
			Plot Disturbance	harrisia			Fire damage:			
			Clearing (inc. logging):				Storm damage:			
			Cultivation (inc. pasture):				Trampling:			
			Soil erosion:				Flood damage:			
			Firewood collection:				Feral herbivores:		gs. small wallows and s	
			Stock grazing:				Other:			

Braun Blanquet Cover Classes

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Survey ID	Clements Creek 2	**Site ID:**	CBC8	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	100	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	1	
RE Code	11.3.1	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU1**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	20 25	23	0.2 - 2%	Eucalyptus camaldulensis	D
T1	8 15	11	2 - 20%	Acacia harpophylla (brigalow)	D
				Lysiphyllum hookeri	A
T2					
T3					
S1	0.5 2	2	0.2 - 2%	Lysiphyllum hookeri	C
				Alectryon diversifolius	D
S2					
G	0 0.5		2 - 20%	Paspalidium caespitosum	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	0.5	0.5	T1	76.9	77.8	0.9	S1
6.9	22	15.1	T1	76	76.5	0.5	S1
22.5	29	6.5	T1	66.8	67.6	0.8	S1
31.5	40	8.5	T1	62.4	64.2	1.8	S1
40	48.1	8.1	Emergent	43.8	45.6	1.8	S1
48.2	61	12.8	T1	33	33.3	0.3	S1
61.5	66	4.5	T1			0	
66	74	8	Emergent			0	
74	82.1	8.1	T1			0	
82.9	88.5	5.6	T1			0	
89.8	95.3	5.5	T1			0	
95.8	98	2.2	T1			0	
99.5	100	0.5	T1			0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	69.8	**Total T2 (%)**	0	**Total TE(%)**	16.1	**Total S (%)**	**6.1**

Site ID:	CBC8

Tree Species	Strata	Rec.	KHT	Shrubs and Ground	Cover	Strata
Acacia harpophylla (brigalow)	T1	Yes	N	Lysiphyllum hookeri	<5% - commo	Shrub
Eucalyptus camaldulensis	Emer T1	Yes	Y	Alectryon diversifolius	5 - 25%	Shrub
Lysiphyllum hookeri	T1	Yes	N	Paspalidium caespitosum	5 - 25%	Native Grass
bottletree	Emergent	No	N	Petalostigma pubescens (quinine bush)	<5% - rare	Shrub
Casuarina cunninghamiana	T1	Yes	N	Apophyllum anomalum (warrior bush)	<5% - rare	Shrub
				Harrisia martinii	<5% - rare	Exotic Other
				Flindersia australis (crows ash)	<5% - rare	Shrub
				Terminalia oblongata	<5% - rare	Shrub
				Ficus sp.	<5% - rare	Shrub
				Carissa ovata	<5% - commo	Shrub
				Stylosanthes scabra*	<5% - rare	Exotic Other
				Sida rhombifolia (common sida*)	<5% - rare	ative Forb / Oth
				Enteropogon ramosus	<5% - commo	Native Grass
				Chrysopogon fallax	<5% - rare	Native Grass
				Schizachyrium fragile	<5% - rare	Native Grass
				Capparis arborea	<5% - rare	ative Forb / Oth
				Bursaria incana	<5% - rare	Shrub
				Enchylaena tomentosa (ruby saltbush)	<5% - rare	ative Forb / Oth
				Sporobolus caroli	<5% - rare	Native Grass
				Sida cordifolia (flannel weed*)	<5% - rare	Exotic Other
				Alectryon oleifolius	<5% - rare	Shrub

Species Richness in 50m x 10m plot		
Native Tree	5	
Native Shrub	10	
Native Grass	5	
Forbs / Other	3	
Total Non-native (%)	0	
Coarse Woody Debris	590	
Large Trees	**Benchmark**	**Total**
Eucs		
Non-Eucs	30	

Braun Blanquet Cover Classes

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.

Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average
Native perennial grass	20	30	0	10	0	12
Native other grass	0	0	0	0	0	0
Native forb & other	0	0	0	0	0	0
Native shrub (<1m)	0	0	0	0	0	0
Exotic grass	0	0	0	0	0	0
Exotic forb & other	0	0	0	0	0	0
Leaf & stick litter	80	70	100	90	100	88
Rocks	0	0	0	0	0	0
Bare ground	0	0	0	0	0	0
Cryptogams	0	0	0	0	0	0
Total	100	100	100	100	100	100

Plot Disturbance		Fire damage:	
Clearing (inc. logging):		Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	
Stock grazing:		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC9 spot moved	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	240	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU4**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	20 35	25	2 - 20%	Eucalyptus coolabah (coolibah)	D
T2	5 15	10	2 - 20%	Eucalyptus coolabah (coolibah)	D
T3					
S1	0.5 2	2	2 - 20%	Terminalia oblongata	D
				hookeri	C
S2					
G	0 0.5		2 - 20%		

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	11.4	11.4	T1	83	83.1	0.1	S1
14.3	50	35.7	T1	80.5	80.6	0.1	S1
55	65	10	T2	67.6	67.7	0.1	S1
74	83	9	T1	65	65.4	0.4	S1
94	100	6	T2	38.1	38.2	0.1	S1
		0		9	9.5	0.5	S1
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	56.1	**Total T2 (%)**	16	**Total TE(%)**	0	**Total S (%)**	**1.3**

Site ID:	CBC9 spot moved

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1	T2		Yes	Y		Terminalia oblongata	<5% - commo	Shrub
Acacia harpophylla	T2			Yes	N		Parkinsonia aculeata	<5% - rare	Shrub
Terminalia oblongata	T2			Yes	N		Acacia harpophylla (brigalow)	<5% - rare	Shrub
							Bothriochloa petusa	<5% - commo	Exotic Grass
							Juncus usitatus	<5% - rare	Native Forb / Other
							Melaleuca trichostachya	<5% - rare	Shrub
							Alectryon diversifolius (holly bush)	<5% - rare	Shrub
							Harrisia martinii	<5% - rare	Exotic Other
							Schizachyrium sp.	<5% - commo	Native Grass
							Marsilea drummondii	<5% - rare	Native Forb / Other
							Cassytha filiformis (dodder laurel)	<5% - rare	Native Forb / Other
							Paspalidium caespitosum	<5% - rare	Native Grass
							Sida cordifolia	<5% - rare	Exotic Other
							Parthenium hysterophorus	<5% - rare	Exotic Other
							Apophyllum anomalum (warrior bush)	<5% - rare	Native Forb / Other
							Chrysopogon fallax	<5% - rare	Native Grass
							Panicum effusum	<5% - rare	Native Grass
							Sporobolus caroli	<5% - rare	Native Grass
							Jasminum didymum subsp lineare	<5% - rare	Native Forb / Other
							Passiflora aurantia var. aurantia	<5% - rare	Exotic Other
							Paspolidium sp.	<5% - rare	Native Grass
							Acacia sp.	<5% - rare	Native Forb / Other
							Cyperus sp.	<5% - rare	Native Forb / Other
							Lomandra longifolia	<5% - rare	Native Forb / Other
							Cryptostegia grandiflora	<5% - rare	Exotic Other
							Achyranthes aspera	<5% - rare	Native Forb / Other

Species Richness in 50m x 10m plot		
Native Tree	3	
Native Shrub	5	
Native Grass	6	
Forbs / Other	9	
Total Non-native (%)	0	
Coarse Woody Debris	230	
Large Trees	**Benchmark**	**Total**
Eucs	45	3
Non-Eucs		

Braun Blanquet Cover Classes

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.

Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	100	40	30	0	10	36	
Native other grass	0	0	0	0	0	0	
Native forb & other	0	1	5	40	40	17.2	
Native shrub (<1m)	0	0	0	0	0	0	
Exotic grass	0	0	0	0	0	0	
Exotic forb & other	0	0	0	0	0	0	
Leaf & stick litter	0	30	35	30	25	24	
Rocks	0	0	0	0	0	0	
Bare ground	0	29	30	30	25	22.8	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance		Fire damage:	
Clearing (inc. logging):		Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	cattle and pig damage
Stock grazing:		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC10	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	125	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU5**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	12 25	18	2 - 20%	Eucalyptus coolabah (coolibah)	D
T2	4 12	10	0.2 - 2%	Eucalyptus coolabah (coolibah)	D
T3					
S1	0.5 2	2	0.2 - 2%	Enchylaena tomentosa (ruby saltbush)	
S2					
G		0 0.5	2 - 20%		

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	3	3	T1	73	73.1	0.1	S1
3.8	9	5.2	T1	56.5	58	1.5	S1
11.4	24	12.6	T1	46	46.2	0.2	S1
24.5	33.6	9.1	T1	12.3	12.5	0.2	S1
35.6	37.2	1.6	T2			0	
37.5	46	8.5	T1			0	
46.5	49	2.5	T1			0	
57	59	2	T1			0	
61.6	74.5	12.9	T1			0	
75.5	82	6.5	T1			0	
92.5	100	7.5	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	69.8	**Total T2 (%)**	1.6	**Total TE(%)**	0	**Total S (%)**	**2**

Site ID:	CBC10

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1			Yes	Y		Parkinsonia aculeata	<5% - rare	Exotic Other
Acacia salicina	T1						Enchylaena tomentosa (ruby saltbush)	<5% - rare	Shrub
							Atalaya hemiglauca	<5% - commo	Shrub
							Schizachyrium fragile	5 - 25%	Native Grass
							Passiflora aurantia var. aurantia	<5% - rare	tic Other
							Bothriochloa petusa	5 - 25%	tic Grass
							Heteropogon contortus	<5% - rare	ve Grass
							Parthenium hysterophorus	<5% - rare	tic Other
							Sida cordifolia (flannel weed*)	<5% - rare	tic Other
							Sesbania cannabina	<5% - rare	tic Other
							Dianella longifolia	<5% - rare	Native Forb / Other
							Cenchrus ciliaris	<5% - rare	tic Grass
							digtaria brownii	<5% - rare	ve Grass
							Marsilea drummondii	<5% - rare	Forb / Other
							Sida sp.	<5% - rare	Native Forb / Other
							Chrysopogon fallax	<5% - rare	Native Grass
							Grewia latifolia	<5% - rare	Shrub
							Capparis arborea	<5% - rare	Shrub
							Achyranthes aspera	<5% - rare	Native Forb / Other
							Vachellia farnesiana		Exotic Other

Species Richness in 50m x 10m plot			Photo No.							
Native Tree	2		Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native Shrub	4		Native perennial grass	20	0	80	80	75	51	
Native Grass	4		Native other grass	0	50	0	0	0	10	
Forbs / Other	4		Native forb & other	1	1	5	1	1	1.8	
Total Non-native (%)	0		Native shrub (<1m)	0	0	0	0	0	0	
Coarse Woody Debris	95		Exotic grass	0	0	0	0	0	0	
Large Trees	**Benchm**	**Total**	Exotic forb & other	0	0	0	0	0	0	
Eucs	45	7	Leaf & stick litter	40	39	15	19	24	27.4	
Non-Eucs			Rocks	0	0	0	0	0	0	
			Bare ground	39	10	0	0	0	9.8	
			Cryptogams	0	0	0	0	0	0	
			Total	100	100	100	100	100	100	

Braun Blanquet Cover Classes	
1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Plot Disturbance			
Clearing (inc. logging):		Fire damage:	
Cultivation (inc. pasture):		Storm damage:	
Soil erosion:		Trampling:	
Firewood collection:		Flood damage:	
Stock grazing:		Feral herbivores:	
		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC11	**Site Photo**
Sample Round	1	**Date:**	24.11.24	
Orientation:	180	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	20	
RE Code	11.3.25	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Mid slope			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Very tall		
AU	**AU2**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	15 35	20	20 - 50%	Eucalyptus camaldulensis	D
T2	3 15	10	0.2 - 2%	Acacia salicina (sally wattle)	D
T3					
S1	0.5 2		0.2 - 2%		
S2					
G	0 0.5		2 - 20%	Cenchrus ciliaris	
			2 - 20%	Bothriochloa petusa	

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	6	6	T2	97	100	3	S1
0	17	17	T1	92	92.5	0.5	S1
18	56	38	T1	80	80.5	0.5	S1
57	61	4	T1	75	75.5	0.5	S1
77	78	1	T2	67	68	1	S1
78	83	5	T2	38.3	38.4	0.1	S1
75	83	8	T1	17.1	17.3	0.2	S1
94	100	6	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	73	**Total T2 (%)**	12	**Total TE(%)**	0	**Total S (%)**	**5.8**

Site ID:	CBC11

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1			Yes	Y		Schizachyrium fragile	<5% - commo	Native Grass
Acacia salicina (sally wattle)	T2			Yes	N		Lomandra longifolia	<5% - commo	ative Forb / Oth
Corymbia tessellaris	T1			Yes	N		Passiflora aurantia var. aurantia	<5% - commo	Exotic Other
Melaleuca trichostachya	T2			Yes	N		Lysiphyllum hookeri	<5% - commo	Shrub
Casuarina Cunningham	T2			Yes	N		Cenchrus ciliaris	5 - 25%	Exotic Grass
sandpaper fig	T2			Yes	N		Terminalia oblongata	<5% - rare	Shrub
Melaleuca nervosa	T2			Yes	N		Parkinsonia aculeata	<5% - rare	Exotic Other
Eucalyptus camaldulensis (river red gum)	T1			Yes	Y		Sida cordifolia (flannel weed*)	<5% - rare	Exotic Other
							Sida sp.	<5% - rare	ative Forb / Oth
							Parthenium hysterophorus	<5% - rare	Exotic Other
							Grewia latifolia	<5% - commo	Shrub
							Bothriochloa bladei	<5% - rare	Native Grass
							Megathyrsus maximus var. pubiglumis	<5% - commo	Exotic Grass
							Enchylaena tomentosa (ruby saltbush)	<5% - rare	ative Forb / Oth
							Native 'indigo forb' sp.	<5% - commo	ative Forb / Oth
							Vachellia farnesiana	<5% - rare	Exotic Other
							Alphitonia excelsa (soap ash)	<5% - rare	Shrub

Species Richness in 50m x 10m plot		
Native Tree	8	
Native Shrub	4	
Native Grass	2	
Forbs / Other	4	
Total Non-native (%)	35.6	
Coarse Woody Debris	170	
Large Trees	**Benchmark**	**Total**
Eucs	53	7
Non-Eucs	26	11

Braun Blanquet Cover Classes

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.							
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	40	10	0	0	0	10	
Native other grass	0	0	0	0	0	0	
Native forb & other	1	0	0	0	2	0.6	
Native shrub (<1m)	0	10	20	50	10	18	
Exotic grass	40	40	40	20	38	35.6	
Exotic forb & other	0	0	0	0	0	0	
Leaf & stick litter	19	40	40	30	50	35.8	
Rocks	0	0	0	0	0	0	
Bare ground	0	0	0	0	0	0	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance		Fire damage:	
Clearing (inc. logging):	y	Storm damage:	y
Cultivation (inc. pasture):		Trampling:	y
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	cattle and pigs
Stock grazing:	y	Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC12	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	180	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Depression			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU5**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	12 35	20	2 - 20%	Eucalyptus coolabah (coolibah)	D
				Acacia harpophylla (brigalow)	A
T2	8 10	9	2 - 20%	Eucalyptus coolabah (coolibah)	D
				Acacia harpophylla (brigalow)	A
T3					
S1					
S2					
G					

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	4	4	T1	92.9	93.7	0.8	S1
8	9	1	T1	59.9	60.2	0.3	S1
23	34	11	T1	33	33.2	0.2	S1
42	46	4	T1			0	
49	49.8	0.8	T1			0	
52	54.5	2.5	T1			0	
62.6	62.8	0.2	T1			0	
67.6	72.2	4.6	T1			0	
75.4	96.7	21.3	T1			0	
97	100	3	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	52.4	**Total T2 (%)**	0	**Total TE(%)**	0	**Total S (%)**	**1.3**

Site ID:	CBC12

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1	T2		Yes	Y		Parkinsonia aculeata	<5% - commo	Exotic Other
Acacia harpophylla (brigalow)	T1	T2		Yes	N		Harisia martinii	<5% - rare	Exotic Other
							Melaleuca trichostachya	<5% - rare	Shrub
							Acacia stenophylla	<5% - rare	Shrub
							Bothriochloa petusa	<5% - rare	Exotic Grass
							Schizachyrium sp.	<5% - rare	Native Grass
							Chrysopogon fallax	<5% - rare	Native Grass
							Calotis sp.	<5% - rare	ative Forb / Oth
							Neptunia gracilis	<5% - rare	ative Forb / Oth
							Heteropogon contortus	<5% - rare	Native Grass
							Panicum effusum	<5% - rare	Native Grass
							Sida cordifolia	<5% - rare	Exotic Other
							Marsilea drummondii	<5% - rare	ative Forb / Oth
							Achyranthes aspera	<5% - rare	ative Forb / Oth

Species Richness in 50m x 10m plot		
Native Tree	2	
Native Shrub	2	
Native Grass	4	
Forbs / Other	4	
Total Non-native (%)	0	
Coarse Woody Debris	290	
Large Trees	**Benchmark**	**Total**
Eucs	45	2
Non-Eucs		

Braun Blanquet Cover Classes

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.							
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	10	10	65	5	30	24	
Native other grass	0	0	0	0	0	0	
Native forb & other	5	5	0	0	1	2.2	
Native shrub (<1m)	0	5	0	0	0	1	
Exotic grass	0	0	0	0	0	0	
Exotic forb & other	0	0	0	0	0	0	
Leaf & stick litter	65	50	35	50	60	52	
Rocks	0	0	0	0	0	0	
Bare ground	20	30	0	45	9	20.8	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance		Fire damage:	
Clearing (inc. logging):		Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	pig evidence. historical
Stock grazing:		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC13	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:	175	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.27f	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Watercourse			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU3**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	12 35	22	2 - 20%	Eucalyptus coolabah (coolibah)	D
				Eucalyptus camaldulensis	C
T2					
T3					
S1	0.5 2	2	0.2 - 2%	Parkinsonia aculeata	D
S2					
G	0 0.5		2 - 20%	bothriochloa petusa	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
99	100	1	T1	99	99.3	0.3	S1
92	92.5	0.5	T1	90	90.5	0.5	S1
90	90.5	0.5	T1	86	86.5	0.5	S1
81	82	1	T1	14	14.3	0.3	S1
53	80	27	T1	18.3	18.6	0.3	S1
33	54	21	T1			#VALUE!	
0	22	22	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	73	**Total T2 (%)**	0	**Total TE(%)**	0	**Total S (%)**	**#VALUE!**

| Site ID: | CBC13 | | |

SA1:Z50urvey ID	Clements Creek 2	**Site ID:**	CBC14	**Site Photo**
Sample Round	1	**Date:**	24.11.24	
Orientation:	180	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	2	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	4 - Clay Plains			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU5**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	10 25	20	2 - 20%	Eucalyptus coolabah (coolibah)	D
T2	3 10	8	0.2 - 2%	Acacia salicina (sally wattle)	D
				Terminalia oblongata	A
				Lysiphyllum hookeri	A
T3					
S1	0.5 3	3	2 - 20%	Parkinsonia aculeata	D
S2					
G	0 0.5		20 - 50%		
				bothriochloa petusa	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	8.7	8.7	T1	92	93	1	S1
15.3	40	24.7	T1	88	90	2	S1
20	23.6	3.6	T2	29.9	30.5	0.6	S1
42	56	14	T1	76.9	78.6	1.7	S1
47	56	9	T2	15.4	15.6	0.2	S1
57	70.6	13.6	T1	60.1	60.2	0.1	S1
74.1	76.5	2.4	T2	53.7	54	0.3	S1
74.1	88	13.9	T1	50	50.5	0.5	S1
91	100	9	T1	38.7	38.8	0.1	S1
		0		29	30.1	1.1	S1
		0		21	21.4	0.4	S1
		0		3	3.1	0.1	S1
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	83.9	**Total T2 (%)**	15	**Total TE(%)**	0	**Total S (%)**	**8.1**

Site ID:	CBC14

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1			Yes	Y		Parkinsonia aculeata	5 - 25%	Exotic Other
Acacia salicina (sally wattle)	T2			Yes	No		panicum sp.	5 - 25%	Native Grass
Terminalia oblongata	T2			Yes	No		Cyperus sp.	<5% - common	Native Forb / Other
Lysiphyllum hookeri	T2			Yes	No		Parthenium hysterophorus	<5% - common	Exotic Other
							Sida cordifolia	<5% - rare	Exotic Other
							Cenchrus ciliaris	5 - 25%	Exotic Grass
							Grewia latifolia	<5% - rare	Shrub
							bothriochloa petusa	5 - 25%	Native Grass
							passiflora sp.	<5% - common	Exotic Other
							Paspalidium caespitosum	<5% - common	Native Grass
							Schizachyrium sp.	<5% - common	Native Grass
							Sida rhombifolia (common sida*)	<5% - rare	Native Forb / Other
							Chrysopogon fallax	<5% - rare	Native Grass
							Sporobolus caroli	<5% - rare	Native Grass
							Marsilea drummondii	<5% - rare	Native Forb / Other
							Achyranthes aspera	<5% - rare	Native Forb / Other
							Vachellia farnesiana	<5% - rare	Native Forb / Other
							Digitaria brownii	<5% - rare	Native Grass
							Paspalidium sp.	<5% - rare	Native Grass
							Pterocaulon sphacelatum	<5% - rare	Shrub
							Panicum queenslandicum	<5% - rare	Native Grass
							Eriachne mucronata	<5% - rare	Native Grass
							Lomandra longifolia	<5% - rare	ative Forb / Other
							Eustrephus latifolius	<5% - rare	Native Forb / Other

cies Richness in 50m x 10m plot CHECK MANUA		
Native Tree	4	
Native Shrub	2	
Native Grass	10	
Forbs / Other	7	
Total Non-native (%	8	
Coarse Woody Deb		
Large Trees	**Benchmark**	**Total**
Eucs	45	8
Non-Eucs	na	

Braun Blanquet Cover Classes

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.							
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	10	10	15	0	5	8	
Native other grass	0	0	0	0	0	0	
Native forb & other	0	0	2	0	0	0.4	
Native shrub (<1m)	0	0	0	5	0	1	
Exotic grass	10	25	0	0	0	7	
Exotic forb & other	0	0	0	0	5	1	
Leaf & stick litter	80	65	68	95	90	79.6	
Rocks	0	0	0	0	0	0	
Bare ground	0	0	15	0	0	3	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance		Fire damage:	
Clearing (inc. logging):		Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	pig cattle damage, scat
Stock grazing:		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC15	**Site Photo**
Sample Round	1	**Date:**	23.11.24	
Orientation:	340	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	5	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Mid slope			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU5**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	15 25	18	2 - 20%	Eucalyptus coolabah (coolibah)	D
T2					
T3					
S1	0.5 2	2	0.2 - 2%	Parkinsonia aculeata	
S2					
G	0 0.5		20 - 50%	bothriochloa petusa	C
				Paspalidium caespitosum	C

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	2	2	T1	87.1	87.2	0.1	S1
10.3	18	7.7	T1	74	75.2	1.2	S1
21	26	5	T1	65.1	65.6	0.5	S1
30.7	71	40.3	T1	18.5	20.1	1.6	S1
72	79.5	7.5	T1	10.1	10.2	0.1	S1
85	100	15	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	77.5	**Total T2 (%)**	0	**Total TE(%)**	0	**Total S (%)**	**3.5**

Site ID:	CBC15

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1			Yes	Y		Parkinsonia aculeata	<5% - commo	Exotic Other
							Apophyllum anomalum (warrior bush)	<5% - commo	ative Forb / Oth
							Lysiphyllum hookeri (white bauhinia)	<5% - rare	Shrub
							Paspalidium caespitosum	5 - 25%	Native Grass
							Bothriochloa petusa	5 - 25%	Exotic Grass
							Sida sp.	<5% - rare	ative Forb / Oth
							Enteropogon ramosa	<5% - commo	Native Grass
							Eriachne mucronata forma (Alpha C.E.Hub	<5% - rare	Native Grass
							Marsilea drummondii	<5% - commo	ative Forb / Oth
							Schizachyrium fragile	<5% - rare	Native Grass
							Parthenium hysterophorus	<5% - rare	Exotic Other
							Achyranthes aspera	<5% - rare	ative Forb / Oth
							Dianella longifolia	<5% - rare	ative Forb / Oth
							Melinis repens	<5% - rare	Exotic Grass
							Vachellia farnesiana*	<5% - rare	Exotic Other
							Stylosanthes scabra*	<5% - rare	Exotic Other
							Chrysopogon fallax	<5% - rare	Native Grass
							Bothriochloa bladhii	<5% - rare	Native Grass
							Juncus sp.	<5% - rare	ative Forb / Oth
							Sida cordifolia (flannel weed*)	<5% - rare	Exotic Other

Species Richness in 50m x 10m plot		
Native Tree	1	
Native Shrub	1	
Native Grass	6	
Forbs / Other	6	
Total Non-native (%)	0	
Coarse Woody Debris	185	
Large Trees	**Benchmark**	**Total**
Eucs	45	7
Non-Eucs	na	

Braun Blanquet Cover Classes	
1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.								
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	10	95	10	60	45	44	
Native other grass	0	0	0	0	0	0	
Native forb & other	0	0	1	0	0	0.2	
Native shrub (<1m)	0	0	0	0	0	0	
Exotic grass	0	0	0	0	0	0	
Exotic forb & other	0	0	0	0	0	0	
Leaf & stick litter	15	5	9	40	45	22.8	
Rocks	0	0	0	0	0	0	
Bare ground	75	0	80	0	0	31	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	90	98	

Plot Disturbance			
Clearing (inc. logging):		Fire damage:	
Cultivation (inc. pasture):		Storm damage:	
Soil erosion:		Trampling:	
Firewood collection:		Flood damage:	
Stock grazing:		Feral herbivores:	cattle and pig damage
		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC16	**Site Photo**
Sample Round	1	**Date:**	23.11.24	
Orientation:		**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	25	
RE Code	11.3.25	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Mid slope			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Very tall		
AU	**AU2**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	25 35	28	2 - 20%	Eucalyptus camaldulensis	D
				Eucalyptus coolabah (coolibah)	S
T2	8 20	13	0.2 - 2%	Eucalyptus coolabah (coolibah)	
				Casuarina cunninghamiana	
T3					
S1	0.5 2	2	0.2 - 2%		
S2					
G	0 0.5		2 - 20%	Cenchrus ciliaris	S
				Megathyrsus maximus var. pubiglumis	D
				Heteropogon contortus	C

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	17	17	T1	94.4	95.1	0.7	S1
19.9	32	12.1	T1	55	55.3	0.3	S1
33	41	8	T1	50	50.1	0.1	S1
42	51	9	T1	40	40.2	0.2	S1
51	58	7	T2	37.9	38.1	0.2	S1
51	58	7	T1	30.5	31	0.5	S1
68	74	6	T2	19.6	19.7	0.1	S1
83	87	4	T1	12	12.1	0.1	S1
87	100	13	T2	5	5.2	0.2	S1
95	100	5	T1			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	62.1	**Total T2 (%)**	26	**Total TE(%)**	0	**Total S (%)**	**2.4**

Site ID:	CBC16

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1	T2		Yes	Y		Cenchrus ciliaris	5 - 25%	Exotic Grass
Eucalyptus camaldulensis	Emer	T1	T2	Yes	Y		Heteropogon contortus	<5% - commo	Native Grass
Casuarina cunninghami	T2			Yes	N		Megathyrsus maximus var. pubiglumis	5 - 25%	Exotic Grass
Melaleuca trichostachya	T2			Yes	N		Parkinsonia aculeata	<5% - rare	Exotic Other
Lysiphyllum hookeri	T2			Yes	N		Grewia latifolia	<5% - rare	Shrub
Ficus sp	T2			Yes			Lysiphyllum hookeri	<5% - commo	Shrub
Melaleuca nervosa	T2			Yes			Passiflora aurantia var. aurantia	<5% - commo	Exotic Other
Lysiphyllum carronii (red bauhinia)	T2			Yes			Bothriochloa petusa	<5% - commo	Exotic Grass
							Schizachyrium fragile	<5% - commo	Native Grass
							Chrysopogon fallax	<5% - rare	Native Grass
							Parthenium hysterophorus	<5% - rare	Exotic Other
							Harrisia martinii	<5% - rare	Exotic Other
							Vachellia farnesiana	<5% - rare	Exotic Other
							Bothriochloa bladii	<5% - rare	Native Grass
							Eustrephus latifolius (wombat berry)	<5% - rare	ative Forb / Oth
							Cyperus sp.	<5% - commo	ative Forb / Oth
							Lomandra longifolia	<5% - commo	ative Forb / Oth
							Dianella longifolia	<5% - rare	ative Forb / Oth
							Achyranthes aspera	<5% - rare	ative Forb / Oth

Species Richness in 50m x 10m plot			Photo No.							
Native Tree	8		Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native Shrub	2		Native perennial grass	10	0	15	15	40	16	
Native Grass	4		Native other grass	0	0	0	0	0	0	
Forbs / Other	5		Native forb & other	1	0	0	1	1	0.6	
Total Non-native (%)	16.8		Native shrub (<1m)	0	0	0	0	0	0	
Coarse Woody Debris	240		Exotic grass	0	25	30	29	0	16.8	
Large Trees	**Benchmark**	**Total**	Exotic forb & other	0	0	0	0	0	0	
Eucs	53	5	Leaf & stick litter	89	75	40	55	59	63.6	
Non-Eucs	26	9	Rocks	0	0	0	0	0	0	
			Bare ground	0	0	15	0	0	3	
			Cryptogams	0	0	0	0	0	0	
			Total	100	100	100	100	100	100	

Braun Blanquet Cover Classes	
1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Plot Disturbance			
Clearing (inc. logging):		Fire damage:	
Cultivation (inc. pasture):		Storm damage:	
Soil erosion:		Trampling:	
Firewood collection:		Flood damage:	
Stock grazing:		Feral herbivores:	cattle foraging pig dung
		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC17	**Site Photo**
Sample Round	1	**Date:**	23.11.24	
Orientation:	315	**Observers**	jk lh	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.1	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	4 - Clay Plains			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU1**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	20 25	25	0.2 - 2%	Eucalyptus coolabah (coolibah)	D
				Corymbia tessellaris	
T1	15 20	17	20 - 50%	Acacia harpophylla (brigalow)	D
T2	3 10	7	0.2 - 2%	Lysiphyllum hookeri	
				Terminalia oblongata	
T3					
S1	0.5 2	2	2 - 20%	Lysiphyllum hookeri	D
S2					
G	0 0.5		0.2 - 2%	Paspalidium caespitosum	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	2	2	T1	90	91	1	S1
0	3.3	3.3	T2	82.1	82	-0.1	S1
2.5	6.5	4	T1	75.8	76	0.2	S1
6	15.2	9.2	Emergent	43.4	44.7	1.3	S1
8	9	1	T1	35.7	38	2.3	S1
9	10	1	T2	13.3	14.1	0.8	S1
10	11	1	T1	7.6	8	0.4	S1
11	16	5	T1	2.7	3.6	0.9	S1
29	33	4	Emergent			0	
16	23	7	T1			0	
24	36	12	T1			0	
42	44	2	T2			0	
45.5	50	4.5	T1			0	
52	71	19	T1			0	
68	73	5	Emergent			0	
70	85	15	T1			0	
Total T1 (%)	70.5	**Total T2 (%)**	6.3	**Total TE(%)**	18.2	**Total S (%)**	**6.8**

Site ID:	CBC17													
Tree Species			Strata			Rec.	KHT		Shrubs and Ground				Cover	Strata
Eucalyptus coolabah (coolibah)			Emer	T1		No	Yes		Terminalia oblongata				<5% - commo	Shrub
Acacia harpophylla (brigalow)			T1	T2		Yes	No		Lysiphyllum hookeri				<5% - commo	Shrub
Terminalia oblongata			T2			Yes	No		Alectryon diversifolius				<5% - commo	Shrub
Lysiphyllum hookeri			T2			Yes	No		Harrisia martinii				<5% - commo	Exotic Other
									Carissa ovata				<5% - commo	Shrub
									Capparis arborea				<5% - rare	Shrub
									Paspalidium caespitosum				<5% - commo	Native Grass
									native forb sp.				<5% - commo	ative Forb / Oth
									Cenchrus ciliaris				<5% - rare	Exotic Grass
									Sida sp.				<5% - rare	ative Forb / Oth
									Enchylaena tomentosa (ruby saltbush)				<5% - rare	ative Forb / Oth
									Enteropogon sp.				<5% - rare	Native Grass

Survey ID	Clements Creek 2	**Site ID:**	CBC17	**Site Photo**
Sample Round	1	**Date:**	23.11.24	
Orientation:	315	**Observers**	jk lh	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.1	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	4 - Clay Plains			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU1**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	20 25	25	0.2 - 2%	Eucalyptus coolabah (coolibah)	D
				Corymbia tessellaris	
T1	15 20	17	20 - 50%	Acacia harpophylla (brigalow)	D
T2	3 10	7	0.2 - 2%	Lysiphyllum hookeri	
				Terminalia oblongata	
T3					
S1	0.5 2	2	2 - 20%	Lysiphyllum hookeri	D
S2					
G	0 0.5		0.2 - 2%	Paspalidium caespitosum	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	2	2	T1	90	91	1	S1
0	3.3	3.3	T2	82.1	82	-0.1	S1
2.5	6.5	4	T1	75.8	76	0.2	S1
6	15.2	9.2	Emergent	43.4	44.7	1.3	S1
8	9	1	T1	35.7	38	2.3	S1
9	10	1	T2	13.3	14.1	0.8	S1
10	11	1	T1	7.6	8	0.4	S1
11	16	5	T1	2.7	3.6	0.9	S1
29	33	4	Emergent			0	
16	23	7	T1			0	
24	36	12	T1			0	
42	44	2	T2			0	
45.5	50	4.5	T1			0	
52	71	19	T1			0	
68	73	5	Emergent			0	
70	85	15	T1			0	
Total T1 (%)	70.5	**Total T2 (%)**	6.3	**Total TE(%)**	18.2	**Total S (%)**	**6.8**

Site ID:	CBC17													
Tree Species			Strata			Rec.	KHT		Shrubs and Ground				Cover	Strata
Eucalyptus coolabah (coolibah)			Emer	T1		No	Yes		Terminalia oblongata				<5% - commo	Shrub
Acacia harpophylla (brigalow)			T1	T2		Yes	No		Lysiphyllum hookeri				<5% - commo	Shrub
Terminalia oblongata			T2			Yes	No		Alectryon diversifolius				<5% - commo	Shrub
Lysiphyllum hookeri			T2			Yes	No		Harrisia martinii				<5% - commo	Exotic Other
									Carissa ovata				<5% - commo	Shrub
									Capparis arborea				<5% - rare	Shrub
									Paspalidium caespitosum				<5% - commo	Native Grass
									native forb sp.				<5% - commo	ative Forb / Oth
									Cenchrus ciliaris				<5% - rare	Exotic Grass
									Sida sp.				<5% - rare	ative Forb / Oth
									Enchylaena tomentosa (ruby saltbush)				<5% - rare	ative Forb / Oth
									Enteropogon sp.				<5% - rare	Native Grass

Survey ID	Clements Creek 2	**Site ID:**	CBC18	**Site Photo**
Sample Round	1	**Date:**	23.11.24	
Orientation:	275	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	4	
RE Code	11.3.25	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Watercourse			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU2**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	15 25	20	2 - 20%	Eucalyptus coolabah (coolibah)	S
				Eucalyptus camaldulensis	D
T2	7 15	12		Casuarina cunninghamiana	C
				Eucalyptus camaldulensis	D
				Eucalyptus coolabah (coolibah)	C
T3					
S1	0.5 2	2	2 - 20%	lantana camara	D
				sandpaper fig	S
				rubber vine	S
S2					
G			20 - 50%	Cenchrus ciliaris	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	13	13	T1	99	99.5	0.5	S1
14	15.5	1.5	T2	87	88	1	S1
16.5	22	5.5	T1	81	83	2	S1
23	34	11	T1	65	67	2	S1
35	46.5	11.5	T1	60.4	61.3	0.9	S1
51	71	20	T1	56	57	1	S1
71.5	93	21.5	T1	51	52	1	S1
96	100	4	T2	43	45.4	2.4	S1
		0		41	42	1	S1
		0		40	40.3	0.3	S1
		0		29.3	31.1	1.8	S1
		0		27.7	28	0.3	S1
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	82.5	**Total T2 (%)**	5.5	**Total TE(%)**	0	**Total S (%)**	**14.2**

| Site ID: | CBC18 | | |

Survey ID	Clements Creek 2	**Site ID:**	CBC19	**Site Photo**
Sample Round	1	**Date:**	23.11.24	
Orientation:	300	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	1	
RE Code	11.3.2	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU				

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E					
T1	20 25	20	2 - 20%	Eucalyptus coolabah (coolibah)	C
				Eucalyptus camaldulensis	A
				Eucalyptus populnea (poplar box)	D
T2	10 15	10	0.2 - 2%	Eucalyptus coolabah (coolibah)	C
				Casuarina cunninghamiana	A
				Eucalyptus populnea (poplar box)	D
T3					
S1	0.5 2	2	0.2 - 2%	stylo	D
S2					
G	0 0.5		20 - 50%	Chrysopogon fallax	S
				both pet	D
				Cenchrus ciliaris	S

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	4	4	T1	77	78	1	S1
18	26	8	T1	65.7	66.6	0.9	S1
26	28	2	T2	12.3	12.4	0.1	S1
28	44	16	T1	38.5	38.6	0.1	S1
48	55.5	7.5	T1	35	35.3	0.3	S1
61.4	71.5	10.1	T1	31.2	32.6	1.4	S1
72	80	8	T1	19.9	20.2	0.3	S1
82	87	5	T2	16.8	17	0.2	S1
82	90	8	T1	4.8	5.4	0.6	S1
97.9	100	2.1	T2			0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	61.6	**Total T2 (%)**	9.1	**Total TE(%)**	0	**Total S (%)**	**4.9**

Site ID:	CBC19

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1			Yes	Y		Stylosanthes scabra	<5% - commo	Exotic Other
Eucalyptus camaldulensis	T1	T2		Yes	Y		Grewia latifolia	<5% - rare	Shrub
Eucalyptus populnea (poplar box)	T1	T2		Yes	Y		Opuntia sp.	<5% - rare	Exotic Other
Casuarina cunninghamiana		T2		Yes	N		Alphitonia excelsa (soap ash)	<5% - rare	Shrub
Brachychiton rupestris (bottletree)	T2			No	N		Parkinsonia aculeata	<5% - rare	Exotic Other
Terminalia oblongata	T2			No	N		Cryptostegia grandiflora	<5% - rare	Exotic Other
Lysiphyllum hookeri	T2			Yes	N		Denhamia cunninghami	<5% - rare	Shrub
							Cenchrus ciliaris	<5% - commo	Exotic Grass
							Bothriochloa petusa	<5% - rare	Exotic Grass
							Chrysopogon fallax	<5% - rare	Native Grass
							Harrisia martinii	<5% - rare	Exotic Other
							Carissa ovata	<5% - rare	Shrub
							Sida sp.	<5% - rare	ative Forb / Oth
							Sporobolus caroli	<5% - rare	Native Grass
							Erythroxylon australe (dogwood)	<5% - rare	Shrub
							Alectryon diversifolius	<5% - rare	Shrub
							Achyranthes aspera	<5% - rare	ative Forb / Oth

Species Richness in 50m x 10m plot		
Native Tree	7	
Native Shrub	6	
Native Grass	2	
Forbs / Other	2	
Total Non-native (%)	32	
Coarse Woody Debris	120	
Large Trees	**Benchmark**	**Total**
Eucs	44/45	no
Non-Eucs		

Braun Blanquet Cover Classes

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.							
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	5	5	5	5	5	5	
Native other grass	0	0	0	0	0	0	
Native forb & other	0	5	0	1	0	1.2	
Native shrub (<1m)	0	0	0	0	0	0	
Exotic grass	45	20	30	0	45	28	
Exotic forb & other	0	15	5	0	0	4	
Leaf & stick litter	50	55	40	94	50	57.8	
Rocks	0	0	0	0	0	0	
Bare ground	0	0	20	0	0	4	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance		Fire damage:	
Clearing (inc. logging):		Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	cattle
Stock grazing:		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC20	**Site Photo**
Sample Round	1	**Date:**	22.11.24	
Orientation:		**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	4	
RE Code	11.3.3	**RE Condition**		
Soil Type:	Clay	**Aspect (°):**		
Topography:	Mid slope			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU4**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	25 35	28	0.2 - 2%	Eucalyptus camaldulensis	D
				Eucalyptus coolabah (coolibah)	C
T1	8 20	15	2 - 20%	Eucalyptus camaldulensis	C
				Eucalyptus coolabah (coolibah)	D
T2					
T3					
S1	0.5 2	2	0.2 - 2%	Lysiphyllum hookeri	D
S2					
G	0 0.5		2 - 20%	Paspalidium caespitosum	D

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
6	9.7	3.7	T1	47	47.2	0.2	S1
9.7	19.5	9.8	Emergent	44	44.3	0.3	S1
19.5	22.3	2.8	T1	43	43.4	0.4	S1
26	30.6	4.6	T1	34.2	34.4	0.2	S1
31.6	53	21.4	T1	26.5	26.6	0.1	S1
55	64.6	9.6	Emergent	18	19	1	S1
69	72	3	T1	14	14.2	0.2	S1
87	89	2	T1	8.9	9	0.1	S1
90	100	10	T1	1.6	2	0.4	S1
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
		0				0	
Total T1 (%)	47.5	**Total T2 (%)**	0	**Total TE(%)**	19.4	**Total S (%)**	**2.9**

Site ID:	CBC20

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus camaldulensis	Eme	T1		Yes	Y		Grewia latifolia	<5% - rare	Native Forb / Other
Eucalyptus coolabah (coolibah)	Eme	T1		Yes	Y		Paspalidium caespitosum	5 - 25%	Native Grass
Acacia harpophylla (brigalow)	T1			No	N		Eragrostis sp.	<5% - rare	Native Grass
Lysiphyllum hookeri	T1			Yes	N		Eustrephus latifolius (wombat berry)	<5% - commo	Native Forb / Other
							Panicum effusum	<5% - commo	Native Grass
Casuarina cunninghamiana	T1			No	N		Lomandra longifolia	<5% - rare	Native Forb / Other
Corymbia tessellaris	T1			Yes	Y		Themeda triandra	<5% - commo	Native Grass
							Schizachyrium fragile	<5% - rare	Native Grass
							Terminalia oblongata	<5% - commo	Shrub
							Atalaya hemiglauca	<5% - rare	Shrub
							Passiflora aurantia var. aurantia	<5% - rare	Exotic Other
							Bothriochloa decipiens var. decipien	<5% - rare	Native Grass
							Chrysopogon fallax	<5% - rare	Native Grass
							Acacia salicina	<5% - rare	Shrub
							Digitaria brownii	<5% - rare	Native Grass
							Eustrephus latifolius (wombat berry)	<5% - rare	Native Forb / Other

Species Richness in 50m x 10m plot		
Native Tree	6	
Native Shrub	3	
Native Grass	8	
Forbs / Other	4	
Total Non-native (%)	0	
Coarse Woody Debris	170	
Large Trees	**Benchmark**	**Total**
Eucs	45	11
Non-Eucs		

Braun Blanquet Cover Classes

1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.							
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	25	50	20	25	90	42	
Native other grass	0	0	0	0	0	0	
Native forb & other	1	0	5	5	0	2.2	
Native shrub (<1m)	0	0	0	0	0	0	
Exotic grass	0	0	0	0	0	0	
Exotic forb & other	0	0	0	0	0	0	
Leaf & stick litter	74	50	75	60	5	52.8	
Rocks	0	0	0	0	0	0	
Bare ground	0	0	0	10	5	3	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance		Fire damage:	
Clearing (inc. logging):	historical logging	Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	
Stock grazing:		Other:	

Survey ID	Clements Creek 2	**Site ID:**	CBC21	**Site Photo**
Sample Round	1	**Date:**	23.11.24	
Orientation:	355	**Observers**	JK LH	
Coordinates:		**Site type**	bioc	
		Slope (%)	0	
RE Code	11.3.3	**RE Condition**	**Rem**	
Soil Type:	Clay	**Aspect (°):**		
Topography:	Flat			
Land Zone:	3 - Alluvial River and Creek Flat			
Geology:	Alluvium	**EDL:**	T1	
Vegetative Structure (formation):		Tall		
AU	**AU5**			

Strata	Height interval	Median	Est. cover	Dominant Species	Dominance
E	25 30	25	0.2 - 2%	Eucalyptus camaldulensis (river red gum)	D
T1	15 25	18	2 - 20%	Eucalyptus coolabah (coolibah)	D
				Eucalyptus camaldulensis	S
T2	7 15	9	2 - 20%		
				Eucalyptus camaldulensis	S
				Eucalyptus coolabah (coolibah)	D
T3				Lysiphyllum hookeri	D
				Acacia salicina	A
S1	0.5 2		2 - 20%	Grewia latifolia	D
					S
				Cryptostegia grandiflora	S
S2					
G			20 - 50%	Cenchrus ciliaris	D
				Bothriochloa petusa	

Tree height (clino) level ground or top of slope = distance from tree x (top% + bottom%)

Tree height (clino) from bottom of slope = distance from tree x (top% - bottom%)

Definitions

Dominance d = dominant; c = co-dominant; s = subdominant; a = associated

Estimated cover I = isolated (0.2-2%); v = very sparse (2-20%); s = sparse (20-50%); m = mid dense (50-80%); d = dense (80-100%)

Walker & Hopkins height classes: 1-3m = dwarf; 3-6m = low; 6-12m = mid-high; 12-20m = tall; 20-35m = very tall; >35m = extremely tall

W&H Crown cover: <0.2% = isolated trees or clumps; 0.2-20% = open woodland; 20-50% = woodland; 50-80% = open forest; 80-100% = closed forest

100m line transect - Crown cover - Tree layer				**100m line transect - Crown cover - Shrub layer**			
Start	**Finish**	**Intercept**	**Strata**	**Start**	**Finish**	**Intercept**	**Strata**
0	30	30	Emergent	0	10	10	S1
32.8	35	2.2	T1	15	15.9	0.9	S1
23	23.7	0.7	T2	18	19	1	S1
16	23	7	T2	29.5	32.3	2.8	S1
14	15	1	T2	27	27.6	0.6	S1
0	12	12	T1	21.5	22.6	1.1	S1
12	14	2	T2	16	18	2	S1
3	5	2	T2	11	12	1	S1
48	50	2	T2	80	84	4	S1
50	63.4	13.4	T1	86	88	2	S1
64	65	1	T2			0	S1
70	74	4	T2			0	S1
88	93	5	T1			0	
95	100	5	T1			0	
		0				0	
		0				0	
Total T1 (%)	37.6	**Total T2 (%)**	19.7	**Total TE(%)**	30	**Total S (%)**	**25.4**

Site ID:	CBC21

Tree Species	Strata			Rec.	KHT		Shrubs and Ground	Cover	Strata
Eucalyptus coolabah (coolibah)	T1	T2	Eme	Yes	Y		Bothriochloa petusa	5 - 25%	Exotic Grass
Eucalyptus camaldulensis	T1	Eme	T2	Yes	Y		Cenchrus ciliaris	5 - 25%	Exotic Grass
Eucalyptus populnea (poplar box)	T1			Yes	Y		Cryptostegia grandiflora	<5% - commo	Exotic Other
Lysiphyllum hookeri	T2			Yes	N		Lysiphyllum hookeri	<5% - rare	Shrub
Acacia salicina	T2			Yes	N		Acacia salicina	<5% - rare	Shrub
Melaleuca bracteata	T2			Yes	N		Lysiphyllum carronii (red bauhinia)	<5% - commo	Shrub
							Sida rhombifolia (common sida*)	<5% - commo	ative Forb / Oth
							Alphitonia excelsa (soap ash)	<5% - commo	Shrub
							Harrisia martinii	<5% - rare	Exotic Other
							Grewia retusifolia	<5% - commo	Shrub
							Stylosanthes scabra	<5% - commo	Exotic Other
							Opuntia sp.	<5% - commo	Exotic Grass
							Alstonia constricta	<5% - commo	Shrub
							Achyranthes aspera	<5% - rare	ative Forb / Oth

Species Richness in 50m x 10m plot		
Native Tree	6	
Native Shrub	6	
Native Grass	0	
Forbs / Other	2	
Total Non-native (%)	41.2	
Coarse Woody Debris	420	
Large Trees	**Benchmark**	**Total**
Eucs	45	4
Non-Eucs		

Braun Blanquet Cover Classes	
1	<5% - rare
2	<5% - common
3	5 - 25%
4	25 - 50%
5	50 - 75%
6	75 - 100%

Photo No.							
Ground layer % 1x1 plots	Q1	Q2	Q3	Q4	Q5	Average	
Native perennial grass	5	20	5	0	5	7	
Native other grass	0	0	0	0	0	0	
Native forb & other	5	1	0	5	0	2.2	
Native shrub (<1m)	0	0	0	0	0	0	
Exotic grass	40	40	60	20	45	41	
Exotic forb & other	0	1	0	0	0	0.2	
Leaf & stick litter	50	38	35	75	50	49.6	
Rocks	0	0	0	0	0	0	
Bare ground	0	0	0	0	0	0	
Cryptogams	0	0	0	0	0	0	
Total	100	100	100	100	100	100	

Plot Disturbance		Fire damage:	
Clearing (inc. logging):	historical clearing	Storm damage:	
Cultivation (inc. pasture):		Trampling:	
Soil erosion:		Flood damage:	
Firewood collection:		Feral herbivores:	cattle pigs scat tracks
Stock grazing:		Other:	

10.0 Appendix D

BioCondition Photos

Appendix Table 1: BioCondition Site Photos CBC01.



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



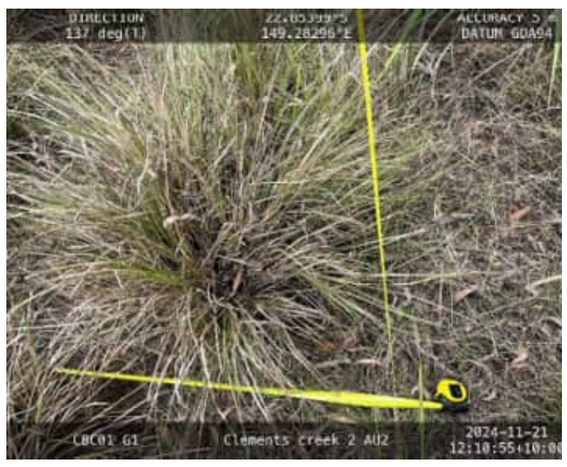
End East



End South



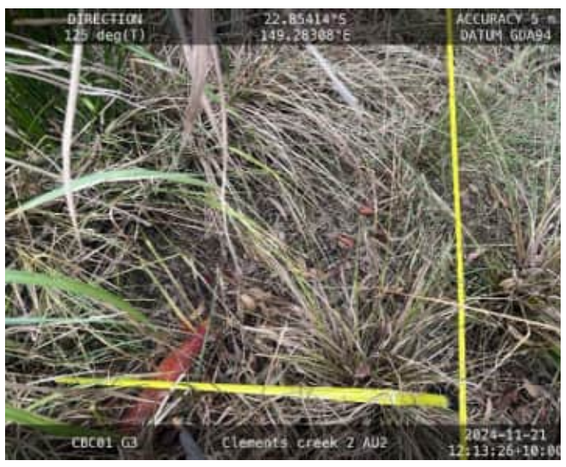
End West



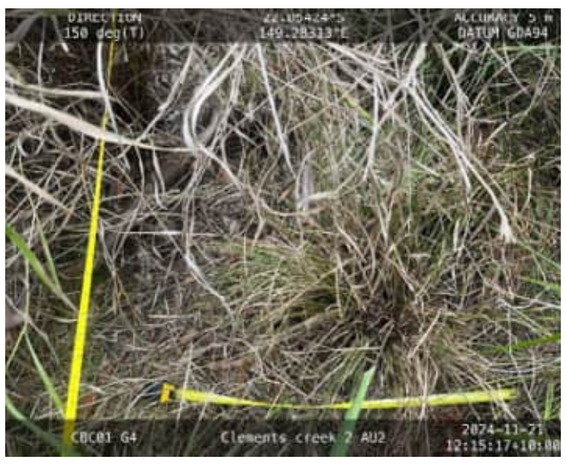
Ground Cover 1 (35m)



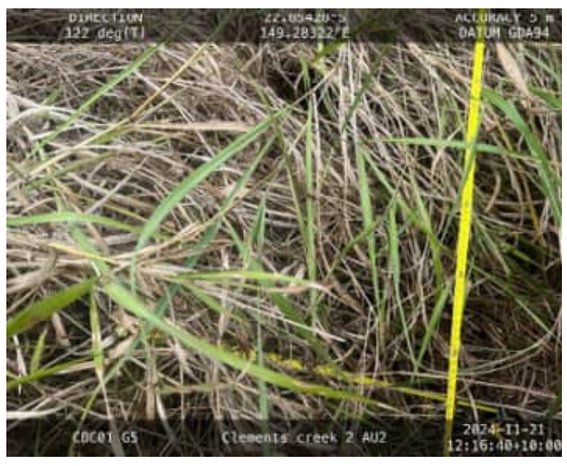
Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 2: BioCondition Site Photos CBC02.



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



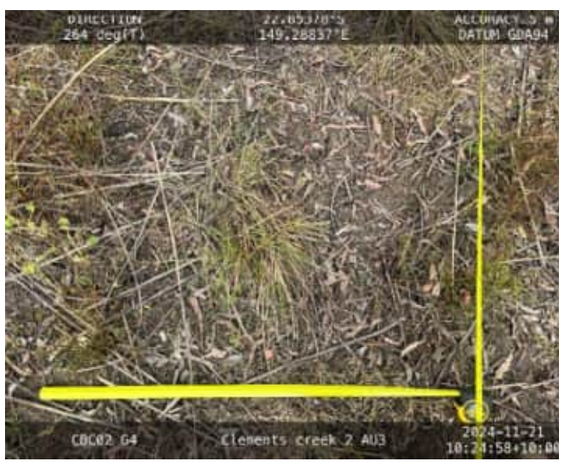
Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 3: BioCondition Site Photos CBC03.



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 4: BioCondition Site Photos CBC04



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 5" BioCondition Site Photos CBC05



Start North



Start East



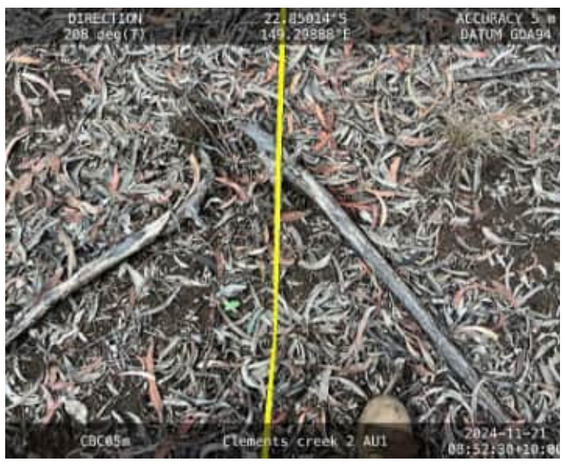
Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



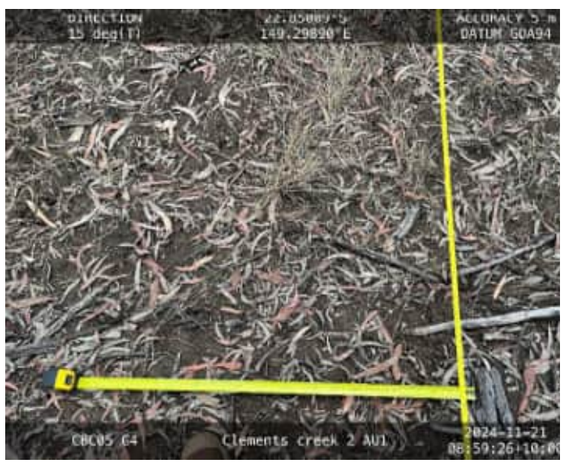
Ground Cover 1 (35m)



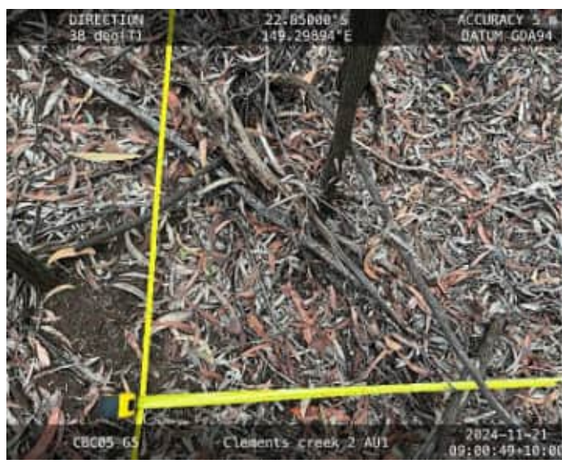
Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 6: BioCondition Site Photos CBC06



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



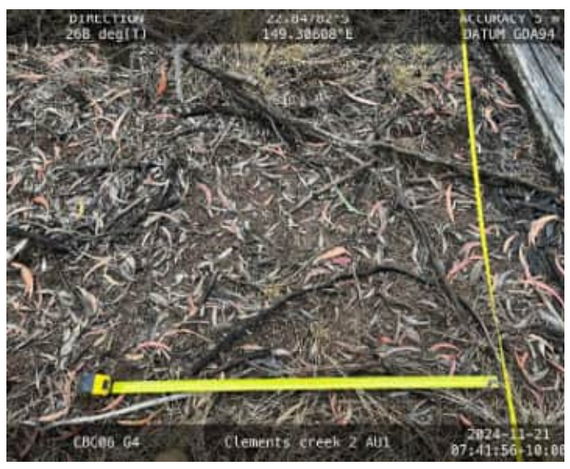
Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 7: BioCondition Site Photos CBC07



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 8: BioCondition Site Photos CBC08



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



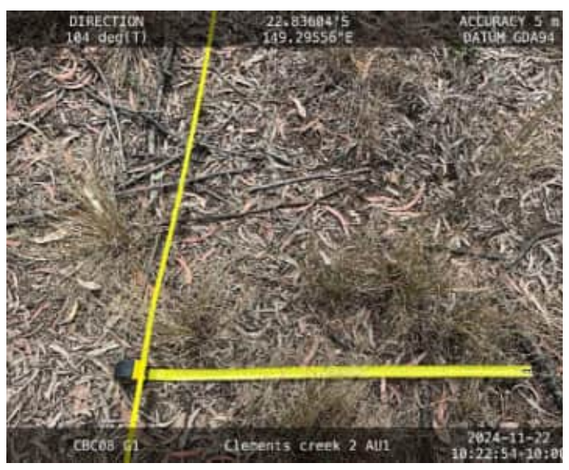
End East



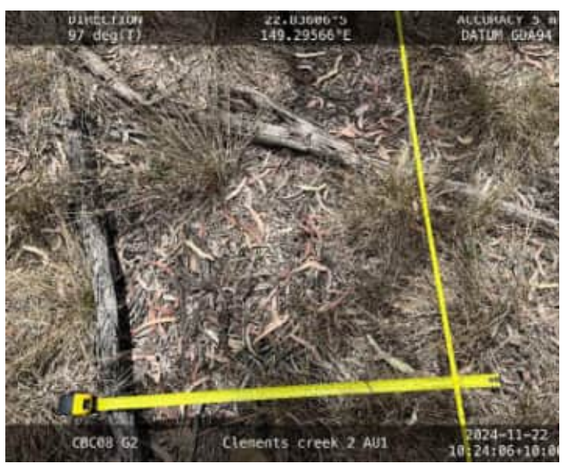
End South



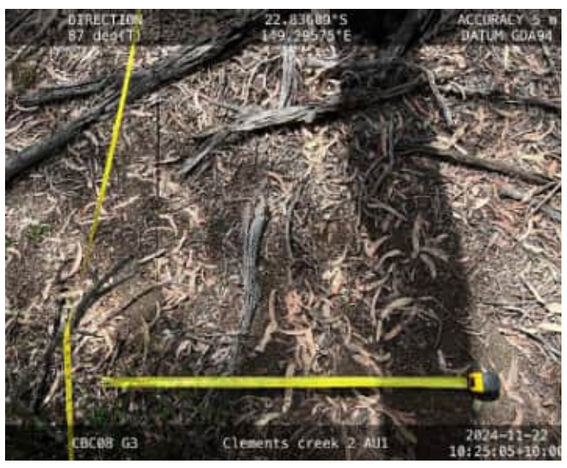
End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m) (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 9: BioCondition Site Photos CBC09



Start North



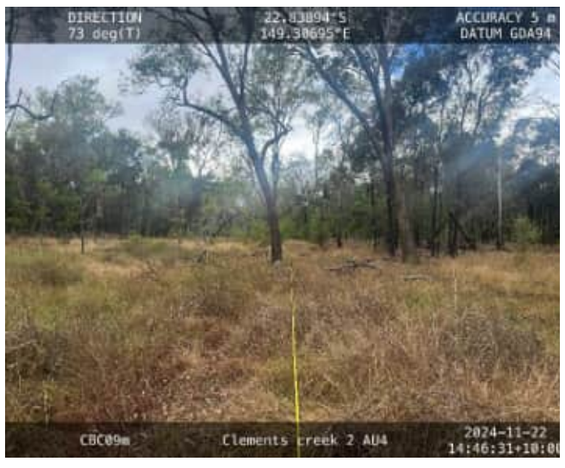
Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 10: BioCondition Site Photos CBC10



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 11: BioCondition Site Photos CBC11



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



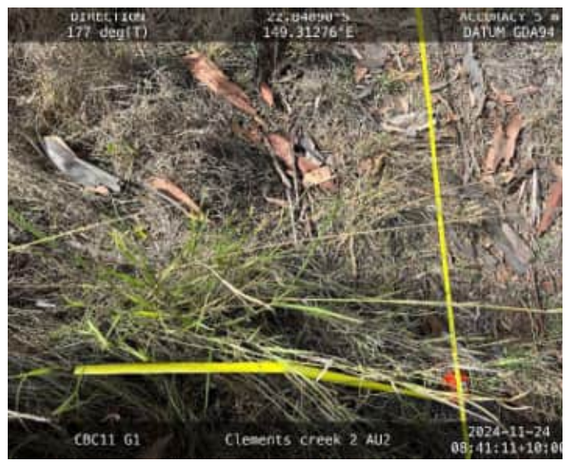
End East



End South



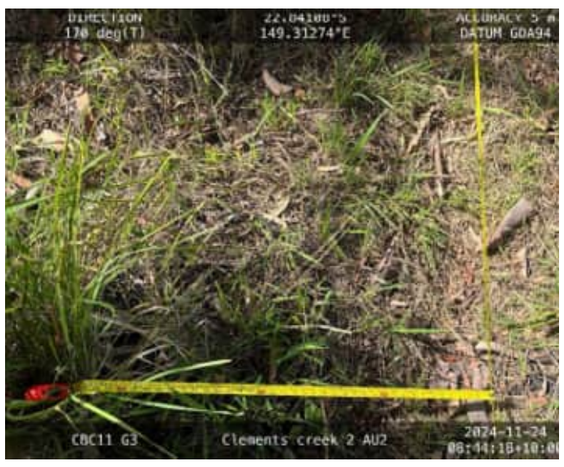
End West



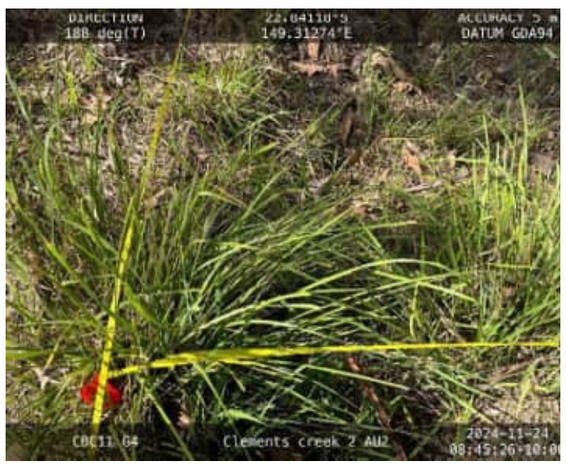
Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 12: BioCondition Site Photos CBC12



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



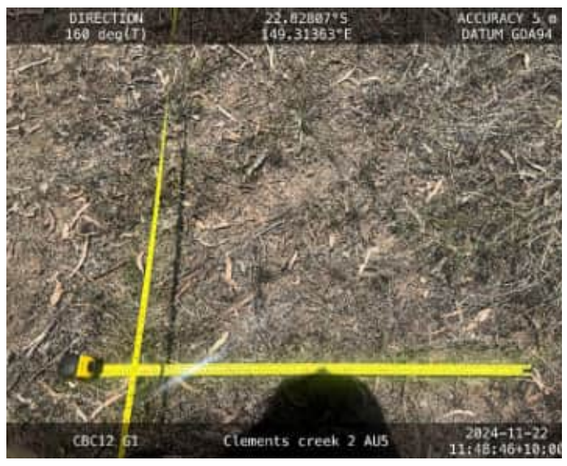
End East



End South



End West



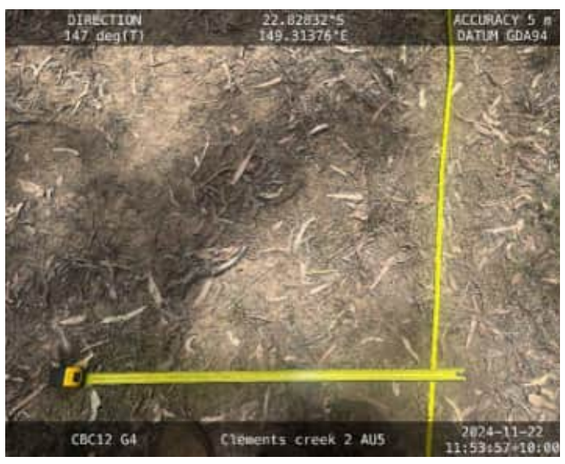
Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 13: BioCondition Site Photos CBC13



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m) (75m)

Appendix Table 14: BioCondition Site Photos CBC14



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 15: BioCondition Site Photos CBC15



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 16: BioCondition Site Photos CBC16



Start North



Start East



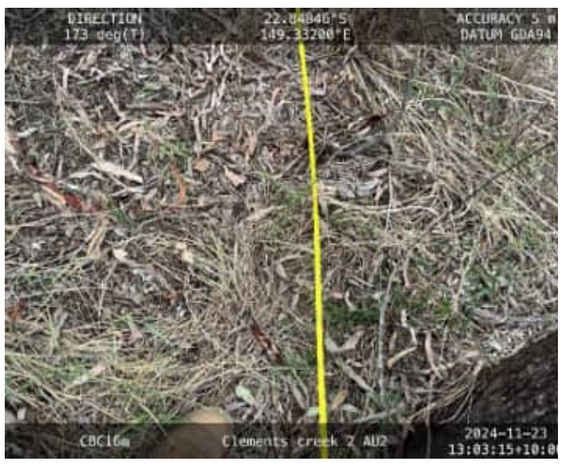
Start South



Start West



Center Landscape



Center Ground



End North



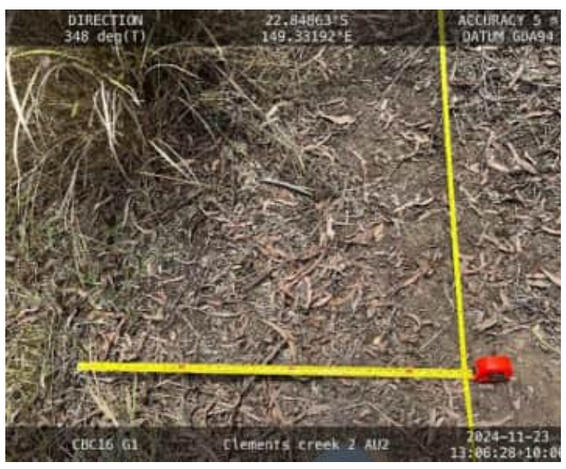
End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 17: BioCondition Site Photos CBC17



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 18: BioCondition Site Photos CBC18



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



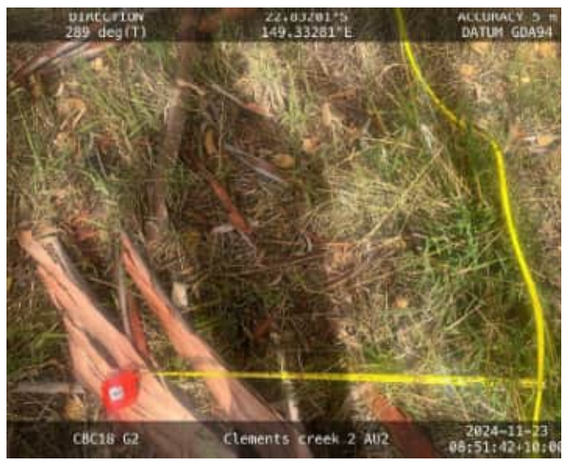
End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 19: BioCondition Site Photos CBC19



Start North



Start East



Start South



Start West

Center Landscape

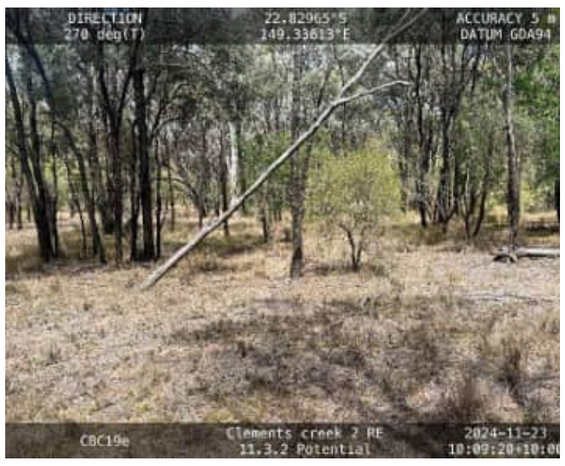
Center Ground

End North

End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 20: BioCondition Site Photos CBC20



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

Appendix Table 21: BioCondition Site Photos CBC21



Start North



Start East



Start South



Start West



Center Landscape



Center Ground



End North



End East



End South



End West



Ground Cover 1 (35m)



Ground Cover 2 (45m)



Ground Cover 3 (55m)



Ground Cover 4 (65m)



Ground Cover 5 (75m)

11.0 Appendix E

Habitat quality assessment criteria and scoring for threatened fauna

Appendix E – Habitat Quality Assessment Criteria and Scoring for Threatened Fauna

Koala (*Phascolarctos cinereus*)

Occurrence and habitat

Clements creek is located within the distribution of the koala. Presence of this species has been confirmed by desktop assessment, literature review (Earthtrade, 2024) (LEC, 2023) and multiple individuals observed during fieldwork undertaken for this habitat quality assessment.

In Queensland koalas can be found from the Atherton Tablelands west of Cairns, south to the NSW/QLD border and inland to central and western Queensland. Koalas near the western edge of their range are often associated with watercourses though are not restricted to them (Melzer, 2014) (Sullivan, 2002). Within the Brigalow Belt they occur at low densities, approximately 0.005 koalas/ha and have thought to have declined by 30-40% in the last 20 year (DAWE, 2022).

Estimating species habitat attributes

Habitat scoring for the koala has been previously formulated for a related project by Umwelt (2024) (refer to Appendix E Table 1 and Appendix E Table 2). The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

The assessment for the absence of threats is provided in Appendix E Table 3. While vehicle strike and disease have been determined as key threats (DAWE, 2022) (DCCEW, 2022), these threats are not relevant to this habitat quality assessment due to the following:

- Vehicle strike – While Manly Road dissects through the OIA, it is a rural one lane dirt road with limited traffic. The threats of vehicle strike in regards to the koala are generally reserved for high traffic areas where roads act as hard barrier.
- Disease – While disease is listed as a key threat, it is beyond the level of detail required for terrestrial habitat quality assessment.

Due to the reasons above, vehicle strike and disease are not assessed for this this habitat quality assessment.

Threats to the koala were assessed using the following:

- Scope – the proportion of the species habitat or local population that can reasonably be expected to be affected by the threat.
- Severity – within the scope, the level of damage from the threat the species habitat or local population that can reasonably be expected, given the current circumstances and trends.
- For each threat, a score between 1 and 25 is determined by multiplying the score assigned to the scope and severity of that threat.
- A threat with a score of 1 poses a very high threat, conversely, a threat with a score of 25 poses a very low threat to the species

- The overall score for the assessment of threats is determined by the highest threat, which is the lowest number.

The results from the assessment of absence of threats utilised in the habitat quality score for the OIA is detailed in Appendix E Table 3.

Appendix E Table 1: Habitat quality scoring criteria and metrics for the koala (Umwelt, 2024).

Attribute	Attribute Weighting (%)	Indicator / Threat Factor	Scoring	Contribution of Indicator to Attribute Weighting (%)	Justification
Quality and availability of food and habitat required for foraging	25	Presence of preferred food tree species	0 – Does not contain a locally important koala tree species 3 – Contains one locally important koala tree species 5 – Contains two or more locally important koala tree species, or one locally important koala tree species that alone accounts for >50 % of the canopy	50	The presence and density of preferred food tree species are key factors that influence the quality of habitat for koalas (DAWE 2022a). The required density of food trees for koalas is poorly known and highly variable across the species' range, therefore density of preferred food tree species has not been included as an indicator. The nutritional quality of available trees, not the diversity of trees, primarily drives foraging decisions and subsequently population density (DAWE 2022a). A locally important koala tree is defined as a tree from a species that is regularly browsed by koalas in a particular area, such that it could be considered a substantial portion of the koala's diet (DAWE 2022a).
		Size of habitat patch	0 – <1 ha patch 1 – 1 - 5 ha patch 2 – 6 - 10 ha patch 3 – 11 - 40 ha patch 4 – 41 - 100 ha patch 5 – >100 ha patch	50	The amount of habitat required to support a population is poorly understood, and definitionally difficult (Youngentob *et al.* 2021). It is influenced by factors such as habitat quality, spacing of trees in the landscape and the availability and use of climate refugia (DAWE 2022a). Koalas have a highly variable home range, but in general are substantially larger in inland semi-arid woodlands (DAWE 2022a). A study undertaken at Blair Athol, approximately 330 km northwest of the Study Area, found a mean home range size of 116 ha (range 5.4 - 296 ha) (Ellis *et al.* 2002). A study undertaken at Springsure, approximately 250 km west of the Study Area, found a mean home range

Attribute	Attribute Weighting (%)	Indicator / Threat Factor	Scoring	Contribution of Indicator to Attribute Weighting (%)	Justification
					size of 80 ha for males (range 30 - 150 ha) and 38 ha for females (range 6 - 90 ha).
Quality and availability of habitat required for shelter and breeding	25	Presence of large trees (BioCondition)	0 – No large trees 1 – 1 - 25 % of large tree benchmark 2 – 26 - 50 % of large tree benchmark 3 – 51 - 75 % large tree benchmark 4 – 76 - 99 % of large tree benchmark 5 – ≥100 % of large tree benchmark	50	Koalas use a wide range of tree species for shelter, preferring larger and more shady trees (DAWE 2022a).
		Presence of refugia (e.g., suitable drainage lines, riparian zones, patches with favourable hydrological systems)	0 – Patch does not contain refugia 3 – Refugia occurs in close proximity to patch (within 1 km) 5 – Refugia present within patch	50	DAWE (2022) identifies climate refugia as a crucial habitat element that provides important shelter for koalas during times of heat and water stress.
Quality and availability of habitat required for mobility	25	Size of habitat patch	0 – <1 ha patch 1 – 1 - <50 ha patch 2 – 50 - <250 ha patch 3 – 250 - >500 ha patch 4 – 500 - <1000 ha patch 5 – ≥1000 ha patch	75	The amount of habitat required to support a population is poorly understood, and definitionally difficult (Youngentob *et al.* 2021). It is influenced by factors such as habitat quality, spacing of trees in the landscape and the availability and use of climate refugia (DAWE 2022a). The scoring is based on guidelines from the superseded *EPBC Act Referral Guidelines for the Vulnerable Koala* (Department of the Environment 2014), which assigns the highest habitat value score to inland habitat that is part of a contiguous

Attribute	Attribute Weighting (%)	Indicator / Threat Factor	Scoring	Contribution of Indicator to Attribute Weighting (%)	Justification
					landscape ≥ 1,000 ha, and the second highest to contiguous vegetation < 1000 ha but > 500 ha. A threshold patch size of 1 ha has been adopted in accordance with the New South Wales government State Environmental Planning Policy (Koala Habitat Protection) 2021 (SEPP 2021).
		Presence of nearby vegetated watercourses	0 = >3 km from suitable vegetated water source 3 = 1 - 3 km from suitable vegetated water source 4 = <1 km from suitable vegetated water source 5 = <500 m from suitable vegetated water source	25	Riparian vegetation facilitates local movement (Davies *et al.* 2013, in DAWE 2022a) and is important in long-distance dispersal (McAlpine *et al.* 2006a and Norman *et al.* 2019, in DAWE 2022a). Further, Melzer *et al.* (2014) observed koala activity as being based around stream-fringing communities, particularly in drier western parts of the study area.
Absence of threats	25	Habitat loss / fragmentation	**Scope** refers to the proportion of the species' habitat or local population within the matter area that can reasonably be expected to be affected by the threat within ten years given the continuation of current circumstances and trends. The scope scoring metrics are provided in detail below Appendix E Table 2 and follow the guide (DES, 2020). **Severity** refers to the level of damage from the threat to the species' habitat/local population that can reasonably be expected given the continuation of current circumstances and trends The severity scoring metrics are provided in detail below Appendix E Table 2 and follow the guide (DES, 2020).	100% for lowest scoring indicator (i.e., the most significant threat)	These threats have been identified in the Conservation Advice (DAWE 2022b) and Recovery Plan (DAWE 2022a) for the species and are considered relevant to the Project.
		Predation by dogs			

Attribute	Attribute Weighting (%)	Indicator / Threat Factor	Scoring	Contribution of Indicator to Attribute Weighting (%)	Justification
		Mortality from vehicle strike			
		Disease including koala retrovirus (KoRV) and Chlamydia (*Chlamydia percorum*)			

Attribute	Attribute Weighting (%)	Indicator / Threat Factor	Scoring	Contribution of Indicator to Attribute Weighting (%)	Justification
		Inappropriate fire regime.			

Appendix E Table 2: Criteria for the assessment of individual threats to the koala. (Umwelt, 2024).

Threat	Score	Scope	Severity
Habitat clearing and fragmentation	1	The site is located within mapped habitat subjected to selective logging, thinning or other tree-loss related practice.	The monitoring site is within breeding/climate refuge habitat (if relevant) AND within 100m to a mapped watercourse AND ground-truthed as remnant status
	2	The site is within a mapped habitat patch AND mapped as Category X/ non-remnant vegetation.	The monitoring site is within breeding or foraging habitat AND ground truthed as non-remnant vegetation
	3	The site is within a habitat patch AND mapped as Category C/ High-value regrowth vegetation or Category R.	The monitoring site is within breeding or foraging habitat AND ground truthed as regrowth vegetation
	4	The site is within a habitat patch AND mapped as Category B/ Remnant vegetation.	The monitoring site is outside but adjacent (within 100m) of mapped breeding or foraging habitat AND ground truthed as regrowth or remnant vegetation (clearing this vegetation would increase edge effect or possibly connectivity of adjacent habitat)
	5	Mapped as Category A vegetation	Mapped as Category A vegetation OR

Threat	Score	Scope	Severity
			The monitoring site is outside of mapped habitat AND within an area ground truthed as non-remnant, OR The monitoring site is outside of mapped breeding or foraging habitat AND not adjacent (>100m away from mapped habitat) AND ground truthed as regrowth or remnant vegetation.
Predation by feral carnivores	1	Feral dogs, cats or foxes present on site, no active management actions to monitor AND no active management actions in place to reduce/ prevent the increase of feral animal numbers AND the species is commonly preyed upon by the feral animals (EPBC recovery plan) to a point where it can remove a population in absence of other threats.	The species is a terrestrial forager, disperser and breeder species spending most of its life on ground AND the species is commonly preyed upon by the feral animals (EPBC recovery plan) to a point where it can remove a population in absence of other threats.
	2	Feral dogs, cats or foxes present on site, no active management actions to monitor AND no active management actions in place to reduce/ prevent the increase of feral animal numbers	The species is terrestrial forager, disperser or breeder species and expected to be on the ground daily during any stage of its annual behavioural cycle AND the species is commonly preyed upon by the feral animals on site (EPBC advice)
	3	Feral dogs, cats or foxes present on site. There are active management actions to monitor AND reduce/ prevent all known species and increase of feral animal numbers anywhere on the site	The species is terrestrial forager, disperser or breeder species and expected to be on the ground daily during any stage of its annual behavioural cycle AND the species is not commonly preyed upon by the feral animals on site (EPBC advice) AND it is expected that feral animals are present
	4	Feral dogs, cats or foxes present on site, active management actions to monitor and reduce/ prevent the increase of feral animal numbers within 3km of the monitoring site.	The species is terrestrial forager, disperser or breeder species and expected to be on the ground weekly during any stage of its annual behavioural cycle OR The habitat patch has been burnt within the past 2 years AND it is expected that feral animals are present

Threat	Score	Scope	Severity
	5	Feral dogs, cats or foxes present on site, active management to monitor and reduce/ prevent the increase of feral animal numbers within 3km of the monitoring site for a minimum of 5 years	The species very rarely comes to ground AND the habitat has not been burnt within the past 2 years AND there are no active feral animal management actions within 250m of the site OR The species very rarely comes to ground AND The habitat has been burnt within the past 2 years AND there are active feral animal management actions within 250m of the site
Inappropriate fire regimes Please use the Bushfire resilience Communities Technical Reference Guide to determine VHC fuel load.	1	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, Recovery plan) AND The patch has a VHC-fuel load greater than 25t/ha AND fire regime not consistent with RE fire management guidelines AND no fire breaks/ non-remnant grassland which provides access for fire response within 100m of the site	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, Recovery plan) AND The patch is one contiguous area (insignificant gaps) greater than 1000ha and the site is within vegetation classified a VHC of at least 15t/ha
	2	The habitat patch has a VHC-fuel load greater than 25t/ha AND fire regime not consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response OR The habitat patch has a VHC fuel load =>15t/ha and <25t/ha AND neither of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	The matter species is predominantly arboreal AND fire is considered to be moderate to severe threat (EPBC conservation advice, Recovery plan) AND The patch is one contiguous area (insignificant gaps) greater than 500ha and the site is within vegetation classified a VHC of at least 15t/ha OR The matter species is not arboreal, fire is considered a severe threat AND The patch is one contiguous area (insignificant gaps) greater than 1000ha and the site is within vegetation classified a VHC of at least 15t/ha
	3	The habitat patch has a VHC-fuel load =>15t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines OR There are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load greater than 25t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	The patch is one contiguous area (insignificant gaps) between 250ha and <500ha and the site is within vegetation classified a VHC of at least 15t/ha OR The patch is one contiguous area greater than 500ha and the site is within vegetation classified a VHC of at least 10t/ha OR The matter species is not arboreal, fire is not considered a severe threat AND The patch is one contiguous area (insignificant gaps)

Threat	Score	Scope	Severity
		OR The habitat patch has a VHC-fuel load less than 15t/ha AND fire regime not consistent with RE fire management guidelines AND no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	greater than 1000ha and the site is within vegetation classified a VHC of at least 15t/ha OR The matter species is not arboreal, fire is not considered a severe threat AND The patch is one contiguous area (insignificant gaps) greater than 500ha and the site is within vegetation classified a VHC of => 15t/ha
	4	The habitat patch has a VHC-fuel load between 15t/ha and <25t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load less than 15t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines OR There are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load less than 10t/ha AND neither of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	The patch is one contiguous area (insignificant gaps) between 100 and <250ha and the site is within vegetation classified a VHC of at least 15t/ha OR The patch is one contiguous area between 250t/ha and <500t/ha and the site is within vegetation classified a VHC of at least 10t/ha OR The patch has a fuel load =<10/tha within one contiguous patch =>250ha OR The matter species is not arboreal, fire is not considered a severe threat AND The patch is one contiguous area (insignificant gaps) greater than 500ha and the site is within vegetation classified a VHC of => 15t/ha OR The matter species is not arboreal, fire is not considered a severe threat AND the site is within vegetation classified a VHC of <15t/ha
	5	The habitat patch has a VHC-fuel load less than 15t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load less than 10t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site	The patch is one contiguous area (insignificant gaps) less than 100ha and the site is within vegetation classified a VHC of at least 15t/ha OR The patch is one contiguous area less than 250ha and the site is within vegetation classified a VHC of =<10t/ha OR The matter species is not arboreal, fire is not considered a severe threat AND the site is within vegetation classified a VHC of <15t/ha

Appendix E Table 3: An assessment of individual threats to the koala.

Threat	Scope	Severity	Score
Habitat loss and subsequent fragmentation	The site is within a habitat patch AND mapped as Category B/ Remnant vegetation = score of 4	The monitoring site is within breeding or foraging habitat AND ground truthed as remnant vegetation = score of 4	4 x 4 = 16
Inappropriate fire regimes	The habitat patch has a VHC-fuel load between 15t/ha and <25t/ha AND fire regime consistent with RE fire management guidelines AND there are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load less than 15t/ha AND one of the following fire management actions are true: fire regime is consistent with RE fire management guidelines OR There are fire breaks/ non-remnant grassland/ access for fire response within 100m of the site OR The habitat patch has a VHC-fuel load less than 10t/ha AND neither of the following fire management actions are true: fire regime is consistent with RE fire management guidelines AND there are no fire breaks/ non-remnant grassland/ access for fire response within 100m of the site = score of 4	The patch is one contiguous area (insignificant gaps) between 250ha and <500ha and the site is within vegetation classified a VHC of at least 15t/ha OR The patch is one contiguous area greater than 500ha and the site is within vegetation classified a VHC of at least 10t/ha OR The patch is one contiguous area (insignificant gaps) greater than 1000ha and the site is within vegetation classified a VHC of at least 15t/ha OR The patch is one contiguous area (insignificant gaps) greater than 500ha and the site is within vegetation classified a VHC of => 15t/ha = score of 4	4 x 4 = 16
Predation by feral carnivores	Feral dogs, cats or foxes present on site, no active management actions to monitor AND no active management actions in place to reduce/ prevent the increase of feral animal numbers = score of 2.	The species is terrestrial forager, disperser or breeder species and expected to be on the ground daily during any stage of its annual behavioural cycle AND the species is commonly preyed upon by the feral animals on site (EPBC advice) = score of 2.	2 x 2 = 4
Threat score utilise in assessment (lowest number is used)			**4**

Greater Glider (southern and central) (*Petauroides volans*)

Recent taxonomic work suggests the greater glider (*Petauroides volans lato sensu*) is a composite species and should be recognised as three distinct taxa, although these are not yet officially recognised by some authorities (DCCEEW, 2022). All three species, including the greater glider (southern and central) are protected under legislation as *P. volans* (sensu lato).

Occurrence and habitat

Clements creek is located within the distribution of the greater glider. Presence of this species has been confirmed by desktop assessment, literature review and multiple individuals observed during fieldwork undertaken for this habitat quality assessment (Earthtrade, 2024) (LEC, 2023).

The greater glider is an arboreal nocturnal marsupial predominately solitary and largely restricted to eucalypt forests and woodlands of eastern Australia. It is generally found in highest abundance within taller moist eucalypt forest on fertile soils, with relatively old trees and abundant hollows.

Estimating species habitat attributes

Habitat scoring for the koala has been previously formulated in the Brigalow Belt by Sander and Stanton (2021). The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

It has been determined (Sanders and Stanton , 2021) that quality of habitat required for 'foraging', 'shelter', 'breeding' and 'mobility' utilises the following factors to predict greater glider habitat amenity (refer to Appendix E Table 4). Each factor was given a weighting to produce total maximum score of 25 for each component of habitat quality.

Appendix E Table 4: Habitat quality components, factors and weighting.

Habitat Quality Component	Factor	Weighting
Foraging Habitat	Number of large eucalyptus trees (%) compared to the benchmark	25
Shelter and Breeding	Trees (including stags) containing hollows >20cm diameter (total/ha)	25
Mobility	Canopy cover (T1) %	25

Number of large eucalyptus trees compared to the benchmark taken from BioCondition assessments is utilised to estimate the quality of 'foraging' habitat (Appendix E Table 5).

Trees (including stags) containing hollows larger than 20cm in diameter is utilised to estimate the quality of 'shelter' and 'breeding' habitat.

Canopy cover percent (T1) collected during BioCondition assessments used to assess the quality of habitat used for 'mobility'.

The criteria and scoring metric for each factor of 'foraging', 'shelter', 'breeding' and 'mobility' is detailed in Appendix E Table 5 to Appendix E Table 7.

The criteria for the assessment for the absence of threats is provided in Appendix E Table 8, and the assessment for the absence of threats is provided in Appendix E Table 9.

Quality of habitat required for foraging

Greater gliders are described as having a strictly 'eucalyptus' diet but will also occasionally take flowers and rarely phyllodes of *Acacia* spp. and mistletoe leaves (Lindenmayer, 2002) (Kavanagh and Wheeler, 2004) (Woinarski, Burbidge and Harrison , 2012). Studies have found a preference for young leaves or particular eucalypt species, with selection likely related to leaf nutrient concentration (Kavanagh, 1990) (Lindenmayer, 2002) (Eyre, 2006). Dietary selection in the southern Brigalow Belt is poorly understood with a single study finding foraging animals most often in *E. moluccana, E. fibrosa* and *Corymbia citriodora* (Smith, 2007). A study of greater gliders across the broader southeast Queensland region (including the Brigalow Belt Bioregion) also *identified E. tereticornis* and *E. citriodora* as predictors of greater glider presence in drier forests (Eyre, 2006)). In contrast found greater gliders showing a preference for *E. acmenoides* over other eucalypts, which included *E. tereticornis* and *C. citriodora*, despite other eucalypts having higher nutrient content (Comport, 1996).

Without a detailed understanding of leaf nutrient, toxicity and fibre content it is difficult to predict and score foraging amenity for greater glider; however, even with this understanding these parameters would be difficult to measure in the field. Many studies have identified tree size as being important for greater gliders. Smith et al., (2007) found gliders only in trees with a diameter at breast height (DBH) of >20 cm and most in trees 30-70 cm in size; use of trees <30 cm was less than expected based on tree availability. Other studies have also noted tree size (Kavanagh, 1990); (Eyre, 2006) or leaf biomass (Comport, 1996) as an important predictor of greater glider activity. Considering these factors, foraging habitat has been scored by comparing the abundance of large eucalypts against the benchmark for each RE as in Appendix E Table 5. This is more measurable in the field than leaf nutrient content.

It is noted this scoring system may have co-dependence with 'shelter and breeding' as suitably large hollows are also correlated to tree size (Smith, 2007). Furthermore, each different RE will have a different DBH threshold and the abundance of eucalypts between REs will vary. This measure is useful for comparing the same RE, or at the very least REs pre-grouped according to habitat value. It is not suitable for evaluating which of two or more REs have the higher amenity.

Appendix E Table 5: Criteria for scoring foraging habitat for the greater glider – Number of large eucalyptus trees (%) compared to the benchmark. Estimated from BioCondition methodology (Eyre T. &., 2011).

Number of large eucalyptus trees compared to the benchmark (%)	<10	>10 -30	>30-50	>50-70	>70-90	>90
Score	0	5	10	15	20	25

Quality of habitat required for shelter and breeding

The sheltering and breeding requirements of greater gliders are relatively well understood. They require large old-growth trees with abundant large hollows. Both live and dead trees will be used but

most den trees are living (Kavanagh and Wheeler, 2004). Preferred hollows are typically higher in the canopy, and deeper hollows with a large internal cavity are preferred over shallow hollows (Lindenmayer, 2002). Hollow entrance size is poorly documented but is likely around 18 cm (Goldingay, 2012).

In south-east Queensland the greater glider is often absent from sites supporting fewer than six hollow-bearing trees per hectare (Lindenmayer, 2002). Studies in Barakula State Forest in the southern Brigalow Belt found female greater gliders inhabited areas with, on average, 3.8 den trees per hectare while male home ranges had far fewer, on average 0.9 den trees per hectare (Smith, 2007), although males used slightly more hollow-bearing trees overall (4-20, average 11) than females (6-18, average 10). The scoring system below is based on this work and evaluates habitats based on the number of trees containing hollows >20 cm diameter, see Appendix E Table 6.

Appendix E Table 6: Criteria for scoring shelter and breeding habitat for the greater glider – Trees (including stags) containing hollows >20cm diameter (total/ha) Estimated from BioCondition methodology (Eyre T. &., 2011).

Trees (incl. stags) containing hollows >20 cm dia. (total/ha)	0	1-3	4-5	6-7	8-9	>9
Score	0	5	10	15	20	25

Quality of habitat required for mobility

Greater gliders have little body fat and animals can lose condition quickly (Lindenmayer, 2002). Rapid long-distance movements by the species are unlikely, especially across habitats where there are few hollows for 'stop-overs'. This may explain their low dispersal through fragmented and/or heavily logged landscapes where hollow-bearing tree density has been reduced.

In contrast to most other glider species, greater gliders spend a significant portion (40%) of their time resting (Comport, 1996) (Lindenmayer, 2002). They are also much slower to move and more reluctant to glide than other Australian gliding mammals. Unlike a number of other arboreal mammal species such as the brushtail possum, they are rarely observed venturing to the ground.

In addition to hollow density, these behaviours suggest canopy density may be important for facilitating greater glider movement. Despite their ability to glide large distances if required, often in excess of 50 m (Lindenmayer, 2002), overlapping canopies which allow animals to efficiently move without the need to glide may be more amenable. This may affect habitat selection, with greater gliders being rare in comparatively open woodlands despite tall forage trees and abundant hollows. Conversely, overly dense regrowth forest is believed to impair the movement of greater gliders (Lindenmayer, 2002). The scoring and metrics summarised in Appendix E Table 7, which reflects canopy cover, is based on canopy intercept data collected as per the BioCondition Assessment Manual (Eyre T. &., 2011).

Appendix E Table 7: Criteria for scoring mobility habitat for the greater glider – Canopy cover (T1)%. Estimated from BioCondition methodology (Eyre T. &., 2011).

Canopy Cover (T1)%	0-39	40-49	50-59	60-69	70-79	≥80
Score	0	5	10	15	20	25

Absence of threats

The main threatening processes to greater glider populations and habitat consist of (DCCEW, 2022):

- Habitat loss and subsequent fragmentation
- Timber logging/production (assessed with habitat loss and subsequent fragmentation)
- Inappropriate fire regimes
- Barbed wire fencing entanglement, and
- Climate change (not assessed).

The criteria and scoring metrics used to assess absence of threats is summarised below in Appendix E Table 8. Threats to the greater glider were assessed using the following:

- Scope – the proportion of the species habitat or local population that can reasonably be expected to be affected by the threat.
- Severity – within the scope, the level of damage from the threat the species habitat or local population that can reasonably be expected, given the current circumstances and trends.
- For each threat, a score between 1 and 25 is determined by multiplying the score assigned to the scope and severity of that threat.
- A threat with a score of 1 poses a very high threat, conversely, a threat with a score of 25 poses a very low threat to the species
- The overall score for the assessment of threats is determined by the highest threat, which is the lowest number.

The results from the assessment of absence of threats utilised in the habitat quality score for the OIA is detailed in Appendix E Table 9.

Appendix E Table 8: Criteria and scoring metric used to assess absence of threats for the greater glider – modified from the Guide.

Threat	Score	Scope	Severity
Habitat loss and subsequent fragmentation	1	Area is planned to be logged or is entirely cleared	80 – 100% of the area is likely to be entirely cleared or entirely modified within 10 years
	2	Land clearing is expected	40 – 79 % of the area is likely to be entirely cleared or entirely modified within 10 years
	3	Whilst land clearing is not expected both properties have been heavily logged as evidenced by the lack of large trees	11 – 39 % of the area is likely to be entirely cleared or entirely modified within 10 years
	4	Land is protected by regulated vegetation	6-10% of the area is likely to undergo minor impact land clearing (fencing, cattle yard etc) within 10 years
	5	Area is within a national park, nature refuge or offset area	As there is no scope for land clearing to occur within 10 years
Inappropriate fire regimes	1	Fire will impact destroy/degrade the 80-100% of greater glider habitat	Very high intensity fires will destroy most greater glider habitat
	2	Fire will impact destroy/degrade the 60 - 79% of greater glider habitat	High intensity fires will impact will greater glider habitat
	3	Areas of remnant and HVR greater glider habitat have been impacted by severe wildfires within the last ten years. Based on these historical trends up to 50% of suitable habitat may be affected within a ten-year period	Impacts of fire on habitats and greater glider populations is subject to fire intensity. Low heat fires, which tend to not affect the canopy, will have only small to negligible impacts to the population. High intensity wildfires may have a much greater impact. It is difficult to guess the types of fires likely in the OIA within the next 10-years but, on historical evidence, is rated as moderate
	4	Fire will impact 20-39% of greater glider habitat	Naturally occurring low intensity fires will have unplanned impact to greater glider habitat
	5	Fire will impact 1-19% of greater glider habitat	Fire management will limit the impact of fire
Barbed wire fencing entanglement	1	Barbed wire within 20m multiple hollow bearing trees within 1ha	Barbed wire entanglement is likely to impact 80-100% of populated
	2	Barbed wire within 20m of one hollow bearing tree within 1ha	Barbed wire entanglement is likely to impact 40-79% of populated
	3	Barbed wire is limited to cleared or mostly cleared areas	Barbed wire entanglement is likely to impact 11-39% of populated
	4	Barbed wire fences are present but do not cover a large portion of the property	Barbed wire entanglement is likely to impact 6-10% of populated
	5	No barbed wire or top strand is not barbed throughout the propety	In the event of a barbed wire entanglement, it is unlikely that more than 1-5% of the population will be impacted

Appendix E Table 9: An assessment of individual threats to the greater glider.

Threat	Scope	Severity	Score
Habitat loss and subsequent fragmentation	Land is protected by regulated vegetation = score of 4.	6-10% of the area is likely to undergo minor impact land clearing within 10 years for tracks and fire breaks = score of 4.	4 x 4= 16
Inappropriate fire regimes	A conservative estimate has been made that areas of remnant greater glider habitat have been impacted by sever wildfires within the last ten years. = Based on these historical trends up to 50% of suitable habitat may be affected within a ten-year period = score of 3.	Due to the lack of data, a conservative estimate has been made. Impacts of fire on habitats and greater glider populations is subject to fire intensity. Low heat fires, which tend to not affect the canopy, will have only small to negligible impacts to the population. High intensity wildfires may have a much greater impact. It is difficult to guess the types of fires likely in the OIA within the next 10-years but, on historical evidence, is rated as moderate = score of 3.	3 x 3 = 9
Barbed wire fencing entanglement	Barbed wire is limited to cleared or mostly cleared areas. There are some barbed fire fences near mapped breeding habitat = score of 3.	A conservative estimate has been made that Barbed wire entanglement is likely to impact 11-39% of populated = score of 3	3 x 3 = 9
Threat score utilise in assessment (lowest number is used)			**9**

Squatter pigeon (*Geophaps scripta scripta*)

Occurrence and habitat

Clements creek is located within the distribution of the squatter pigeon. Presence of this species has been confirmed by desktop assessment, literature review and multiple individuals observed during fieldwork undertaken for this habitat quality assessment (Earthtrade, 2024) (LEC, 2023).

Squatter pigeons occur in open forest to sparse open woodlands which are dominated by *Eucalyptus, Corymbia*, *Acacia* and or *Callitris* species, within 3 km of permanent or seasonal water (DCCEEW, 2024). This includes open forests to sparse open woodlands and scrub that are in remnant or regrowth condition and partly modified vegetation communities (DCCEEW, 2024). Foraging habitat generally consist of, but is not restricted to well-draining sandy or gravel based soils that support open forest to woodland communities with patchy tussock grassy understories within 3km of a permanent or seasonal waterbody (DCCEEW, 2024). Squatter pigeons mainly forage on fallen seeds from low vegetation, including grasses, herbs and shrubs (DCCEEW, 2024). Breeding habitat occurs on stony rises with sandy or gravel soils within 1 km of a permanent waterbody (DCCEEW, 2024).

Both foraging and breeding habitat:

- Generally, consists of, but not restricted to low to gently sloping, flat to undulating plains and foothills (Regional Ecosystem Land Zone 5) and lateritic (duplex) soils on low jump-ups and escarpments (Regional Ecosystem Land Zone 7) (DCCEW, 2024).
- Typically, a ground cover layer that is considerably patchy consisting of native, perennial tussock grasses or a mix of perennial tussock grasses and low shrubs or forbs. This patchy ground cover layer rarely exceeds 33%. The remaining ground surface consists of bare patches of gravelly or dusty soil and leaf litter (DCCEW, 2024).

Estimating species habitat attributes

Habitat scoring for the squatter pigeon has been previously formulated in Central Queensland by Sander and Stanton (2021) and BAAM (2021). The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

Quality of habitat required for foraging, shelter and breeding and mobility

Squatter pigeons utilise similar habitat for most of their life-cycle, including foraging, sheltering, breeding and movement. Typically, inhabiting open forest to sparse open woodlands with a sparse to patchy ground cover (<33%) and within 3km to water.

Squatter pigeons are known to be relatively localised. However, there is evidence indicating squatter pigeon is more widespread (Cooper RM, 2014). It is likely squatter pigeons are highly mobile birds capable of covering distances quickly over a variety of remnant and no-remnant patches.

It has been determined (BAAM, 2021) (Sanders and Stanton , 2021) that quality of habitat required for ‘foraging’, ‘shelter’, ‘breeding’ and ‘mobility’ utilises the following factors to predict squatter pigeon habitat amenity (refer to Appendix E Table 10). Each factor was given a weighting to produce total maximum score of 25 for each component of habitat quality.

Appendix E Table 10: Habitat quality components, factors and weighting.

Habitat Quality Component	Factor	Weighting
Foraging Habitat	Ground Cover	10
	Native grass species richness	10
	Soil type	5
Shelter and Breeding	Canopy cover	20
	Soil type	5
Mobility	Distance to water	25

Ground cover (weighting 10), native grass species richness (weighting 10), soil type (weighting 5) taken from BioCondition assessments is utilised to estimate the quality of 'foraging' habitat (refer to Appendix E Table 11 to Appendix E Table 13).

Canopy cover (weighting 20) and soil type (weighting 5) collected during BioCondition assessments is utilised to estimate the quality of 'shelter' and 'breeding' habitat (refer to Appendix E Table 14 to Appendix E Table 15).

Distance to water (weighting 25) determined from GIS aerial imagery and on-ground observations of watering points is used to assess the quality of habitat used for 'mobility', refer to Appendix E Table 16

The criteria for the assessment for the absence of threats is provided in Appendix E Table 17, and the assessment for the absence of threats is provided in Appendix E Table 18.

Appendix E Table 11: Criteria for scoring foraging habitat for the squatter pigeon – Percent of leaf debris and bare ground. Estimated from BioCondition methodology (Eyre T. &., 2011).

Leaf debris and Bare ground (%)	<60	≥ 60 – 70	≥70
Score	0	5	10

Appendix E Table 12: Criteria for scoring foraging habitat (availability of food) for the squatter pigeon - presence of legumes and native grass species richness. Estimated from BioCondition methodology (Eyre T. &., 2011).

Availability of food	Criteria	Score
	Few or no legumes and or native grass present (including Stylo). Native grass species richness score 0-1.	0
	Legumes and/or native grass present. Native grass species richness scores 2.5	5
	Legumes and/or native grass present Native grass species richness scores 5	10

Appendix E Table 13: Criteria for scoring foraging habitat (availability of soil type) for the squatter pigeon – presence of suitable soil.

Soil type	Criteria	Score
	Does not comply with below	0
	Well draining, sandy or gravelly soil, low, gently sloping, flat to undulating plains and foothills or lateritic soils on low jump ups and escarpments	5

Appendix E Table 14: Criteria for scoring shelter and breeding habitat for the squatter pigeon – canopy cover (T1 + T2). Estimated from BioCondition methodology (Eyre T. &., 2011).

Canopy (T1 + T2) cover (%)	0-30	>30-50	>50-60	>60-70	>70-80	>80
Score	20	16	12	8	4	0

Appendix E Table 15: Criteria for scoring shelter and breeding habitat (availability of soil type) for the squatter pigeon – presence of suitable soil.

Soil type	Criteria	Score
	Does not comply with below	0
	Well draining, sandy or gravelly soil, low, gently sloping, flat to undulating plains and foothills or lateritic soils on low jump ups and escarpments	5

Squatter pigeon utilise a selection of waterbodies and water sources, including artificial/manmade features consisting of, but not limited to water troughs and dams. These features are difficult to detected using GIS software, thus, the quality of mobility habitat score may not always reflect on-ground conditions. Subsequently, manual variation of these scores may be included in the analysis based on ground truthed results.

Appendix E Table 16: Criteria for scoring mobility habitat for the squatter pigeon – distance to water. Determined from GIS analysis and ground truth results.

Distance to water (km)	0 -1	>1-2	>2-3	>3-4	>4-8	>8
Score	25	20	15	10	5	0

Absence of threats

The main threatening processes to squatter pigeon populations and habitat consist of (DCCEW, 2024):

- Loss and fragmentation of habitat
- Degradation of habitat by domesticated herbivores
- Degradation of habitat by exotic weeds
- Predation from native and exotic predators.

The criteria and scoring metrics used to assess absence of threats is summarised below in Appendix E Table 17. Threats to the squatter pigeon were assessed using the following:

- Scope – the proportion of the species habitat or local population that can reasonably be expected to be affected by the threat.
- Severity – within the scope, the level of damage from the threat the species habitat or local population that can reasonably be expected, given the current circumstances and trends.
- For each threat, a score between 1 and 25 is determined by multiplying the score assigned to the scope and severity of that threat.
- A threat with a score of 1 poses a very high threat, conversely, a threat with a score of 25 poses a very low threat to the species

- The overall score for the assessment of threats is determined by the highest threat, which is the lowest number.

The results from the assessment of absence of threats utilised in the habitat quality score for the OIA is detailed in Appendix E Table 18.

Appendix E Table 17: Criteria and scoring metric used to assess absence of threats for the squatter pigeon – modified from the Guide.

Threat	Score	Scope	Severity
Loss and fragmentation of habitat	1	Area is planned to be logged or is entirely cleared	80 – 100% of the area is likely to be entirely cleared or entirely modified within 10 years
	2	Land clearing is expected	40 – 79 % of the area is likely to be entirely cleared or entirely modified within 10 years
	3	Whilst land clearing is not expected both properties have been heavily logged as evidenced by the lack of large trees	11 – 39 % of the area is likely to be entirely cleared or entirely modified within 10 years
	4	Land is protected by regulated vegetation	6-10% of the area is likely to undergo minor impact land clearing (fencing, cattle yard etc) within 10 years
	5	Area is within a national park, nature refuge or offset area	As there is no scope for land clearing to occur within 10 years
Degradation of habitat by domesticated herbivores	1	Domesticated herbivores will degrade the 80-100% of squatter pigeon habitat.	80 – 100% of squatter pigeon habitat is likely to degraded by domesticated herbivores within 10 years.
	2	Domesticated herbivores will degrade the 60 - 79% of squatter pigeon habitat.	40 – 79% of squatter pigeon habitat is likely to degraded by domesticated herbivores within 10 years.
	3	Domesticated herbivores will degrade 40 - 59% of squatter pigeon habitat.	11 – 39% of squatter pigeon habitat is likely to degraded by domesticated herbivores within 10 years.
	4	Domesticated herbivores will degrade 20-39% of squatter pigeon habitat.	6 – 10% of squatter pigeon habitat is likely to degraded by domesticated herbivores within 10 years.
	5	Domesticated herbivores will degrade 1-19% of squatter pigeon habitat.	5% or less of squatter pigeon habitat is likely to degraded by domesticated herbivores within 10 years
Degradation of habitat by exotic weeds	1	Exotic weeds will degrade the 80-100% of squatter pigeon habitat.	80 – 100% of squatter pigeon habitat is likely to degraded by exotic weeds within 10 years.
	2	Exotic weeds will degrade the 60 - 79% of squatter pigeon habitat.	40 – 79% of squatter pigeon habitat is likely to degraded by exotic weeds within 10 years.
	3	Exotic weeds will degrade 40 - 59% of squatter pigeon habitat.	11 – 39% of squatter pigeon habitat is likely to degraded by exotic weeds within 10 years.
	4	Exotic weeds will degrade 20-39% of squatter pigeon habitat.	6 – 10% of squatter pigeon habitat is likely to degraded by exotic weeds within 10 years.
	5	Exotic weeds will degrade 1-19% of squatter pigeon habitat.	5% or less of squatter pigeon habitat is likely to degraded by exotic weeds within 10 years
Predation from native and exotic predators	1	The area is heavily disturbed, with no cover and dingo/wild dog have been detected.	No predator control is planned.
	2	Area has limited cover and dingo/wild dog have been detected.	Without increased pest management it is estimated that predation is likely to affect or reduce the species.

Threat	Score	Scope	Severity
	3	All areas have the potential to be affected by dingo/wild dog predation. Evidence of predators was observed in areas outside of tracks and disturbance.	Without increased pest management it is estimated that predation is unlikely to affect or reduce the species'.
	4	All areas have the potential to be affected by dingo/wild dog predation. Limited to no evidence of dingo/wild dog was observed however predator activity will largely be limited to tracks and areas of disturbance which facilitate ease of hunting.	Unmanaged pest control is in place.
	5	Limited areas have the potential to be impacted by dingo/wild dog predation - high shrub and dense ground cover impacts hunting success or area is fenced.	Managed pest control is in place.

Appendix E Table 18: An assessment of individual threats to the squatter pigeon.

Threat	Scope	Severity	Score
Loss and fragmentation of habitat	Land is protected by regulated vegetation – entire OIA is remnant vegetation Category B = score of 4.	6-10% of the area is likely to undergo minor impact land clearing (fencing, cattle yard etc) within 10 years due to fire breaks and fencing = score of 4.	4 x 4 = 16
Degradation of habitat by domesticated herbivores	Domesticated herbivores will degrade 20-39% of squatter pigeon habitat. Within the OIA, cattle have grazed for a considerable amount of time and grazing has not decreased ground cover to a significant degree = score of 4.	11 – 39% of squatter pigeon habitat is likely to degraded by domesticated herbivores within 10 years. Due to the lack of data, a conservative estimate has been made. Squatter pigeons are often found in non-remnant paddocks that are heavily grazed = score of 3	4 x 3 = 12
Degradation of habitat by exotic weeds	Exotic weeds will degrade 40 - 59% of squatter pigeon habitat. Invasive grasses can invade remnant vegetation, especially near non-remnant vegetation where exotic pasture such as buffel grass can create homogenous thick ground cover that is unsuitable for the squatter pigeon = score of 3.	11 – 39% of squatter pigeon habitat is likely to degraded by exotic weeds within 10 years. Due to the lack of data, a conservative estimate has been made. Squatter pigeons are often found in non-remnant paddocks = score of 4	3 x 3 = 9
Predation from native and exotic predators	All areas have the potential to be affected by dingo/wild dog predation. Evidence of predators was observed in areas outside of tracks and disturbance. Dingo/wild dog tracks were detected within the OIA and there is no barriers that are likely to reduce their impact on the squatter pigeon = score of 3.	Without increased pest management it is estimated that predation is unlikely to affect or reduce the species population. However, despite lack of predator control, squatter pigeons has persisted within the OIA. As such a conservative score of three was given = score of 3.	3 x 3 = 9
Threat score utilise in assessment (lowest number is used)			**9**

Ornamental snake (*Denisonia maculata*)

Occurrence and habitat

Clements creek is located within the distribution of the ornamental snake. Presence of this species has been confirmed by desktop assessment and literature review (Earthtrade, 2024). Ornamental snake has been identified and mapped within the OIA.

The ornamental snake is known to inhabit brigalow (*Acacia harpophylla*) forest growing on cracking gilgai clays, riverside woodland, and open forest growing on natural levees (Wilson, 2020). This habitat preference was believed to reflect the relative abundance of its primary food source – native frogs (Cogger, 2018). At a brigalow woodland site near Nebo, snakes were only found in the vicinity of a complex of flooded gilgai, where there was an abundance of frog prey, however snakes were not found in nearby riparian and floodplain woodland vegetation (Veary, 2011). Activity levels, and hence highest potential for ornamental snake detection, are typically restricted to periods following suitable summer rainfall events which create optimum conditions for its favoured prey to be most active and concentrated around frog breeding sites. The above suggest the opportunity to detect the ornamental snake is highly constrained by gilgai habitat with cracking clays and wet weather conditions (Veary, 2011).

During the day, the snake shelters, in cracking clays, litter and fallen timber (Cogger, 2000), becoming active only at night. Suggesting that coarse woody debris may also be an important component of good quality ornamental snake habitat (Veary, 2011).

Ornamental snake habitat has been defined as (Kerswell A, 2020) (Andrew Veary, 2011):

- Low areas of the catchment that are subject to flooding and frequent inundations
- Gilgais of varying size and depth
- Soils with high clay content, that have higher water retention and are subject to cracking when dry
- Gilgai habitat with abundant logs and coarse woody debris
- Abundant seasonal frog populations
- Patches of habitat typically larger than 10 ha that are connected to or within large areas of remnant vegetation.

“Preferred” ornamental snake ornamental snake habitat has been defined as (Kerswell A, 2020):

- *Gilgai depressions (with or without the presence of brigalow or canopy vegetation), mounds and wetlands on cracking clays (predominately Land Zone 4) where essential microhabitat features are present including an abundance of deep soil cracks. Other microhabitat features including fallen woody debris may or may not be present. Seasonal flooding of habitat area is a requirement.*

*“*Suitable” ornamental snake habitat has been defined as:

- *Suitable areas are defined as areas that are currently or previously dominated by brigalow or coolabah communities where gilgai or soil cracks are infrequent and or shallow, including non-remnant areas.*

"Marginal" ornamental snake habitat, has been defined as (Kerswell A, 2020):

- *Area currently or previously dominated by brigalow or coolabah communities where gilgais or soil cracks are infrequent or are shallow or non-remnant areas where threats are high (high abundance of weed incursion and cattle compacting soils) but the species still have potential to occur, especially in times where water is present and prey abundance (frogs) is high.*

Estimating species habitat attributes

The majority of regional ecosystems within the OIA have been considered ornamental snake habitat based on records of on desktop assessments and literature review.

The occurrence and quality of frog habitat in the form gilgais or cracking clays have been used as a surrogate to assess the quality of habitat required for foraging.

Quality of habitat required for foraging

The ornamental snake feeds on primarily on frogs that utilise a complex network of gilgais and cracking clay of various sizes.

The criteria to assess foraging habitat is summarised in Appendix E Table 19.

Appendix E Table 19: Criteria to assess ornamental snake foraging habitat.

Score	Criteria
0	No Frog habitat – no gilgai or cracking clays.
5	Non-remnant areas with brigalow or coolabah communities with soil cracks and gilgai that are infrequent cracks or shallow cracks.
10	Currently or previously dominated by brigalow or coolabah communities where gilgai or soil cracks are infrequent or are shallow
15	Areas containing gilgai that have deep varying cracking clays or gilgai of varying sizes. That habitat is more than more than 1 km from a watercourse or not subject to flooding
20	Extensive gilgai with or without brigalow or other canopy vegetation that contains deep varying cracking clays **or** gilgais of varying sizes. That habitat must be within 1 km of a watercourse or in a area subject to flooding
25	Extensive gilgai with or without brigalow or other canopy vegetation that contains deep varying cracking clays **and** gilgai of varying sizes. That habitat must be within 1 km of a watercourse or in a area subject to flooding

Quality of habitat required for shelter and breeding

The quality of shelter and breeding habitat and mobility habitat (refer to Appendix E Table 20 and Appendix E Table 21) is estimated using the following:

- Assessing the extensiveness and complexity of gilgai formation, cracking clays and distance from a watercourse or is the area is subject to flooding.
- The amount (m/ha) of coarse woody debris.

Veary (2011) demonstrated that gilgai formations with deep cracking clay soils are vital indicators for ornamental snake presence. This largely relates to the landscapes ability to capture water allowing for ornamental snake prey items (frogs) to complete the breeding cycle (discussed above). However, deep cracking clays and to a lesser extinct coarse woody debris provides refugia for the ornamental snake to shelter and breed (Andrew Veary, 2011). Mobility is also impacted by the

presence/abundance of cracking clays and coarse woody debris, where presumably ornamental snakes use cracking clays to move across landscape and coarse woody debris is used for dry season refugia (Andrew Veary, 2011). Subsequently, the quality of shelter and breeding habitat and the quality of mobility habitat is assessed using the same criteria and metrics.

Appendix E Table 20: Criteria for scoring shelter and breeding habitat and mobility habitat for the ornamental snake - areas availability of gilgai with abundant deep cracking clays.

Land scape values.	Criteria	Score
	No gilgai or cracking clays.	0
	Non-remnant areas with brigalow or coolabah communities with soil cracks and gilgai that are infrequent cracks or shallow cracks.	4
	Currently or previously dominated by brigalow or coolabah communities where gilgai or soil cracks are infrequent or are shallow	8
	Areas containing gilgai that have deep varying cracking clays or gilgai of varying sizes. That habitat is more than more than 1 km from a watercourse or not subject to flooding	12
	Extensive gilgai with or without brigalow or other canopy vegetation that contains deep varying cracking clays **or** gilgais of varying sizes. That habitat must be within 1 km of a watercourse or in a area subject to flooding	16
	Extensive gilgai with or without brigalow or other canopy vegetation that contains deep varying cracking clays **and** gilgai of varying sizes. That habitat must be within 1 km of a watercourse or in a area subject to flooding	20

While the shelter and breeding habitat and mobility habitat of the ornamental snakes relies heavily on cracking clays and gilgai formation, coarse woody debris to some extent has been demonstrated as suitable dry season refugia. The scoring and metrics assessing coarse woody are weighted less to reflect that and are summarised in Appendix E Table 21.

Appendix E Table 21: Criteria for scoring shelter and breeding habitat and mobility habitat for the ornamental snake - coarse woody debris assessed using the BioCondition Method (Eyre T. &., 2011).

Coarse Woody Debris (m/ha)	<100	100-200	200-300	300-400	400-500	>500
Score	0	1	2	3	4	5

Absence of threats

The key threats to the ornamental snake and ornamental snake habitat consist of (DCCEEW, 2024):

- Past broad scale land clearing and habitat degradation (not assessed)
- Current habitat clearing
- Habitat destruction caused by cattle and pigs by the trampling and pugging of gilgai and cracking clays
- Cane toads (not assessed).

Whilst the ornamental snake conservation advice (DCCEEW, 2024) lists cane toads as a threat to the ornamental snake, there appears to be no correlation between these two species in relation to relative abundances (Andrew Veary, 2011). Subsequently, cane toads was not used in the following assessment of threats.

The criteria and scoring metrics used to assess absence of threats is summarised below in Appendix E Table 22. Threats to the ornamental snake were assessed using the following:

- Scope – the proportion of the species habitat or local population that can reasonably be expected to be affected by the threat.
- Severity – within the scope, the level of damage from the threat the species habitat or local population that can reasonably be expected, given the current circumstances and trends.
- For each threat, a score between 1 and 25 is determined by multiplying the score assigned to the scope and severity of that threat.
- A threat with a score of 1 poses a very high threat, conversely, a threat with a score of 25 poses a very low threat to the species
- The overall score for the assessment of threats is determined by the highest threat, which is the lowest number.

The results from the assessment of absence of threats utilised in the habitat quality score for the OIA is detailed in Appendix E Table 23.

Appendix E Table 22: Criteria and scoring metric used to assess absence of threats for the ornamental snake – modified from the Guide.

Threat	Score	Scope	Severity
Loss and fragmentation of habitat	1	Area is planned to be logged or is entirely cleared	80 – 100% of the area is likely to be entirely cleared or entirely modified within 10 years
	2	Area is isolated with gaps from other suitable habitat greater than 1km	40 – 79 % of the area is likely to be entirely cleared or entirely modified within 10 years
	3	Area is fragmented with gaps from other suitable habitat less than 1 km	11 – 39 % of the area is likely to be entirely cleared or entirely modified within 10 years
	4	Area is contiguous with privately owned land with no protections, or area is fragmented and less than 500m from protected land, land clearing is not expected to occur within the next 10 years	6-10% of the area is likely to undergo minor impact land clearing (fencing, cattle yard etc) within 10 years
	5	Area is contiguous with protected land. Land clearing with not expected to occur within the next 10 years.	As there is no scope for land clearing to occur within 10 years
Degradation of habitat by domesticated herbivores	1	Feral pigs and or cattle are actively destroying large areas (>100m2) of the habitat	80 – 100% Feral pigs or cattle will have significantly reduced remaining Ornamental snake habitat and frog populations within 10 years
	2	Feral pigs and or cattle are actively destroying moderate sized areas (<100m2) + of the habitat.	40 – 79% Feral pigs or cattle will have significantly reduced remaining Ornamental snake habitat and frog populations within 10 years
	3	Moderate signs of pigs or cattle within the area - wallows, greater than 5 scat piles of cattle dung identified within 20 mins or fresh footprints	11 – 39% within 10 years. While pigs or cattle may impact the area, it is likely to modify crackling clay due it is isolation to other suitable habitat.
	4	Minor signs of pigs or cattle within the area, no wallows, less than 5 scat piles of pig/cattle dung identified withing 20 mins, fresh footprints	6 – 10% Feral pigs or cattle will have minor impacts on the area within 10 years.
	5	Limited signs of pigs or cattle, no wallows, one scat piles of pig/cattle dung identified within 20 mins and no fresh foot prints.	5% or less – Feral pigs or cattle will have limited to no impacts on the area within 10 years.

Appendix E Table 23 An assessment of individual threats to the ornamental snake.

Threat	Scope	Severity	Score
Loss and fragmentation of habitat	Area is contiguous with privately owned land with no protections, or area is fragmented and less than 500m from protected land, land clearing is not expected to occur within the next 10 years = score of 4.	6-10% of the area is likely to undergo minor impact land clearing (fencing, cattle yard etc) within 10 years = score of 4.	4 x 4 = 16
Degradation of habitat by domesticated herbivores	Minor signs of pigs or cattle within the area, no wallows, less than 5 scat piles of pig/cattle dung identified withing 20 mins, fresh footprints = score of 4.	6 – 10% Feral pigs or cattle will have minor impacts on the area within 10 years = score of 4.	4 x 4 = 16
Threat score utilise in assessment (lowest number is used)			**16**

12.0 Appendix F

Habitat quality sheets

12.1 Brigalow TEC (RE 11.3.1) Habitat Quality

See next page.

	11.3.1																				
																					11.3.1
	11.3.1	CBC3			CBC5			CBC6			CBC7			CBC8			CBC17			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Average Bi	Average Sc
Recruitment of woody perennial species in EDL	100	100	100%	5	66.67	67%	3	66.67	67%	3	100	100%	5	80	80%	5	75	75%	5	70%	4.333333
Native plant species richness - trees	3	4	133%	5	3	100%	5	6	200%	5	5	167%	5	5	167%	5	4	133%	5	129%	5
Native plant species richness - shrubs	5	11	220%	5	6	120%	5	6	120%	5	7	140%	5	10	200%	5	5	100%	5	129%	5
Native plant species richness - grasses	4	6	150%	5	6	150%	5	4	100%	5	4	100%	5	5	125%	5	2	50%	2.5	96%	4.583333
Native plant species richness - forbs	8	3	38%	2.5	0	0%	0	6	75%	2.5	2	25%	2.5	3	38%	2.5	3	38%	2.5	30%	2.083333
Tree canopy height (average of emergent, canopy and sub-canopy laye	14	17	121%	5	13	93%	5	10	71%	5	9	64%	3	11	79%	5	17	121%	5	79%	
Tree sub-canopy height	4	7	175%	5	0	0%	0	5	125%	5	0	0%	0	0	0%	0	7	175%	5	68%	
Average score				5			2.5			5			1.5	0		2.5	0		5	0%	3.583333
Tree canopy cover (average of emergent, canopy and sub-canopy laye	29	72.7	251%	3	75.2	259%	3	43.9	151%	5	61.5	212%	3	69.8	241%	3	70.5	243%	3	194%	
Tree sub-canopy cover	9	2	22%	2	0	0%	0	13.5	150%	5	0	0%	0	0	0%	0	6.3	70%	5	35%	
Average score				2.5			1.5			5			1.5	0		1.5	0		4	0%	2.666667
Shrub canopy cover	8	23.7	296%	3	2	25%	3	13.6	170%	5	0	0%	0	6.1	76%	5	6.8	85%	5	93%	3.5
Native grass cover	8	38	475%	5	6	75%	3	28	350%	5	44	550%	5	12	150%	5	1	13%	1	230%	4
Organic litter	34	52.6	155%	5	80.6	237%	3	55.6	164%	5	41.4	122%	5	88	259%	3	89	262%	3	171%	4
Large trees (euc and non-euc)	70	11	16%	5	0	0%	0	3	4%	5	5	7%	5	0	0%	0	1	1%	5	4%	3.333333
Coarse woody debris	1752	650	37%	2	480	27%	2	780	45%	2	810	46%	2	590	34%	2	645	37%	2	32%	2
Non-native plant cover	0		0%	10		0%	10		0%	10	0	0%	10	0	0%	10	0	0%	10	0%	10
Total Site Condition Score				60			43			62.5			52.5			51.5			55		54.08333
Max Site condition score - 80				80			80			80			80			80			80		80
Site Conditions Score - out of 3																					2.028125
Site Context																					
Size of patch - max score of 10		10		10	10		10	10		10	10		10	10		10	10		10		10
Connectedness - max score of 5		4		4	5		5	5		5	5		5	5		5	4		4		4.666667
Context - max score of 10		5		5	4		4	4		4	5		5	5		5	4		4		4.5
Site Context Score				19			19			19			20			20			18		19.16667
MAX Site Context Score - 20				20			20			20			20			20			20		56
Site Context Score - out of 3																					1.026786

Final habitat quality score (weighted)	**AU1 - 11.3.1**
Site Condition score (out of 80	54.08
Site Context Score (out of 20	19.17
Total	73.25
Habitat Quality score (out of 10)	7.33
Assessment Unit area (ha) in offset area	510.16
Total offset area (ha) for this MNES	510.16
Size Weighting	1.00
Weighted Habitat Quality Score	***7.33***

12.2 Ornamental Snake Habitat Quality

See next page.

Species Stocking Rate (SSR)								Entire Site
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		10		10
		No		Yes - adjacent		Yes - on site		
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15			10
		Not habitat	Dispersal	Foraging	Breeding			
Approximate density (per ha)	Score	0	10	20	30			10
		0%						
Role/importance of species population on site*	0	0	5	10		15		
		0	5 - 15	16-20		21-30		
Total SRR score (out of 70)	0							30
SRR Score (out of 4)	**0**							1.71

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

		Not OS habitat				Not OS habitat
Final habitat quality score (weighted)	**AU1-11.3.1**	AU2-11.3.25	**AU3-11.3.27f**	**AU4-11.3.3**	**AU5-11.3.3**	AU6-11.3.2
Site Condition score (out of 3)	1.82	1.66	1.78	2.28	1.76	1.11
Site Context Score (out of 3)	1.93	1.22	1.81	2.20	2.08	1.27
Species Stocking Rate Score (out of 4)	1.71	0.00	1.71	1.71	1.71	0.00
Habitat Quality score (out of 10)	5.46	2.88	5.30	6.19	5.55	2.38
Assessment Unit area (ha) in offset area	510.16	0.00	7.52	62.97	259.37	0.00
Total offset area (ha) for this MNES	840.01	840.01	840.01	840.01	840.01	840.01
Size Weighting	0.61	0.00	0.01	0.07	0.31	0.00
Weighted Habitat Quality Score	***3.32***	0.00	***0.05***	***0.46***	***1.71***	0.00
Overall Habitat Quality Score	***5.54***					

Offset Area 5.54

| Assessment Unit | AU1-11.3.1 | | |

Offset Area

Assessment Unit	AU3-11.3.27f								
		AU3-11.3.27f			AU3-11.3.27f				AU3-11.3.27f
ENTER RE INTO GREEN BOX	11.3.27f_wooded	CBC2			CBC13			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	66.67	67%	3.00	100.00	100%	5.00	0.83	4.00
Native plant species richness - trees	1.00	3.00	300%	5.00	3.00	300%	5.00	3.00	5.00
Native plant species richness - shrubs	1.00	0.00	0%	0.00	2.00	200%	5.00	1.00	2.50
Native plant species richness - grasses	3.00	9.00	300%	5.00	5.00	167%	5.00	2.33	5.00
Native plant species richness - forbs	6.00	7.00	117%	5.00	8.00	133%	5.00	1.25	5.00
Tree canopy height (average of emergent, canopy and sub-canopy layers)	16.00	15.00	94%	5.00	22.00	138%	5.00	1.16	
Tree sub-canopy height	0.00	0.00			0.00				
Average score		0.00		5.00	0.00		5.00		5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40.00	71.50	179%	5.00	73.00	183%	5.00	1.81	
Tree sub-canopy cover	0.00	0.00			0.00				
Average score		0.00		5.00	0.00		5.00		5.00
Shrub canopy cover	0.00	2.30			1.90				
Native grass cover	3.00	34.00	1133%	5.00	62.00	2067%	5.00	16.00	5.00
Organic litter	15.00	37.00	247%	3.00	23.00	153%	5.00	2.00	4.00
Large trees (euc and non-euc)	28.00	2.00	7%	5.00	0.00	0%	0.00	0.04	2.50
Coarse woody debris	530.00	160.00	30%	2.00	700.00	132%	5.00	0.81	3.50
Non-native plant cover	0.00	0.00	0%	10.00	0.00	0%	0.00	0.00	5.00
Quality and availability of food and foraging habitat - max score of 10		4.00		4.00	4.00		4.00		4.00
Quality and availability of shelter - max score of 10		3.60		3.60	4.00		4.00		3.80
Total Site Condition Score				60.60			58.00		59.30
Max Site condidion score - 100				100.00			100.00		100.00
Site Conditions Score - out of 3				1.82			1.74		1.78
Site Context									
Size of patch - max score of 10		10.00		10.00	10.00		10.00		10.00
Connectedness - max score of 5		4.00		4.00	4.00		4.00		4.00
Context - max score of 5		4.00		4.00	4.00		4.00		4.00
Ecologial Corridors		0.00		0.00	0.00		0.00		
Threats to the species - max score of 15		3.60		3.60	4.00		4.00		3.80
Species mobility capacity - max score of 10		5.40		5.40	5.40		5.40		5.40
Site Context Score				27.00			27.40		27.20
MAX Site Context Score - 45				45.00			45.00		45.00
Site Context Score - out of 3				1.80			1.83		1.81

Offset Area

Assessment Unit	AU4-11.3.3															
		AU4-11.3.3				AU4-11.3.3			AU4-11.3.3			AU4-11.3.3				AU4-11.3.3
ENTER RE INTO GREEN BOX	11.3.3	CBC4				CBC9			CBC10			CBC20			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score		Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00		100.00	100%	5.00	50.00	50%	3.00	66.67	67%	3.00	0.79	4.00
Native plant species richness - trees	3.00	4.00	133%	5.00		3.00	100%	5.00	2.00	67%	2.50	6.00	200%	5.00	1.25	4.38
Native plant species richness - shrubs	5.00	4.00	80%	2.50		5.00	100%	5.00	4.00	80%	2.50	3.00	60%	2.50	0.80	3.13
Native plant species richness - grasses	12.00	8.00	67%	2.50		6.00	50%	2.50	4.00	33%	2.50	8.00	67%	2.50	0.54	2.50
Native plant species richness - forbs	15.00	4.00	27%	2.50		9.00	60%	2.50	4.00	27%	2.50	4.00	27%	2.50	0.35	2.50
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	22.00	122%	5.00		25.00	139%	5.00	18.00	100%	5.00	15.00	83%	5.00	1.11	
Tree sub-canopy height	10.00	10.00	100%	5.00		10.00	100%	5.00	10.00	100%	5.00	0.00	0%	0.00	0.75	
Average score		0.00		5.00		0.00		5.00	0.00		5.00	0.00		2.50		4.38
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	28.00	67.70	242%	3.00		56.10	200%	3.00	69.80	249%	3.00	47.50	170%	5.00	2.15	
Tree sub-canopy cover	5.00	6.50	130%	5.00		16.00	320%	3.00	1.60	32%	2.00	0.00	0%	0.00	1.21	
Average score		0.00		4.00		0.00		3.00	0.00		2.50	0.00		2.50		3.00
Shrub canopy cover	4.00	3.20	80%	5.00		1.30	33%	3.00	2.00	50%	5.00	2.90	72%	5.00	0.59	4.50
Native grass cover	45.00	52.60	117%	5.00		36.00	80%	3.00	51.00	113%	5.00	42.00	93%	5.00	1.01	4.50
Organic litter	30.00	40.00	133%	5.00		24.00	80%	5.00	27.40	91%	5.00	52.80	176%	5.00	1.20	5.00
Large trees (euc and non-euc)	10.00	10.00	100%	10.00		3.00	30%	5.00	7.00	70%	10.00	11.00	110%	15.00	0.78	10.00
Coarse woody debris	285.00	290.00	102%	5.00		230.00	81%	5.00	95.00	33%	2.00	170.00	60%	5.00	0.69	4.25
Non-native plant cover	0.00	0.02	2%	10.00		0.00	0%	10.00	0.00	0%	10.00	0.00	0%	10.00	0.01	10.00
Quality and availability of food and foraging habitat - max score of 10		10.00		10.00		8.00		8.00	4.00		4.00	8.00		8.00		7.50
Quality and availability of shelter - max score of 10		8.80		8.80		7.20		7.20	3.20		3.20	6.80		6.80		6.50
Total Site Condition Score				85.30				74.20			64.70			80.30		76.13
Max Site condidion score - 100				100.00				100.00			100.00			100.00		100.00
Site Conditions Score - out of 3				2.56				2.23			1.94			2.41		2.28
Site Context																
Size of patch - max score of 10		10.00		10.00		10.00		10.00	10.00		10.00	10.00		10.00		10.00
Connectedness - max score of 5		5.00		5.00		5.00		5.00	5.00		5.00	5.00		5.00		5.00
Context - max score of 5		5.00		5.00		5.00		5.00	4.00		4.00	5.00		5.00		4.75
Ecologial Corridors		0.00		0.00		0.00		0.00	0.00		0.00	0.00		0.00		0.00
Threats to the species - max score of 15		8.80		8.80		7.20		7.20	3.20		3.20	6.80		6.80		6.50
Species mobility capacity - max score of 10		7.20		7.20		7.20		7.20	5.40		5.40	7.20		7.20		6.75
Site Context Score				36.00				34.40			27.60			34.00		33.00
MAX Site Context Score - 45				45.00				45.00			45.00			45.00		45.00
Site Context Score - out of 3				2.40				2.29			1.84			2.27		2.20

Offset Area

Assessment Unit	AU5-11.3.3														
		AU5-11.3.3			AU5-11.3.3			AU5-11.3.3			AU5-11.3.3				AU5-11.3.3
ENTER RE INTO GREEN BOX	11.3.3	CBC12			CBC14			CBC15			CBC21			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	1.00	5.00
Native plant species richness - trees	3.00	2.00	67%	2.50	4.00	133%	5.00	1.00	33%	2.50	6.00	200%	5.00	1.08	3.75
Native plant species richness - shrubs	5.00	2.00	40%	2.50	2.00	40%	2.50	1.00	20%	0.00	6.00	120%	5.00	0.55	2.50
Native plant species richness - grasses	12.00	4.00	33%	2.50	10.00	83%	2.50	6.00	50%	2.50	0.00	0%	0.00	0.42	1.88
Native plant species richness - forbs	15.00	4.00	27%	2.50	7.00	47%	2.50	6.00	40%	2.50	2.00	13%	0.00	0.32	1.88
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	20.00	111%	5.00	20.00	111%	5.00	18.00	100%	5.00	18.00	100%	5.00	1.06	
Tree sub-canopy height	10.00	9.00	90%	5.00	8.00	80%	5.00	0.00	0%	0.00	9.00	90%	5.00	0.65	
Average score		0.00		5.00	0.00		5.00	0.00		2.50	0.00		5.00		4.38
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	28.00	52.40	187%	5.00	83.90	300%	3.00	77.50	277%	3.00	37.60	134%	5.00	2.24	
Tree sub-canopy cover	5.00	0.00	0%	0.00	15.00	300%	3.00	0.00	0%	0.00	19.70	394%	3.00	1.74	
Average score		0.00		2.50	0.00		3.00	0.00		1.50	0.00		4.00		2.75
Shrub canopy cover	4.00	1.30	33%	3.00	8.10	203%	3.00	3.50	88%	5.00	25.40	635%	3.00	2.39	3.50
Native grass cover	45.00	24.00	53%	3.00	8.00	18%	1.00	44.00	98%	5.00	7.00	16%	1.00	0.46	2.50
Organic litter	30.00	52.00	173%	5.00	79.60	265%	3.00	22.80	76%	5.00	49.60	165%	5.00	1.70	4.50
Large trees (euc and non-euc)	10.00	2.00	20%	5.00	8.00	80%	10.00	7.00	70%	10.00	4.00	40%	5.00	0.53	7.50
Coarse woody debris	285.00	290.00	102%	5.00	525.00	184%	5.00	185.00	65%	5.00	420.00	147%	5.00	1.25	5.00
Non-native plant cover	0.00	0.00	0%	10.00	0.07	7%	5.00	0.00	0%	10.00	0.41	41%	3.00	0.12	7.00
Quality and availability of food and foraging habitat - max score of 10		4.00		4.00	4.00		4.00	4.00		4.00	0.00		0.00		3.00
Quality and availability of shelter - max score of 10		4.00		4.00	5.20		5.20	3.60		3.60	1.60		1.60		3.60
Total Site Condition Score				61.50			61.70			64.10			47.60		58.73
Max Site condidion score - 100				100.00			100.00			100.00			100.00		100.00
Site Conditions Score - out of 3				1.85			1.85			1.92			1.43		1.76
Site Context															
Size of patch - max score of 10		10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00		10.00
Connectedness - max score of 5		4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00		4.75
Context - max score of 5		4.00	4.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00		4.25
Ecologial Corridors		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00
Threats to the species - max score of 15		4.00	4.00	5.20	5.20	3.60	3.60	3.60	3.60	3.60	1.60	1.60	1.60		3.60
Species mobility capacity - max score of 10		5.40	5.40	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60		8.55
Site Context Score			27.40		34.80		32.20		30.20				31.15		
MAX Site Context Score - 45			45.00		45.00		45.00		45.00				45.00		
Site Context Score - out of 3			1.83		2.32		2.15		2.01				2.08		

12.3 Koala Habitat Quality

See next page.

Species Stocking Rate (SSR)								Entire site
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	10	0		5		10		**10**
		No		Yes - adjacent		Yes - on site		
Species usage of the site (habitat type & evidenced usage)	15	0	5	10	15			**15**
		Not habitat	Dispersal	Foraging	Breeding			
Approximate density (per ha)	10	0	10	20		30		**10**
		0%						
Role/importance of species population on site*	0	0	5		10		15	**15**
		0	5 - 15		16-20		21-30	
Total SRR score (out of 70)	35							**50**
SRR Score (out of 4)	2							**2.86**

*SSR Supplementary Table				Score
*Key source population for breeding	Score	0	10	10
		No	Yes/ Possibly	
*Key source population for dispersal	Score	0	5	5
		No	Yes/ Possibly	
*Necessary for maintaining genetic diversity	Score	0	15	15
		No	Yes/ Possibly	
*Near the limit of the species range	Score	0	15	0
		No	Yes	
Total score				30

not koala habitat

Final habitat quality score (weighted)	AU1-11.3.1	AU2-11.3.25	AU3-11.3.27f	AU4-11.3.3	AU5-11.3.3	AU6-11.3.2
Site Condition score (out of 3)	1.61	2.18	2.01	2.38	2.03	1.50
Site Context Score (out of 3)	1.50	1.82	1.97	1.67	1.87	1.87
Species Stocking Rate Score (out of 4)	0.00	2.86	2.86	2.86	2.86	2.86
Habitat Quality score (out of 10)	3.11	6.85	6.83	6.91	6.75	6.22
Assessment Unit area (ha) in offset area	0.00	128.94	7.52	62.97	259.37	2.43
Total offset area (ha) for this MNES	461.22	461.22	461.22	461.22	461.22	461.22
Size Weighting	0.00	0.28	0.02	0.14	0.56	0.01
Weighted Habitat Quality Score	0.00	***1.92***	***0.11***	***0.94***	***3.80***	***0.03***
Total Habitat Quality Score	0.00					***6.80***

Offset Area

Assessment Unit	AU2-11.3.25																	
	AU2-11.3.25				AU2-11.3.25			AU2-11.3.25			AU2-11.3.25				AU2-11.3.25	
ENTER RE INTO GREEN BOX	11.3.25	CBC1			CBC11			CBC16			CBC18				SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score		Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00		100%	5.00
Native plant species richness - trees	4.00	4.00	100%	5.00	8.00	200%	5.00	8.00	200%	5.00	5.00	125%	5.00		156%	5.00
Native plant species richness - shrubs	4.00	1.00	25%	2.50	4.00	100%	5.00	2.00	50%	2.50	4.00	100%	5.00		69%	3.75
Native plant species richness - grasses	8.00	4.00	50%	2.50	2.00	25%	2.50	4.00	50%	2.50	0.00	0%	0.00		31%	1.88
Native plant species richness - forbs	13.00	4.00	31%	2.50	4.00	31%	2.50	5.00	38%	2.50	1.00	8%	0.00		27%	1.88
Tree canopy height (average of emergent, canopy and sub-canopy layers)	23.00	22.00	96%	5.00	20.00	87%	5.00	28.00	122%	5.00	20.00	87%	5.00		98%	
Tree sub-canopy height	11.00	13.00	118%	5.00	10.00	91%	5.00	13.00	118%	5.00	12.00	109%	5.00		109%	
Average score		0.00		5.00	0.00		5.00	0.00		5.00	0.00		5.00			5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	34.00	34.30	101%	5.00	73.00	215%	3.00	62.10	183%	5.00	82.50	243%	3.00		185%	
Tree sub-canopy cover	12.00	22.50	188%	5.00	12.00	100%	5.00	26.00	217%	3.00	5.50	46%	2.00		138%	
Average score		0.00		5.00	0.00		4.00	0.00		4.00	0.00		2.50			3.88
Shrub canopy cover	7.00	4.40	63%	5.00	5.80	83%	5.00	2.40	34%	3.00	14.20	203%	3.00		96%	4.00
Native grass cover	35.00	71.00	203%	5.00	10.00	29%	1.00	16.00	46%	1.00	43.00	123%	5.00		100%	3.00
Organic litter	21.00	29.00	138%	5.00	35.80	170%	5.00	63.60	303%	3.00	55.00	262%	3.00		218%	4.00
Large trees (euc and non-euc)	32.00	27.00	84%	10.00	18.00	56%	10.00	14.00	44%	5.00	15.00	47%	5.00		58%	7.50
Coarse woody debris	473.00	210.00	44%	2.00	170.00	36%	2.00	240.00	51%	5.00	260.00	55%	5.00		47%	3.50
Non-native plant cover	0.00	0.00	0%	10.00	0.36	36%	3.00	0.17	17%	5.00	0.00	0%	10.00		13%	7.00
Quality and availability of food and foraging habitat - max score of 10		10.00		10.00	10.00		10.00	10.00		10.00	10.00		10.00			10.00
Quality and availability of shelter - max score of 10		7.00		7.00	7.00		7.00	7.00		7.00	8.00		8.00			7.25
Total Site Condition Score				81.50			72.00			65.50			71.50			72.63
Max Site condidion score - 100				100.00			100.00			100.00			100.00			100.00
Site Conditions Score - out of 3				2.45			2.16			1.97			2.15			2.18
Site Context																
Size of patch - max score of 10		10.00		10.00	10.00		10.00	10.00		10.00	10.00		10.00			10.00
Connectedness - max score of 5		4.00		4.00	4.00		4.00	4.00		4.00	5.00		5.00			4.25
Context - max score of 5		4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00			4.00
Ecologial Corridors		0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00			0.00
Threats to the species - max score of 15		4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00			4.00
Species mobility capacity - max score of 10		10.00		10.00	5.00		5.00	5.00		5.00	0.00		0.00			5.00
Site Context Score				32.00			27.00			27.00			23.00			27.25
MAX Site Context Score - 45				45.00			45.00			45.00			45.00			45.00
Site Context Score - out of 3				2.13			1.80			1.80			1.53			1.82

Offset Area

Assessment Unit	AU2-11.3.25	AU3-11.3.27f								
	AU2-11.3.25		AU3-11.3.27f			AU3-11.3.27f				AU3-11.3.27f
ENTER RE INTO GREEN BOX		11.3.27f_wooded	CBC2			CBC13			SIZE OF PATCH	
	Average Score	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	5.00	100.00	66.67	67%	3.00	100.00	100%	5.00	0.83	4.00
Native plant species richness - trees	5.00	1.00	3.00	300%	5.00	3.00	300%	5.00	3.00	5.00
Native plant species richness - shrubs	3.75	1.00	0.00	0%	0.00	2.00	200%	5.00	1.00	2.50
Native plant species richness - grasses	1.88	3.00	9.00	300%	5.00	5.00	167%	5.00	2.33	5.00
Native plant species richness - forbs	1.88	6.00	7.00	117%	5.00	8.00	133%	5.00	1.25	5.00
Tree canopy height (average of emergent, canopy and sub-canopy layers)		16.00	15.00	94%	5.00	22.00	138%	5.00	1.16	
Tree sub-canopy height		0.00	0.00			0.00				
Average score	5.00		0.00		5.00	0.00		5.00		5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)		40.00	71.50	179%	5.00	73.00	183%	5.00	1.81	
Tree sub-canopy cover		0.00	0.00			0.00				
Average score	3.88		0.00		5.00	0.00		5.00		5.00
Shrub canopy cover	4.00	0.00	2.30			1.90				
Native grass cover	3.00	3.00	34.00	1133%	5.00	62.00	2067%	5.00	16.00	5.00
Organic litter	4.00	15.00	37.00	247%	3.00	23.00	153%	5.00	2.00	4.00
Large trees (euc and non-euc)	7.50	28.00	2.00	7%	5.00	0.00	0%	0.00	0.04	2.50
Coarse woody debris	3.50	530.00	160.00	30%	2.00	700.00	132%	5.00	0.81	3.50
Non-native plant cover	7.00	0.00	0.00	0%	10.00	0.00	0%	0.00	0.00	5.00
Quality and availability of food and foraging habitat - max score of 10	10.00		10.00		10.00	10.00		10.00		10.00
Quality and availability of shelter - max score of 10	7.25		6.00		6.00	5.00		5.00		5.50
Total Site Condition Score	72.63				69.00			65.00		67.00
Max Site condidion score - 100	100.00				100.00			100.00		100.00
Site Conditions Score - out of 3	2.18				2.07			1.95		2.01
Site Context										
Size of patch - max score of 10	10.00		10.00		10.00	10.00		10.00		10.00
Connectedness - max score of 5	4.25		4.00		4.00	4.00		4.00		4.00
Context - max score of 5	4.00		4.00		4.00	4.00		4.00		4.00
Ecologial Corridors	0.00		0.00		0.00	0.00		0.00		
Threats to the species - max score of 15	4.00		4.00		4.00	4.00		4.00		4.00
Species mobility capacity - max score of 10	5.00		10.00		10.00	5.00		5.00		7.50
Site Context Score	27.25				32.00			27.00		29.50
MAX Site Context Score - 45	45.00				45.00			45.00		45.00
Site Context Score - out of 3	1.82				2.13			1.80		1.97

Offset Area

Assessment Unit	AU4-11.3.3														
		AU4-11.3.3			AU4-11.3.3			AU4-11.3.3			AU4-11.3.3				AU4-11.3.3
ENTER RE INTO GREEN BOX	11.3.3	CBC4			CBC9			CBC10			CBC20			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00	100.00	100%	5.00	50.00	50%	3.00	66.67	67%	3.00	0.79	4.00
Native plant species richness - trees	3.00	4.00	133%	5.00	3.00	100%	5.00	2.00	67%	2.50	6.00	200%	5.00	1.25	4.38
Native plant species richness - shrubs	5.00	4.00	80%	2.50	5.00	100%	5.00	4.00	80%	2.50	3.00	60%	2.50	0.80	3.13
Native plant species richness - grasses	12.00	8.00	67%	2.50	6.00	50%	2.50	4.00	33%	2.50	8.00	67%	2.50	0.54	2.50
Native plant species richness - forbs	15.00	4.00	27%	2.50	9.00	60%	2.50	4.00	27%	2.50	4.00	27%	2.50	0.35	2.50
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	22.00	122%	5.00	25.00	139%	5.00	18.00	100%	5.00	15.00	83%	5.00	1.11	
Tree sub-canopy height	10.00	10.00	100%	5.00	10.00	100%	5.00	10.00	100%	5.00	0.00	0%	0.00	0.75	
Average score		0.00		5.00	0.00		5.00	0.00		5.00	0.00		2.50		4.38
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	28.00	67.70	242%	3.00	56.10	200%	3.00	69.80	249%	3.00	47.50	170%	5.00	2.15	
Tree sub-canopy cover	5.00	6.50	130%	5.00	16.00	320%	3.00	1.60	32%	2.00	0.00	0%	0.00	1.21	
Average score		0.00		4.00	0.00		3.00	0.00		2.50	0.00		2.50		3.00
Shrub canopy cover	4.00	3.20	80%	5.00	1.30	33%	3.00	2.00	50%	5.00	2.90	72%	5.00	0.59	4.50
Native grass cover	45.00	52.60	117%	5.00	36.00	80%	3.00	51.00	113%	5.00	42.00	93%	5.00	1.01	4.50
Organic litter	30.00	40.00	133%	5.00	24.00	80%	5.00	27.40	91%	5.00	52.80	176%	5.00	1.20	5.00
Large trees (euc and non-euc)	10.00	10.00	100%	10.00	3.00	30%	5.00	7.00	70%	10.00	11.00	110%	15.00	0.78	10.00
Coarse woody debris	285.00	290.00	102%	5.00	230.00	81%	5.00	95.00	33%	2.00	170.00	60%	5.00	0.69	4.25
Non-native plant cover	0.00	0.02	2%	10.00	0.00	0%	10.00	0.00	0%	10.00	0.00	0%	10.00	0.01	10.00
Quality and availability of food and foraging habitat - max score of 10		10.00		10.00	10.00		10.00	10.00		10.00	10.00		10.00		10.00
Quality and availability of shelter - max score of 10		8.00		8.00	5.00		5.00	6.00		6.00	10.00		10.00		7.25
Total Site Condition Score				84.50			74.00			73.50			85.50		79.38
Max Site condidion score - 100				100.00			100.00			100.00			100.00		100.00
Site Conditions Score - out of 3				2.54			2.22			2.21			2.57		2.38
Site Context															
Size of patch - max score of 10		10.00		10.00	10.00		10.00	10.00		10.00	10.00		10.00		10.00
Connectedness - max score of 5		5.00		5.00	5.00		5.00	5.00		5.00	5.00		5.00		5.00
Context - max score of 5		5.00		5.00	5.00		5.00	4.00		4.00	5.00		5.00		4.75
Ecologial Corridors		0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00		0.00
Threats to the species - max score of 15		4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00		4.00
Species mobility capacity - max score of 10		0.00		0.00	0.00		0.00	0.00		0.00	5.00		5.00		1.25
Site Context Score				24.00			24.00			23.00			29.00		25.00
MAX Site Context Score - 45				45.00			45.00			45.00			45.00		45.00
Site Context Score - out of 3				1.60			1.60			1.53			1.93		1.67

Offset Area

Assessment Unit	AU4-11.3.3	AU5-11.3.3															
	AU4-11.3.3		AU5-11.3.3			AU5-11.3.3			AU5-11.3.3			AU5-11.3.3					AU5-11.3.3
ENTER RE INTO GREEN BOX		11.3.3	CBC12			CBC14			CBC15			CBC21			SIZE OF PATCH		
	Average Score	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %		Average Score
Recruitment of woody perennial species in EDL	4.00	100.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	1.00		5.00
Native plant species richness - trees	4.38	3.00	2.00	67%	2.50	4.00	133%	5.00	1.00	33%	2.50	6.00	200%	5.00	1.08		3.75
Native plant species richness - shrubs	3.13	5.00	2.00	40%	2.50	2.00	40%	2.50	1.00	20%	0.00	6.00	120%	5.00	0.55		2.50
Native plant species richness - grasses	2.50	12.00	4.00	33%	2.50	10.00	83%	2.50	6.00	50%	2.50	0.00	0%	0.00	0.42		1.88
Native plant species richness - forbs	2.50	15.00	4.00	27%	2.50	7.00	47%	2.50	6.00	40%	2.50	2.00	13%	0.00	0.32		1.88
Tree canopy height (average of emergent, canopy and sub-canopy layers)		18.00	20.00	111%	5.00	20.00	111%	5.00	18.00	100%	5.00	18.00	100%	5.00	1.06		
Tree sub-canopy height		10.00	9.00	90%	5.00	8.00	80%	5.00	0.00	0%	0.00	9.00	90%	5.00	0.65		
Average score	4.38		0.00		5.00	0.00		5.00	0.00		2.50	0.00		5.00			4.38
Tree canopy cover (average of emergent, canopy and sub-canopy layers)		28.00	52.40	187%	5.00	83.90	300%	3.00	77.50	277%	3.00	37.60	134%	5.00	2.24		
Tree sub-canopy cover		5.00	0.00	0%	0.00	15.00	300%	3.00	0.00	0%	0.00	19.70	394%	3.00	1.74		
Average score	3.00		0.00		2.50	0.00		3.00	0.00		1.50	0.00		4.00			2.75
Shrub canopy cover	4.50	4.00	1.30	33%	3.00	8.10	203%	3.00	3.50	88%	5.00	25.40	635%	3.00	2.39		3.50
Native grass cover	4.50	45.00	24.00	53%	3.00	8.00	18%	1.00	44.00	98%	5.00	7.00	16%	1.00	0.46		2.50
Organic litter	5.00	30.00	52.00	173%	5.00	79.60	265%	3.00	22.80	76%	5.00	49.60	165%	5.00	1.70		4.50
Large trees (euc and non-euc)	10.00	10.00	2.00	20%	5.00	8.00	80%	10.00	7.00	70%	10.00	4.00	40%	5.00	0.53		7.50
Coarse woody debris	4.25	285.00	290.00	102%	5.00	525.00	184%	5.00	185.00	65%	5.00	420.00	147%	5.00	1.25		5.00
Non-native plant cover	10.00	0.00	0.00	0%	10.00	0.07	7%	5.00	0.00	0%	10.00	0.41	41%	3.00	0.12		7.00
Quality and availability of food and foraging habitat - max score of 10	10.00		10.00		10.00	10.00		10.00	10.00		10.00	10.00		10.00			10.00
Quality and availability of shelter - max score of 10	7.25		4.00		4.00	7.00		7.00	6.00		6.00	5.00		5.00			5.50
Total Site Condition Score	79.38				67.50			69.50			72.50			61.00			67.63
Max Site condidion score - 100	100.00				100.00			100.00			100.00			100.00			100.00
Site Conditions Score - out of 3	2.38				2.03			2.09			2.18			1.83			2.03
Site Context																	
Size of patch - max score of 10	10.00		10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.00			10.00
Connectedness - max score of 5	5.00		4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00			4.75
Context - max score of 5	4.75		4.00	4.00	5.00	5.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00			4.25
Ecologial Corridors	0.00		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00			0.00
Threats to the species - max score of 15	4.00		4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00			4.00
Species mobility capacity - max score of 10	1.25		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00			5.00
Site Context Score	25.00			27.00		29.00			28.00			28.00					28.00
MAX Site Context Score - 45	45.00			45.00		45.00			45.00			45.00					45.00
Site Context Score - out of 3	1.67			1.80		1.93			1.87			1.87					1.87

Offset Area

Assessment Unit	AU6-11.3.2					
	AU6-11.3.2					AU6-11.3.2
ENTER RE INTO GREEN BOX	11.3.2	CBC19			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	71.43	71%	3.00	0.71	3.00
Native plant species richness - trees	2.00	7.00	350%	5.00	3.50	5.00
Native plant species richness - shrubs	2.00	6.00	300%	5.00	3.00	5.00
Native plant species richness - grasses	9.00	2.00	22%	0.00	0.22	0.00
Native plant species richness - forbs	17.00	2.00	12%	0.00	0.12	0.00
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	20.00	111%	5.00	1.11	
Tree sub-canopy height	0.00	10.00				
Average score		0.00		5.00	0.00	5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40.00	61.60	154%	5.00	1.54	
Tree sub-canopy cover	0.00	9.10				
Average score		0.00		5.00	0.00	5.00
Shrub canopy cover	2.00	4.90	245%	3.00	2.45	3.00
Native grass cover	35.00	5.00	14%	1.00	0.14	1.00
Organic litter	30.00	57.80	193%	5.00	1.93	5.00
Large trees (euc and non-euc)	22.00	0.00	0%	0.00	0.00	0.00
Coarse woody debris	307.00	120.00	39%	2.00	0.39	2.00
Non-native plant cover	0.00	0.28	28%	3.00	0.28	3.00
Quality and availability of food and foraging habitat - max score of 10		10.00		10.00		10.00
Quality and availability of shelter - max score of 10		3.00		3.00		3.00
Total Site Condition Score				50.00		50.00
Max Site condidion score - 100				100.00		100.00
Site Conditions Score - out of 3				1.50		1.50
Site Context						
Size of patch - max score of 10		10.00		10.00		10.00
Connectedness - max score of 5		5.00		5.00		5.00
Context - max score of 5		4.00		4.00		4.00
Ecologial Corridors		0.00		0.00		0.00
Threats to the species - max score of 15		4.00		4.00		4.00
Species mobility capacity - max score of 10		5.00		5.00		5.00
Site Context Score				28.00		28.00
MAX Site Context Score - 45				45.00		45.00
Site Context Score - out of 3				1.87		1.87

12.4 Greater Glider Habitat Quality

See next page.

Species Stocking Rate (SSR)							Entire Site
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		10	**10**
		No		Yes - adjacent		Yes - on site	
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15		**15**
		Not habitat	Dispersal	Foraging	Breeding		
Approximate density (per ha)	Score	0	10	20	30		**10**
		0%					
Role/importance of species population on site*	0	0	5	10		15	**15**
		0	5 - 15	16-20		21-30	
Total SRR score (out of 70)	0						**50**
SRR Score (out of 4)	**0**						**2.86**

***SSR Supplementary Table**				
*Key source population for breeding	Score	0	10	10
		No	Yes/ Possibly	
*Key source population for dispersal	Score	0	5	5
		No	Yes/ Possibly	
*Necessary for maintaining genetic diversity	Score	0	15	15
		No	Yes/ Possibly	
*Near the limit of the species range	Score	0	15	0
		No	Yes	
Total Score				**30**

Final habitat quality score (weighted)	**AU1-11.3.1**	**AU2-11.3.25**	**AU3-11.3.27f**	**AU4-11.3.3**	**AU5-11.3.3**	**AU6-11.3.2**
Site Condition score (out of 3)	1.61	1.84	1.61	2.16	1.76	1.11
Site Context Score (out of 3)	1.28	1.98	2.09	2.01	1.99	2.03
Species Stocking Rate Score (out of 4)	0.00	0.00	0.00	2.86	2.86	2.86
Habitat Quality score (out of 10)	2.89	3.82	3.70	7.03	6.61	6.00
Assessment Unit area (ha) in offset area	0.00	128.94	6.11	62.97	259.37	2.43
Total offset area (ha) for this MNES	459.82	459.82	459.82	459.82	459.82	459.82
Size Weighting	0.00	0.28	0.01	0.14	0.56	0.01
Weighted Habitat Quality Score	***0.00***	***1.07***	***0.05***	***0.96***	***3.73***	***0.03***
Total Habitat Quality Score						***5.84***

Offset Area

Assessment Unit	AU2-11.3.25															
		AU2-11.3.25			AU2-11.3.25			AU2-11.3.25			AU2-11.3.25					AU2-11.3.25
ENTER RE INTO GREEN BOX	11.3.25	CBC1			CBC11			CBC16			CBC18			SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %		Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	100%		5.00
Native plant species richness - trees	4.00	4.00	100%	5.00	8.00	200%	5.00	8.00	200%	5.00	5.00	125%	5.00	156%		5.00
Native plant species richness - shrubs	4.00	1.00	25%	2.50	4.00	100%	5.00	2.00	50%	2.50	4.00	100%	5.00	69%		3.75
Native plant species richness - grasses	8.00	4.00	50%	2.50	2.00	25%	2.50	4.00	50%	2.50	0.00	0%	0.00	31%		1.88
Native plant species richness - forbs	13.00	4.00	31%	2.50	4.00	31%	2.50	5.00	38%	2.50	1.00	8%	0.00	27%		1.88
Tree canopy height (average of emergent, canopy and sub-canopy layers)	23.00	22.00	96%	5.00	20.00	87%	5.00	28.00	122%	5.00	20.00	87%	5.00	98%		
Tree sub-canopy height	11.00	13.00	118%	5.00	10.00	91%	5.00	13.00	118%	5.00	12.00	109%	5.00	109%		
Average score		0.00		5.00	0.00		5.00	0.00		5.00	0.00		5.00			5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	34.00	34.30	101%	5.00	73.00	215%	3.00	62.10	183%	5.00	82.50	243%	3.00	185%		
Tree sub-canopy cover	12.00	22.50	188%	5.00	12.00	100%	5.00	26.00	217%	3.00	5.50	46%	2.00	138%		
Average score		0.00		5.00	0.00		4.00	0.00		4.00	0.00		2.50			3.88
Shrub canopy cover	7.00	4.40	63%	5.00	5.80	83%	5.00	2.40	34%	3.00	14.20	203%	3.00	96%		4.00
Native grass cover	35.00	71.00	203%	5.00	10.00	29%	1.00	16.00	46%	1.00	43.00	123%	5.00	100%		3.00
Organic litter	21.00	29.00	138%	5.00	35.80	170%	5.00	63.60	303%	3.00	55.00	262%	3.00	218%		4.00
Large trees (euc and non-euc)	32.00	27.00	84%	10.00	18.00	56%	10.00	14.00	44%	5.00	15.00	47%	5.00	58%		7.50
Coarse woody debris	473.00	210.00	44%	2.00	170.00	36%	2.00	240.00	51%	5.00	260.00	55%	5.00	47%		3.50
Non-native plant cover	0.00	0.00	0%	10.00	0.36	36%	3.00	0.17	17%	5.00	0.00	0%	10.00	13%		7.00
Quality and availability of food and foraging habitat - max score of 10		2.00		2.00	2.00		2.00	2.00		2.00	4.00		4.00			2.50
Quality and availability of shelter - max score of 10		10.00		10.00	2.00		2.00	0.00		0.00	2.00		2.00			3.50
Total Site Condition Score				76.50			59.00			50.50			59.50			61.38
Max Site condidion score - 100				100.00			100.00			100.00			100.00			100.00
Site Conditions Score - out of 3				2.30			1.77			1.52			1.79			1.84
Site Context																
Size of patch - max score of 10		10.00		10.00	10.00		10.00	10.00		10.00	10.00		10.00			10.00
Connectedness - max score of 5		4.00		4.00	4.00		4.00	4.00		4.00	5.00		5.00			4.25
Context - max score of 5		4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00			4.00
Ecologial Corridors		0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00			0.00
Threats to the species - max score of 15		0.00		0.00	8.00		8.00	6.00		6.00	10.00		10.00			6.00
Species mobility capacity - max score of 10		5.40		5.40	5.40		5.40	5.40		5.40	5.40		5.40			5.40
Site Context Score				23.40			31.40			29.40			34.40			29.65
MAX Site Context Score - 45				45.00			45.00			45.00			45.00			45.00
Site Context Score - out of 3				1.56			2.09			1.96			2.29			1.98

Offset Area

Assessment Unit	AU3-11.3.27f								
		AU3-11.3.27f			AU3-11.3.27f				AU3-11.3.27f
ENTER RE INTO GREEN BOX	11.3.27f_wooded	CBC2			CBC13			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	66.67	67%	3.00	100.00	100%	5.00	0.83	4.00
Native plant species richness - trees	1.00	3.00	300%	5.00	3.00	300%	5.00	3.00	5.00
Native plant species richness - shrubs	1.00	0.00	0%	0.00	2.00	200%	5.00	1.00	2.50
Native plant species richness - grasses	3.00	9.00	300%	5.00	5.00	167%	5.00	2.33	5.00
Native plant species richness - forbs	6.00	7.00	117%	5.00	8.00	133%	5.00	1.25	5.00
Tree canopy height (average of emergent, canopy and sub-canopy layers)	16.00	15.00	94%	5.00	22.00	138%	5.00	1.16	
Tree sub-canopy height	0.00	0.00			0.00				
Average score		0.00		5.00	0.00		5.00		5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40.00	71.50	179%	5.00	73.00	183%	5.00	1.81	
Tree sub-canopy cover	0.00	0.00			0.00				
Average score		0.00		5.00	0.00		5.00		5.00
Shrub canopy cover	0.00	2.30			1.90				
Native grass cover	3.00	34.00	1133%	5.00	62.00	2067%	5.00	16.00	5.00
Organic litter	15.00	37.00	247%	3.00	23.00	153%	5.00	2.00	4.00
Large trees (euc and non-euc)	28.00	2.00	7%	5.00	0.00	0%	0.00	0.04	2.50
Coarse woody debris	530.00	160.00	30%	2.00	700.00	132%	5.00	0.81	3.50
Non-native plant cover	0.00	0.00	0%	10.00	0.00	0%	0.00	0.00	5.00
Quality and availability of food and foraging habitat - max score of 10		0.00		0.00	0.00		0.00		0.00
Quality and availability of shelter - max score of 10		2.00		2.00	2.00		2.00		2.00
Total Site Condition Score				55.00			52.00		53.50
Max Site condidion score - 100				100.00			100.00		100.00
Site Conditions Score - out of 3				1.65			1.56		1.61
Site Context									
Size of patch - max score of 10		10.00		10.00	10.00		10.00		10.00
Connectedness - max score of 5		4.00		4.00	4.00		4.00		4.00
Context - max score of 5		4.00		4.00	4.00		4.00		4.00
Ecologial Corridors		0.00		0.00	0.00		0.00		
Threats to the species - max score of 15		8.00		8.00	8.00		8.00		8.00
Species mobility capacity - max score of 10		5.40		5.40	5.40		5.40		5.40
Site Context Score				31.40			31.40		31.40
MAX Site Context Score - 45				45.00			45.00		45.00
Site Context Score - out of 3				2.09			2.09		2.09

Offset Area

Assessment Unit	AU4-11.3.3															
		AU4-11.3.3			AU4-11.3.3			AU4-11.3.3			AU4-11.3.3				AU4-11.3.3	
ENTER RE INTO GREEN BOX	11.3.3	CBC4			CBC9			CBC10			CBC20			SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score	
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00	100.00	100%	5.00	50.00	50%	3.00	66.67	67%	3.00	0.79	4.00	
Native plant species richness - trees	3.00	4.00	133%	5.00	3.00	100%	5.00	2.00	67%	2.50	6.00	200%	5.00	1.25	4.38	
Native plant species richness - shrubs	5.00	4.00	80%	2.50	5.00	100%	5.00	4.00	80%	2.50	3.00	60%	2.50	0.80	3.13	
Native plant species richness - grasses	12.00	8.00	67%	2.50	6.00	50%	2.50	4.00	33%	2.50	8.00	67%	2.50	0.54	2.50	
Native plant species richness - forbs	15.00	4.00	27%	2.50	9.00	60%	2.50	4.00	27%	2.50	4.00	27%	2.50	0.35	2.50	
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	22.00	122%	5.00	25.00	139%	5.00	18.00	100%	5.00	15.00	83%	5.00	1.11		
Tree sub-canopy height	10.00	10.00	100%	5.00	10.00	100%	5.00	10.00	100%	5.00	0.00	0%	0.00	0.75		
Average score		0.00		5.00	0.00		5.00	0.00		5.00	0.00		2.50		4.38	
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	28.00	67.70	242%	3.00	56.10	200%	3.00	69.80	249%	3.00	47.50	170%	5.00	2.15		
Tree sub-canopy cover	5.00	6.50	130%	5.00	16.00	320%	3.00	1.60	32%	2.00	0.00	0%	0.00	1.21		
Average score		0.00		4.00	0.00		3.00	0.00		2.50	0.00		2.50		3.00	
Shrub canopy cover	4.00	3.20	80%	5.00	1.30	33%	3.00	2.00	50%	5.00	2.90	72%	5.00	0.59	4.50	
Native grass cover	45.00	52.60	117%	5.00	36.00	80%	3.00	51.00	113%	5.00	42.00	93%	5.00	1.01	4.50	
Organic litter	30.00	40.00	133%	5.00	24.00	80%	5.00	27.40	91%	5.00	52.80	176%	5.00	1.20	5.00	
Large trees (euc and non-euc)	10.00	10.00	100%	10.00	3.00	30%	5.00	7.00	70%	10.00	11.00	110%	15.00	0.78	10.00	
Coarse woody debris	285.00	290.00	102%	5.00	230.00	81%	5.00	95.00	33%	2.00	170.00	60%	5.00	0.69	4.25	
Non-native plant cover	0.00	0.02	2%	10.00	0.00	0%	10.00	0.00	0%	10.00	0.00	0%	10.00	0.01	10.00	
Quality and availability of food and foraging habitat - max score of 10		0.00		0.00	2.00		2.00	6.00		6.00	10.00		10.00		4.50	
Quality and availability of shelter - max score of 10		2.00		2.00	10.00		10.00	2.00		2.00	8.00		8.00		5.50	
Total Site Condition Score				68.50			71.00			65.50			83.50		72.13	
Max Site condidion score - 100				100.00			100.00			100.00			100.00		100.00	
Site Conditions Score - out of 3				2.06			2.13			1.97			2.51		2.16	
Site Context																
Size of patch - max score of 10		10.00		10.00	10.00		10.00	10.00		10.00	10.00		10.00		10.00	
Connectedness - max score of 5		5.00		5.00	5.00		5.00	5.00		5.00	5.00		5.00		5.00	
Context - max score of 5		5.00		5.00	5.00		5.00	4.00		4.00	5.00		5.00		4.75	
Ecological Corridors		0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00		0.00	
Threats to the species - max score of 15		8.00		8.00	4.00		4.00	6.00		6.00	2.00		2.00		5.00	
Species mobility capacity - max score of 10		5.40		5.40	5.40		5.40	5.40		5.40	5.40		5.40		5.40	
Site Context Score				33.40			29.40			30.40			27.40		30.15	
MAX Site Context Score - 45				45.00			45.00			45.00			45.00		45.00	
Site Context Score - out of 3				2.23			1.96			2.03			1.83		2.01	

Offset Area

Assessment Unit	AU5-11.3.3														
		AU5-11.3.3			AU5-11.3.3			AU5-11.3.3			AU5-11.3.3				AU5-11.3.3
ENTER RE INTO GREEN BOX	11.3.3	CBC12			CBC14			CBC15			CBC21			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	1.00	5.00
Native plant species richness - trees	3.00	2.00	67%	2.50	4.00	133%	5.00	1.00	33%	2.50	6.00	200%	5.00	1.08	3.75
Native plant species richness - shrubs	5.00	2.00	40%	2.50	2.00	40%	2.50	1.00	20%	0.00	6.00	120%	5.00	0.55	2.50
Native plant species richness - grasses	12.00	4.00	33%	2.50	10.00	83%	2.50	6.00	50%	2.50	0.00	0%	0.00	0.42	1.88
Native plant species richness - forbs	15.00	4.00	27%	2.50	7.00	47%	2.50	6.00	40%	2.50	2.00	13%	0.00	0.32	1.88
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	20.00	111%	5.00	20.00	111%	5.00	18.00	100%	5.00	18.00	100%	5.00	1.06	
Tree sub-canopy height	10.00	9.00	90%	5.00	8.00	80%	5.00	0.00	0%	0.00	9.00	90%	5.00	0.65	
Average score		0.00		5.00	0.00		5.00	0.00		2.50	0.00		5.00		4.38
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	28.00	52.40	187%	5.00	83.90	300%	3.00	77.50	277%	3.00	37.60	134%	5.00	2.24	
Tree sub-canopy cover	5.00	0.00	0%	0.00	15.00	300%	3.00	0.00	0%	0.00	19.70	394%	3.00	1.74	
Average score		0.00		2.50	0.00		3.00	0.00		1.50	0.00		4.00		2.75
Shrub canopy cover	4.00	1.30	33%	3.00	8.10	203%	3.00	3.50	88%	5.00	25.40	635%	3.00	2.39	3.50
Native grass cover	45.00	24.00	53%	3.00	8.00	18%	1.00	44.00	98%	5.00	7.00	16%	1.00	0.46	2.50
Organic litter	30.00	52.00	173%	5.00	79.60	265%	3.00	22.80	76%	5.00	49.60	165%	5.00	1.70	4.50
Large trees (euc and non-euc)	10.00	2.00	20%	5.00	8.00	80%	10.00	7.00	70%	10.00	4.00	40%	5.00	0.53	7.50
Coarse woody debris	285.00	290.00	102%	5.00	525.00	184%	5.00	185.00	65%	5.00	420.00	147%	5.00	1.25	5.00
Non-native plant cover	0.00	0.00	0%	10.00	0.07	7%	5.00	0.00	0%	10.00	0.41	41%	3.00	0.12	7.00
Quality and availability of food and foraging habitat - max score of 10		2.00		2.00	8.00		8.00	6.00		6.00	4.00		4.00		5.00
Quality and availability of shelter - max score of 10		0.00		0.00	2.00		2.00	2.00		2.00	2.00		2.00		1.50
Total Site Condition Score				55.50			62.50			64.50			52.00		58.63
Max Site condidion score - 100				100.00			100.00			100.00			100.00		100.00
Site Conditions Score - out of 3				1.67			1.88			1.94			1.56		1.76
Site Context															
Size of patch - max score of 10		10.00	10.00		10.00	10.00		10.00	10.00		10.00	10.00			10.00
Connectedness - max score of 5		4.00	4.00		5.00	5.00		5.00	5.00		5.00	5.00			4.75
Context - max score of 5		4.00	4.00		5.00	5.00		4.00	4.00		4.00	4.00			4.25
Ecologial Corridors		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00			0.00
Threats to the species - max score of 15		4.00	4.00		10.00	10.00		8.00	8.00		0.00	0.00			5.50
Species mobility capacity - max score of 10		5.40	5.40		5.40	5.40		5.40	5.40		5.40	5.40			5.40
Site Context Score			27.40			35.40			32.40			24.40			29.90
MAX Site Context Score - 45			45.00			45.00			45.00			45.00			45.00
Site Context Score - out of 3			1.83			2.36			2.16			1.63			1.99

Offset Area

Assessment Unit	AU6-11.3.2					
	AU6-11.3.2					AU6-11.3.2
ENTER RE INTO GREEN BOX	11.3.2	CBC19			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	71.43	71%	3.00	0.71	3.00
Native plant species richness - trees	2.00	7.00	350%	5.00	3.50	5.00
Native plant species richness - shrubs	2.00	6.00	300%	5.00	3.00	5.00
Native plant species richness - grasses	9.00	2.00	22%	0.00	0.22	0.00
Native plant species richness - forbs	17.00	2.00	12%	0.00	0.12	0.00
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	20.00	111%	5.00	1.11	
Tree sub-canopy height	0.00	10.00				
Average score		0.00		5.00	0.00	5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40.00	61.60	154%	5.00	1.54	
Tree sub-canopy cover	0.00	9.10				
Average score		0.00		5.00	0.00	5.00
Shrub canopy cover	2.00	4.90	245%	3.00	2.45	3.00
Native grass cover	35.00	5.00	14%	1.00	0.14	1.00
Organic litter	30.00	57.80	193%	5.00	1.93	5.00
Large trees (euc and non-euc)	22.00	0.00	0%	0.00	0.00	0.00
Coarse woody debris	307.00	120.00	39%	2.00	0.39	2.00
Non-native plant cover	0.00	0.28	28%	3.00	0.28	3.00
Quality and availability of food and foraging habitat - max score of 10		0.00		0.00		0.00
Quality and availability of shelter - max score of 10		0.00		0.00		0.00
Total Site Condition Score				37.00		37.00
Max Site condidion score - 100				100.00		100.00
Site Conditions Score - out of 3				1.11		1.11
Site Context						
Size of patch - max score of 10		10.00		10.00		10.00
Connectedness - max score of 5		5.00		5.00		5.00
Context - max score of 5		4.00		4.00		4.00
Ecologial Corridors		0.00		0.00		0.00
Threats to the species - max score of 15		6.00		6.00		6.00
Species mobility capacity - max score of 10		5.40		5.40		5.40
Site Context Score				30.40		30.40
MAX Site Context Score - 45				45.00		45.00
Site Context Score - out of 3				2.03		2.03

12.5 Squatter Pigeon Habitat Quality

See next page.

Species Stocking Rate (SSR)							Entire Sites
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score	0		5		10	10
		No		Yes - adjacent		Yes - on site	
Species usage of the site (habitat type & evidenced usage)	Score	0	5	10	15		10
		Not habitat	Dispersal	Foraging	Breeding		
Approximate density (per ha)	Score	0	10	20	30		10
		0%					
Role/importance of species population on site*	0	0	5	10	15		5
		0	5 - 15	16-20	21-30		
Total SRR score (out of 70)	0						35
SRR Score (out of 4)	**0**						2.00

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

Final habitat quality score (weighted)	AU1-11.3.1	AU2-11.3.25	AU3-11.3.27f	AU4-11.3.3	AU5-11.3.3	AU6-11.3.2
Site Condition score (out of 3)	1.61	1.79	1.55	2.06	1.73	1.27
Site Context Score (out of 3)	1.28	2.24	1.20	2.34	2.29	2.29
Species Stocking Rate Score (out of 4)	0.00	2.00	0.00	2.00	2.00	2.00
Habitat Quality score (out of 10)	2.89	6.04	2.75	6.40	6.02	5.56
Assessment Unit area (ha) in offset area	0.00	128.94	0.00	62.97	259.37	2.43
Total offset area (ha) for this MNES	453.71	453.71	453.71	453.71	453.71	453.71
Size Weighting	0.00	0.28	0.00	0.14	0.57	0.01
Weighted Habitat Quality Score	0.00	***1.72***	0.00	***0.89***	***3.44***	***0.03***
Total Habitat Quality Score						***6.08***

Offset Area

Assessment Unit	AU2-11.3.25																	
		AU2-11.3.25				AU2-11.3.25				AU2-11.3.25				AU2-11.3.25				AU2-11.3.25
ENTER RE INTO GREEN BOX	11.3.25	CBC1				CBC11				CBC16				CBC18				SIZE OF PATCH
	Benchmark	Raw Data	% Benchmark	Score		Raw Data	% Benchmark	Score		Raw Data	% Benchmark	Score		Raw Data	% Benchmark	Score		Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00		100.00	100%	5.00		100.00	100%	5.00		100.00	100%	5.00		100%	5.00
Native plant species richness - trees	4.00	4.00	100%	5.00		8.00	200%	5.00		8.00	200%	5.00		5.00	125%	5.00		156%	5.00
Native plant species richness - shrubs	4.00	1.00	25%	2.50		4.00	100%	5.00		2.00	50%	2.50		4.00	100%	5.00		69%	3.75
Native plant species richness - grasses	8.00	4.00	50%	2.50		2.00	25%	2.50		4.00	50%	2.50		0.00	0%	0.00		31%	1.88
Native plant species richness - forbs	13.00	4.00	31%	2.50		4.00	31%	2.50		5.00	38%	2.50		1.00	8%	0.00		27%	1.88
Tree canopy height (average of emergent, canopy and sub-canopy layers)	23.00	22.00	96%	5.00		20.00	87%	5.00		28.00	122%	5.00		20.00	87%	5.00		98%	
Tree sub-canopy height	11.00	13.00	118%	5.00		10.00	91%	5.00		13.00	118%	5.00		12.00	109%	5.00		109%	
Average score		0.00		5.00		0.00		5.00		0.00		5.00		0.00		5.00			5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	34.00	34.30	101%	5.00		73.00	215%	3.00		62.10	183%	5.00		82.50	243%	3.00		185%	
Tree sub-canopy cover	12.00	22.50	188%	5.00		12.00	100%	5.00		26.00	217%	3.00		5.50	46%	2.00		138%	
Average score		0.00		5.00		0.00		4.00		0.00		4.00		0.00		2.50			3.88
Shrub canopy cover	7.00	4.40	63%	5.00		5.80	83%	5.00		2.40	34%	3.00		14.20	203%	3.00		96%	4.00
Native grass cover	35.00	71.00	203%	5.00		10.00	29%	1.00		16.00	46%	1.00		43.00	123%	5.00		100%	3.00
Organic litter	21.00	29.00	138%	5.00		35.80	170%	5.00		63.60	303%	3.00		55.00	262%	3.00		218%	4.00
Large trees (euc and non-euc)	32.00	27.00	84%	10.00		18.00	56%	10.00		14.00	44%	5.00		15.00	47%	5.00		58%	7.50
Coarse woody debris	473.00	210.00	44%	2.00		170.00	36%	2.00		240.00	51%	5.00		260.00	55%	5.00		47%	3.50
Non-native plant cover	0.00	0.00	0%	10.00		0.36	36%	3.00		0.17	17%	5.00		0.00	0%	10.00		13%	7.00
Quality and availability of food and foraging habitat - max score of 10		4.00		4.00		4.00		4.00		6.00		6.00		0.00		0.00			3.50
Quality and availability of shelter - max score of 10		3.60		3.60		0.00		0.00		0.00		0.00		0.00		0.00			0.90
Total Site Condition Score				72.10				59.00				54.50				53.50			59.78
Max Site condidion score - 100				100.00				100.00				100.00				100.00			100.00
Site Conditions Score - out of 3				2.16				1.77				1.64				1.61			1.79
Site Context																			
Size of patch - max score of 10		10.00		10.00		10.00		10.00		10.00		10.00		10.00		10.00			10.00
Connectedness - max score of 5		4.00		4.00		4.00		4.00		4.00		4.00		5.00		5.00			4.25
Context - max score of 5		4.00		4.00		4.00		4.00		4.00		4.00		4.00		4.00			4.00
Ecologial Corridors		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00			0.00
Threats to the species - max score of 15		10.00		10.00		10.00		10.00		10.00		10.00		10.00		10.00			10.00
Species mobility capacity - max score of 10		5.40		5.40		5.40		5.40		5.40		5.40		5.40		5.40			5.40
Site Context Score				33.40				33.40				33.40				34.40			33.65
MAX Site Context Score - 45				45.00				45.00				45.00				45.00			45.00
Site Context Score - out of 3				2.23				2.23				2.23				2.29			2.24

Offset Area

Assessment Unit	AU4-11.3.3														
		AU4-11.3.3			AU4-11.3.3			AU4-11.3.3			AU4-11.3.3				AU4-11.3.3
ENTER RE INTO GREEN BOX	11.3.3	CBC4			CBC9			CBC10			CBC20			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00	100.00	100%	5.00	50.00	50%	3.00	66.67	67%	3.00	0.79	4.00
Native plant species richness - trees	3.00	4.00	133%	5.00	3.00	100%	5.00	2.00	67%	2.50	6.00	200%	5.00	1.25	4.38
Native plant species richness - shrubs	5.00	4.00	80%	2.50	5.00	100%	5.00	4.00	80%	2.50	3.00	60%	2.50	0.80	3.13
Native plant species richness - grasses	12.00	8.00	67%	2.50	6.00	50%	2.50	4.00	33%	2.50	8.00	67%	2.50	0.54	2.50
Native plant species richness - forbs	15.00	4.00	27%	2.50	9.00	60%	2.50	4.00	27%	2.50	4.00	27%	2.50	0.35	2.50
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	22.00	122%	5.00	25.00	139%	5.00	18.00	100%	5.00	15.00	83%	5.00	1.11	
Tree sub-canopy height	10.00	10.00	100%	5.00	10.00	100%	5.00	10.00	100%	5.00	0.00	0%	0.00	0.75	
Average score		0.00		5.00	0.00		5.00	0.00		5.00	0.00		2.50		4.38
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	28.00	67.70	242%	3.00	56.10	200%	3.00	69.80	249%	3.00	47.50	170%	5.00	2.15	
Tree sub-canopy cover	5.00	6.50	130%	5.00	16.00	320%	3.00	1.60	32%	2.00	0.00	0%	0.00	1.21	
Average score		0.00		4.00	0.00		3.00	0.00		2.50	0.00		2.50		3.00
Shrub canopy cover	4.00	3.20	80%	5.00	1.30	33%	3.00	2.00	50%	5.00	2.90	72%	5.00	0.59	4.50
Native grass cover	45.00	52.60	117%	5.00	36.00	80%	3.00	51.00	113%	5.00	42.00	93%	5.00	1.01	4.50
Organic litter	30.00	40.00	133%	5.00	24.00	80%	5.00	27.40	91%	5.00	52.80	176%	5.00	1.20	5.00
Large trees (euc and non-euc)	10.00	10.00	100%	10.00	3.00	30%	5.00	7.00	70%	10.00	11.00	110%	15.00	0.78	10.00
Coarse woody debris	285.00	290.00	102%	5.00	230.00	81%	5.00	95.00	33%	2.00	170.00	60%	5.00	0.69	4.25
Non-native plant cover	0.00	0.02	2%	10.00	0.00	0%	10.00	0.00	0%	10.00	0.00	0%	10.00	0.01	10.00
Quality and availability of food and foraging habitat - max score of 10		4.00		4.00	4.00		4.00	4.00		4.00	4.00		4.00		4.00
Quality and availability of shelter - max score of 10		1.20		1.20	1.20		1.20	2.40		2.40	4.80		4.80		2.40
Total Site Condition Score				71.70			64.20			63.90			74.30		68.53
Max Site condidion score - 100				100.00			100.00			100.00			100.00		100.00
Site Conditions Score - out of 3				2.15			1.93			1.92			2.23		2.06
Site Context															
Size of patch - max score of 10		10.00	10.00		10.00	10.00		10.00	10.00		10.00	10.00			10.00
Connectedness - max score of 5		5.00	5.00		5.00	5.00		5.00	5.00		5.00	5.00			5.00
Context - max score of 5		5.00	5.00		5.00	5.00		4.00	4.00		5.00	5.00			4.75
Ecologial Corridors		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00			0.00
Threats to the species - max score of 15		10.00	10.00		10.00	10.00		10.00	10.00		10.00	10.00			10.00
Species mobility capacity - max score of 10		5.40	5.40		5.40	5.40		5.40	5.40		5.40	5.40			5.40
Site Context Score				35.40			35.40			34.40			35.40		35.15
MAX Site Context Score - 45				45.00			45.00			45.00			45.00		45.00
Site Context Score - out of 3				2.36			2.36			2.29			2.36		2.34

Offset Area

Assessment Unit	AU5-11.3.3														
		AU5-11.3.3			AU5-11.3.3			AU5-11.3.3			AU5-11.3.3				AU5-11.3.3
ENTER RE INTO GREEN BOX	11.3.3	CBC12			CBC14			CBC15			CBC21			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	100.00	100%	5.00	1.00	5.00
Native plant species richness - trees	3.00	2.00	67%	2.50	4.00	133%	5.00	1.00	33%	2.50	6.00	200%	5.00	1.08	3.75
Native plant species richness - shrubs	5.00	2.00	40%	2.50	2.00	40%	2.50	1.00	20%	0.00	6.00	120%	5.00	0.55	2.50
Native plant species richness - grasses	12.00	4.00	33%	2.50	10.00	83%	2.50	6.00	50%	2.50	0.00	0%	0.00	0.42	1.88
Native plant species richness - forbs	15.00	4.00	27%	2.50	7.00	47%	2.50	6.00	40%	2.50	2.00	13%	0.00	0.32	1.88
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	20.00	111%	5.00	20.00	111%	5.00	18.00	100%	5.00	18.00	100%	5.00	1.06	
Tree sub-canopy height	10.00	9.00	90%	5.00	8.00	80%	5.00	0.00	0%	0.00	9.00	90%	5.00	0.65	
Average score		0.00		5.00	0.00		5.00	0.00		2.50	0.00		5.00		4.38
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	28.00	52.40	187%	5.00	83.90	300%	3.00	77.50	277%	3.00	37.60	134%	5.00	2.24	
Tree sub-canopy cover	5.00	0.00	0%	0.00	15.00	300%	3.00	0.00	0%	0.00	19.70	394%	3.00	1.74	
Average score		0.00		2.50	0.00		3.00	0.00		1.50	0.00		4.00		2.75
Shrub canopy cover	4.00	1.30	33%	3.00	8.10	203%	3.00	3.50	88%	5.00	25.40	635%	3.00	2.39	3.50
Native grass cover	45.00	24.00	53%	3.00	8.00	18%	1.00	44.00	98%	5.00	7.00	16%	1.00	0.46	2.50
Organic litter	30.00	52.00	173%	5.00	79.60	265%	3.00	22.80	76%	5.00	49.60	165%	5.00	1.70	4.50
Large trees (euc and non-euc)	10.00	2.00	20%	5.00	8.00	80%	10.00	7.00	70%	10.00	4.00	40%	5.00	0.53	7.50
Coarse woody debris	285.00	290.00	102%	5.00	525.00	184%	5.00	185.00	65%	5.00	420.00	147%	5.00	1.25	5.00
Non-native plant cover	0.00	0.00	0%	10.00	0.07	7%	5.00	0.00	0%	10.00	0.41	41%	3.00	0.12	7.00
Quality and availability of food and foraging habitat - max score of 10		4.00		4.00	8.00		8.00	4.00		4.00	0.00		0.00		4.00
Quality and availability of shelter - max score of 10		1.20		1.20	0.00		0.00	1.20		1.20	3.60		3.60		1.50
Total Site Condition Score				58.70			60.50			61.70			49.60		57.63
Max Site condidion score - 100				100.00			100.00			100.00			100.00		100.00
Site Conditions Score - out of 3				1.76			1.82			1.85			1.49		1.73
Site Context															
Size of patch - max score of 10		10.00	10.00		10.00	10.00		10.00	10.00		10.00	10.00			10.00
Connectedness - max score of 5		4.00	4.00		5.00	5.00		5.00	5.00		5.00	5.00			4.75
Context - max score of 5		4.00	4.00		5.00	5.00		4.00	4.00		4.00	4.00			4.25
Ecologial Corridors		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00			0.00
Threats to the species - max score of 15		10.00	10.00		10.00	10.00		10.00	10.00		10.00	10.00			10.00
Species mobility capacity - max score of 10		5.40	5.40		5.40	5.40		5.40	5.40		5.40	5.40			5.40
Site Context Score			33.40			35.40			34.40			34.40			34.40
MAX Site Context Score - 45			45.00			45.00			45.00			45.00			45.00
Site Context Score - out of 3			2.23			2.36			2.29			2.29			2.29

Offset Area

Assessment Unit	AU6-11.3.2					
	AU6-11.3.2					AU6-11.3.2
ENTER RE INTO GREEN BOX	11.3.2	CBC19			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	71.43	71%	3.00	0.71	3.00
Native plant species richness - trees	2.00	7.00	350%	5.00	3.50	5.00
Native plant species richness - shrubs	2.00	6.00	300%	5.00	3.00	5.00
Native plant species richness - grasses	9.00	2.00	22%	0.00	0.22	0.00
Native plant species richness - forbs	17.00	2.00	12%	0.00	0.12	0.00
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.00	20.00	111%	5.00	1.11	
Tree sub-canopy height	0.00	10.00				
Average score		0.00		5.00	0.00	5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40.00	61.60	154%	5.00	1.54	
Tree sub-canopy cover	0.00	9.10				
Average score		0.00		5.00	0.00	5.00
Shrub canopy cover	2.00	4.90	245%	3.00	2.45	3.00
Native grass cover	35.00	5.00	14%	1.00	0.14	1.00
Organic litter	30.00	57.80	193%	5.00	1.93	5.00
Large trees (euc and non-euc)	22.00	0.00	0%	0.00	0.00	0.00
Coarse woody debris	307.00	120.00	39%	2.00	0.39	2.00
Non-native plant cover	0.00	0.28	28%	3.00	0.28	3.00
Quality and availability of food and foraging habitat - max score of 10		4.00		4.00		4.00
Quality and availability of shelter - max score of 10		1.20		1.20		1.20
Total Site Condition Score				42.20		42.20
Max Site condidion score - 100				100.00		100.00
Site Conditions Score - out of 3				1.27		1.27
Site Context						
Size of patch - max score of 10		10.00		10.00		10.00
Connectedness - max score of 5		5.00		5.00		5.00
Context - max score of 5		4.00		4.00		4.00
Ecologial Corridors		0.00		0.00		0.00
Threats to the species - max score of 15		10.00		10.00		10.00
Species mobility capacity - max score of 10		5.40		5.40		5.40
Site Context Score				34.40		34.40
MAX Site Context Score - 45				45.00		45.00
Site Context Score - out of 3				2.29		2.29

12.6 Regional Ecosystem 11.3.2

See next page.

	AU.3.2					
						AU.3.2
	11.3.2 Benchmar	Raw Data	% Benchmark	Score	SIZE OF PATCH Average B	Average Score
Recruitment of woody perennial species in EDL	100	71.42857143	71%	3	71%	3
Native plant species richness - trees	2	7	350%	5	350%	5
Native plant species richness - shrubs	2	6	300%	5	300%	5
Native plant species richness - grasses	9	2	22%	0	22%	0
Native plant species richness - forbs	17	2	12%	0	12%	0
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18	20	111%	5	111%	
Tree sub-canopy height	0	10	0%	0	0%	
Average score		0		2.5	0%	2.5
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40	61.6	154%	5	154%	
Tree sub-canopy cover	0	9.1	0%	0	0%	
Average score		0		2.5	0%	2.5
Shrub canopy cover	2	4.9	245%	3	245%	3
Native grass cover	35	5	14%	1	14%	1
Organic litter	30	57.8	193%	5	193%	5
Large trees (euc and non-euc)	22	0	0%	0	0%	0
Coarse woody debris	307	120	39%	2	39%	2
Non-native plant cover	0	0.28	28%	3	28%	3
Total Site Condition Score				32		32
Max Site condidion score - 80				100		80
Site Conditions Score - out of 3				0.96		1.2
Site Context						
Size of patch - max score of 10		10		10		10
Connectedness - max score of 5		5		5		5
Context - max score of 10		4		4		4
Site Context Score				19		19
MAX Site Context Score						20
Site Context Score - out of 3						2.85

Final habitat quality score (weighted)	**AU6**
Site Condition score (out of 80)	32.00
Site Context Score (out of 20)	19.00
Total	51.00
Habitat Quality score (out of 10)	5.10
Assessment Unit area (ha) in offset area	2.43
Total offset area (ha) for this MNES	2.43
Size Weighting	1.00
Weighted Habitat Quality Score	***5.10***
Total Score	***5.10***

12.7 Regional Ecosystem 11.3.3

See next page.

	AU4 - RE 11.3.3 with gilgai														
														AU4 - RE 11.3.3 with gilg	
	11.3.3	CBC4			CBC9			CBC10			CBC20			SIZE OF PATCH	
	Benchmar	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Average B	Average Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100%	5	50	50%	3	66.66667	67%	3	79%	4
Native plant species richness - trees	3	4	133%	5	3	100%	5	2	67%	2.5	6	200%	5	125%	4.375
Native plant species richness - shrubs	5	4	80%	2.5	5	100%	5	4	80%	2.5	3	60%	2.5	80%	3.125
Native plant species richness - grasses	12	8	67%	2.5	6	50%	2.5	4	33%	2.5	8	67%	2.5	54%	2.5
Native plant species richness - forbs	15	4	27%	2.5	9	60%	2.5	4	27%	2.5	4	27%	2.5	35%	2.5
Tree canopy height (average of emergent, canopy and sub-ca	18	22	122%	5	25	139%	5	18	100%	5	15	83%	5	111%	
Tree sub-canopy height	10	10		0	10		0	10		0	0		0		
Average score		0		2.5	0		2.5	0		2.5	0		2.5		2.5
Tree canopy cover (average of emergent, canopy and sub-ca	28	67.7	242%	3	56.1	200%	3	69.8	249%	3	47.5	170%	5	215%	
Tree sub-canopy cover	5	6.5		0	16		0	1.6		0	0		0		
Average score		0		1.5	0		1.5	0		1.5	0		2.5		1.75
Shrub canopy cover	4	3.2	80%	5	1.3	33%	3	2	50%	5	2.9	72%	5	59%	4.5
Native grass cover	45	52.6	117%	5	36	80%	3	51	113%	5	42	93%	5	101%	4.5
Organic litter	30	40	133%	5	24	80%	5	27.4	91%	5	52.8	176%	5	120%	5
Large trees (euc and non-euc)	10	10	100%	10	3	30%	5	7	70%	10	11	110%	15	78%	10
Coarse woody debris	285	290	102%	5	230	81%	5	95	33%	2	170	60%	5	69%	4.25
Non-native plant cover	0	0.02	2%	10	0	0%	10	0	0%	10	0	0%	10	1%	10
Total Site Condition Score				61.5			55			54			70.5		59
Max Site condidion score - 80				80			80			80			80		80
Site Conditions Score - out of 3															2.2125
Site Context															
Size of patch - max score of 10		10		10	10		10	10		10	10		10		1000%
Connectedness - max score of 5		5		5	5		5	5		5	5		5		500%
Context - max score of 10		5		5	5		5	4		4	5		5		475%
Site Context Score				20			20			19			20		19.75
MAX Site Context Score															20
Site Context Score - out of 3															2.9625

	AU5 - RE 11.3.3															
															AU5 - RE 11.3	
	11.3.3	CBC12			CBC14			CBC15			CBC21			SIZE OF PATCH		
	Benchmar	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Average Bi	Average Sc	
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	3	2	67%	2.5	4	133%	5	1	33%	2.5	6	200%	5	108%	3.75	
Native plant species richness - shrubs	5	2	40%	2.5	2	40%	2.5	1	20%	0	6	120%	5	55%	2.5	
Native plant species richness - grasses	12	4	33%	2.5	10	83%	2.5	6	50%	2.5	0	0%	0	42%	1.875	
Native plant species richness - forbs	15	4	27%	2.5	7	47%	2.5	6	40%	2.5	2	13%	0	32%	1.875	
Tree canopy height (average of emergent, canopy and sub-ca	18	20	111%	5	20	111%	5	18	100%	5	18	100%	5	106%		
Tree sub-canopy height	10	9		0	8		0	0		0	9		0			
Average score		0		2.5	0		2.5	0		2.5	0		2.5		2.5	
Tree canopy cover (average of emergent, canopy and sub-ca	28	52.4	187%	5	83.9	300%	3	77.5	277%	3	37.6	134%	5	224%		
Tree sub-canopy cover	5	0		0	15		0	0		0	19.7		0			
Average score		0		2.5	0		1.5	0		1.5	0		2.5		2	
Shrub canopy cover	4	1.3	33%	3	8.1	203%	3	3.5	88%	5	25.4	635%	3	239%	3.5	
Native grass cover	45	24	53%	3	8	18%	1	44	98%	5	7	16%	1	46%	2.5	
Organic litter	30	52	173%	5	79.6	265%	3	22.8	76%	5	49.6	165%	5	170%	4.5	
Large trees (euc and non-euc)	10	2	20%	5	8	80%	10	7	70%	10	4	40%	5	53%	7.5	
Coarse woody debris	285	290	102%	5	525	184%	5	185	65%	5	420	147%	5	125%	5	
Non-native plant cover	0	0	0%	10	0.07	7%	5	0	0%	10	0.41	41%	3	12%	7	
Total Site Condition Score				51			48.5			56.5			42		49.5	
Max Site condidion score - 80				80			80			80			80		100	
Site Conditions Score - out of 3															1.485	
Site Context																
Size of patch - max score of 10		10		10	10		10	10		10	10		10	1000%		
Connectedness - max score of 5		4		4	5		5	5		5	5		5	475%		
Context - max score of 10		4		4	5		5	4		4	4		4	425%		
Site Context Score				18			20			19			19	19		
MAX Site Context Score														20		
Site Context Score - out of 3														2.85		

Final habitat quality score (weighted)	AU4	AU5
Site Condition score (out of 80)	59.00	49.50
Site Context Score (out of 20)	19.75	19.00
Total	78.75	68.50
Habitat Quality score (out of 10)	7.88	6.85
Assessment Unit area (ha) in offset area	62.97	259.37
Total offset area (ha) for this MNES	322.34	322.34
Size Weighting	0.20	0.80
Weighted Habitat Quality Score	***1.54***	***5.51***
Total Score	7.05	

12.8 Regional Ecosystem 11.3.25

See next page.

	AU2 - 11.3.25															
															AU2 - 11.3.2	
	11.3.25	CBC1			CBC11			CBC16			CBC18			SIZE OF PATCH		
	Benchmar	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Average B	Average Sc	
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	4	4	100%	5	8	200%	5	8	200%	5	5	125%	5	156%	5	
Native plant species richness - shrubs	4	1	25%	2.5	4	100%	5	2	50%	2.5	4	100%	5	69%	3.75	
Native plant species richness - grasses	8	4	50%	2.5	2	25%	2.5	4	50%	2.5	0	0%	0	31%	1.875	
Native plant species richness - forbs	13	4	31%	2.5	4	31%	2.5	5	38%	2.5	1	8%	0	27%	1.875	
Tree canopy height (average of emergent, canopy	23	22	96%	5	20	87%	5	28	122%	5	20	87%	5	98%		
Tree sub-canopy height	11	13		0	10		0	13		0	12		0			
Average score		0		2.5	0		2.5	0		2.5	0		2.5		2.5	
Tree canopy cover (average of emergent, canopy a	34	34.3	101%	5	73	215%	3	62.1	183%	5	82.5	243%	3	185%		
Tree sub-canopy cover	12	22.5		0	12		0	26		0	5.5		0			
Average score		0		2.5	0		1.5	0		2.5	0		1.5		2	
Shrub canopy cover	7	4.4	63%	5	5.8	83%	5	2.4	34%	3	14.2	203%	3	96%	4	
Native grass cover	35	71	203%	5	10	29%	1	16	46%	1	43	123%	5	100%	3	
Organic litter	21	29	138%	5	35.8	170%	5	63.6	303%	3	55	262%	3	218%	4	
Large trees (euc and non-euc)	32	27	84%	10	18	56%	10	14	44%	5	15	47%	5	58%	7.5	
Coarse woody debris	473	210	44%	2	170	36%	2	240	51%	5	260	55%	5	47%	3.5	
Non-native plant cover	0		0%	10	0.356	36%	3	0.168	17%	5	0	0%	10	13%	7	
Total Site Condition Score				59.5			50			49.5			50		51	
Max Site condidion score - 80															80	
Site Conditions Score - out of 3															1.9125	
Site Context																
Size of patch - max score of 10	10		10		10		10		10		10		10		1000%	
Connectedness - max score of 5	4		4		4		4		4		5		5		425%	
Context - max score of 10	4		4		4		4		4		4		4		400%	
Site Context Score			18			18			18				19		18.25	
MAX Site Context Score															20	
Site Context Score - out of 3															2.7375	

Final habitat quality score (weighted)	**AU2**
Site Condition score (out of 80)	51.00
Site Context Score (out of 20)	18.25
Total	69.25
Habitat Quality score (out of 10)	6.93
Assessment Unit area (ha) in offset area	128.94
Total offset area (ha) for this MNES	128.94
Size Weighting	1.00
Weighted Habitat Quality Score	***6.93***
Total Score	***6.93***

12.9 Regional Ecosystem 11.3.27f wooded

See next page.

	AU3 RE 11.3.27f_wooded								
								AU3 RE 11.3.27f_	
	11.3.27f_wooded							SIZE OF PATCH	
	Benchmar	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Average B	Average Score
Recruitment of woody perennial species in EDL	100	66.66667	67%	3	100	100%	5	83%	4
Native plant species richness - trees	1	3	300%	5	3	300%	5	300%	5
Native plant species richness - shrubs	1	0	0%	0	2	200%	5	100%	2.5
Native plant species richness - grasses	3	9	300%	5	5	167%	5	233%	5
Native plant species richness - forbs	6	7	117%	5	8	133%	5	125%	5
Tree canopy height (average of emergent, canopy and sub-canopy laye	16	15	94%	5	22	138%	5	116%	
Tree sub-canopy height	0	0	0%	0	0		0		
Average score		0		2.5	0		2.5		2.5
Tree canopy cover (average of emergent, canopy and sub-canopy laye	40	71.5	179%	5	73	183%	5	181%	
Tree sub-canopy cover	0	0	0%	0	0		0		
Average score		0		2.5	0		2.5		2.5
Shrub canopy cover	0	2.3	0%	0	1.9	0%	0	0%	0
Native grass cover	3	34	1133%	5	62	2067%	5	1600%	5
Organic litter	15	37	247%	3	23	153%	5	200%	4
Large trees (euc and non-euc)	28	2	7%	5	0	0%	0	4%	2.5
Coarse woody debris	530	160	30%	2	700	132%	5	81%	3.5
Non-native plant cover	0	0	0%	10	0	0%	0%	0%	5
Total Site Condition Score				48			45		46.5
Max Site condidion score - 80									80
Site Conditions Score - out of 3									1.74375
Site Context									
Size of patch - max score of 10		10		10	10		10		1000%
Connectedness - max score of 5		4		4	4		4		400%
Context - max score of 10		4		4	4		4		400%
Site Context Score				18			18		18
MAX Site Context Score									20
Site Context Score - out of 3									2.7

Final habitat quality score (weighted)	**AU3**
Site Condition score (out of 80)	46.50
Site Context Score (out of 20)	18.00
Total	64.50
Habitat Quality score (out of 10)	6.45
Assessment Unit area (ha) in offset area	7.52
Total offset area (ha) for this MNES	7.52
Size Weighting	1.00
Weighted Habitat Quality Score	***6.45***
Total Score	***6.45***

13.0 Appendix G

Likelihood occurrence assessment

Desktop Likelihood of Occurrence assessment for threatened fauna and flora.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
Birds					
Calidris acuminata	Sharp-tailed Sandpiper	Occurs along the coastline of Queensland, New South Wales, and Victoria, with scattered records inland and in other states. The species occurs in freshwater/brackish wetlands that have muddy edges with sedges, grass, saltmarsh, or other low vegetation. They can be attracted to aquatic vegetation such as algae mats and water weeds. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	V, M, Ma	V	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Actitis hypoleucos	Common Sandpiper	Occurs along all coastlines of Australia and found in many inland areas where freshwater or saltwater wetlands are present. The species exhibits a preference for mangroves, muddy margins and or rocky shores, and is rarely found on mudflats. They have been recorded in estuaries, deltas, banks, lakes, reservoirs, dams, and occasionally piers and jetties. Roosting habitat is generally rocks or roots/branches of vegetation, particularly mangroves. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	M	SL	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Calidris melanotos	Pectoral Sandpiper	Occurs around the Cairns region in Queensland, widespread in New South Wales, and in southern Victoria, with isolated records throughout the rest of Australia. The species prefers shallow fresh or saline wetlands, generally coastal or near coastal, with muddy edges and low, fringing, or emergent vegetation. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	M, Ma	SL	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Pandion haliaetus	Osprey	Generally a coastal species, occurring in estuaries, bays, inlets, islands and surrounding waters, coral atolls, reefs, lagoons, rock cliffs and stacks. Sometimes ascends larger rivers to far inland.	M, Ma	-	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
		Builds nests high in tree, on pylon or on ground on islands. Feeds on fish (Pizzey and Knight 2007).			
Calidris ferruginea	Curlew Sandpiper	Occurs around the coasts of Australia and is widespread inland in smaller numbers. In Queensland there are scattered records occurring in the Gulf of Carpentaria, with widespread records along the coast south of Cairns. Habitat generally consists of intertidal mudflats in sheltered coastal areas, though is known to occur around non-tidal swamps, lakes, and ephemeral water bodies. They roost on beaches, sandspits, inlets and occasionally dunes. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	CE, M, Ma	CE	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Erythrotriorchis radiatus	Red Goshawk	Occurs from the Kimberly in Western Australia to the Cape York Peninsula in Queensland, with records in south-east Queensland becoming increasingly scant since 2010. The species inhabits open forests, woodlands, wooded riparian zones that transect tropical savannas, and rainforest ecotones along coastal and sub-coastal regions. They prefer intact environments with a mosaic of vegetation types and permanent water. They require trees over 20 m tall with an open limb and canopy structure for nesting (Department of Climate Change, Energy, the Environment and Water, 2023).	E	E	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Falco hypoleucos	Grey Falcon	Occurs in inland Australia in arid and semi-arid conditions, including Murray-Darling Basin, Eyre Basin, central Australia, and Western Australia where annual rainfall is below 500 mm. It appears to be absent east of the Great Dividing Range. They are found in lightly wooded plains with a preference for Acacia woodlands with vegetated watercourses. They require abandoned nests in tall trees for nesting (Department of Climate Change, Energy, the Environment and Water, 2023).	V	V	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Gallinago hardwickii	Latham's Snipe	Occurs from the Cape York Peninsula in Queensland south to South Australia, and inland west of the Great Dividing Range. They inhabit various wetlands, permanent and ephemeral, of	V, M, Ma	SL	Unlikely – no records within 10 km and the OIA

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
		varying salinity, though they prefer freshwater with low, dense vegetation. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).			does not contain suitable habitat.
Geophaps scripta scripta	Squatter Pigeon	Occurs from the Burdekin-Lynd Divide in north Queensland to the Border Rivers in northern New South Wales and inland to Hughenden to Charleville. They are found in remnant, regrowth and modified open-forest and wooded communities dominated by Eucalyptus, Corymbia, Acacia or Callitris species and within 3 km of water bodies. They require patchy understory with tussocks where vegetation is generally below 33% on well-draining, gravelly, sandy, or loamy soils. Breeding occurs within 1km of a suitable, permanent waterbody (Department of Climate Change, Energy, the Environment and Water, 2023).	V	V	Known – species detected within the OIA. .
Grantiella picta	Painted Honeyeater	Occurs sporadically from south-eastern Australia to north-western Queensland and across to eastern Northern Territory. They are found in Eucalypt, Melaleuca, Acacia and Casuarina forests and woodlands that have an abundance of mature trees with mistletoes present, which is their primary food source. They prefer larger sections of intact habitat over strips of remnant vegetation (such as road reserve) though exceptions have been recorded when mistletoes are present in particularly high abundance. Nesting also occurs where mistletoes are abundant (Department of Climate Change, Energy, the Environment and Water, 2023).	V	V	Potential– no records within 10 km however the OIA contains suitable habitat.
Hirundapus caudacutus	White-throated Needletail	Occurs from northern Queensland through to south-eastern Australia and inland to the west of the Great Dividing Range, and in Tasmania. The species is nearly exclusively aerial. They are found above a variety of ecosystems, though there appears to be preference for open forests, rainforest, and heathlands, and less often over woodland and treeless areas. The species spends the non-breeding season (spring and summer) in	V, M	V	Known – records within OIA and OIA contains suitable habitat.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
		Australia (Department of Climate Change, Energy, the Environment and Water, 2023).			
Neochmia ruficauda ruficauda	Star Finch	The Star Finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns (Ausgrid 2011).	E	E	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Poephila cincta cincta	Southern Black-throated Finch	Occurs in grassy woodland dominated by eucalypts, paperbarks or acacias where there are seeding grasses and water. Nests in tree hollows or builds domed nests in trees (Garnett, 2000).	E	E	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Rostratula australis	Australian Painted Snipe	Occurs across Australia though is more common in eastern Australia. They inhabit permanent and ephemeral wetlands, preferably freshwater though occasionally brackish, that typically have emergent, fringing vegetation. They will sometimes use areas lined with trees. Required breeding habitat is shallow freshwater wetlands (often islands within wetlands) with wet mud, dense low cover, and upper and canopy cover nearby (Department of Climate Change, Energy, the Environment and Water, 2023).	E	E	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Stagonopleura guttata	Diamond Firetail	Occurs from very southern Queensland to the Eyre Peninsula, South Australia, and up to 300km inland. They inhabit woodlands, open forests and other lightly timbered habitats dominated by Eucalypts, Acacias of Casuarinas. They exhibit a preference for high grass coverage, low tree density and low coarse woody debris and litter (Department of Climate Change, Energy, the Environment and Water, 2023).	V	V	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Apus pacificus	Fork-tailed Swift	Occurs across all Australia, though the species is nearly exclusively aerial. The species generally occur over inland plains, sometimes coastal areas. The species spends the non-breeding season (spring and summer) in Australia (Department of Climate Change, Energy, the Environment and Water, 2023).	M, Ma	SL	Likely – records are within 10 km of the OIA and the OIA contains suitable habitat.
Cuculus optatus	Oriental Cuckoo	Occurs along the coastline of Northern Territory, Queensland, and New South Wales. The species often inhabits rainforest,	M	SL	Unlikely – no records within 10 km and the OIA

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
		vine thickets, wet sclerophyll forest and open woodlands. The species spends the non-breeding season (spring and summer) in Australia (iNaturalist, 2023).			does not contain suitable habitat.
Motacilla flava	Yellow Wagtail	This species occurs in a range of habitats including estuarine habitats such as sand dunes, mangrove forests and coastal saltmarshes. This species also occurs in open grassy areas including disturbed sites such as sports grounds and has been recorded on the edges of wetlands, swamps, lakes and farm dams. This species migrates from Asia to Australia in spring-summer. It has been recorded in the estuarine areas of the Hunter River in Newcastle NSW and in QLD and the north of NT and WA {Birds Australia, 2007 #1611}.	M	SL	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Mammals					
Dasyurus hallucatus	Northern Quoll	Occurs from Mt Morgan to Weipa inland towards Carnarvon Gorge in Queensland, with some records south to Sunshine Coast hinterland. In Northern Territory they are restricted to the Top End. In Western Australia they are within the Pilbara, on a number of islands, and scattered from Derby to Wyndham. The species is found in a variety of habitats ranging from rocky areas, Eucalypt forests, woodlands, rainforests, beaches, shrublands, grasslands and desert. They favour high-relief areas with shallow soils, high boulder cover and low fire frequency close to permanent water. Dens are often in rocky areas with surrounding vegetation and can be crevices, tree holes or termite mounds (Department of Climate Change, Energy, the Environment and Water, 2023).	E	LC	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Macroderma gigas	Ghost Bat	Occurs disjunctly across northern Australia with occurrences in Pilbara and Kimberly in Western Australia, northern Northern Territory, the Gulf of Carpentaria and in coastal, subcoastal and western Queensland. They utilise a wide range of habitats from arid, savannah, through to rainforest. They require caves, abandoned mines and rock crevices for roosting, with a preference for deep voids with a temperature of 23-28 degrees	V	E	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
		and humidity of 50-100% (Department of Climate Change, Energy, the Environment and Water, 2023).			
Nyctophilus corbeni	Corben's Long-eared Bat	Inhabits a variety of vegetation types, including mallee, bulloke (*Allocasuarina leuhmanni*) and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. (Department of Environment and Heritage Protection 2015)	V	V	Unlikely – no records within 10 km and the OIA does not contain suitable habitat.
Petauroides volans	Greater Glider (southern and central)	Occurs from Proserpine in Queensland south through New South Wales to Blackwood in Victoria in Eucalypt forests and woodlands below 1200 m above sea level. Tall, montane and moist forests tend to be preferred, though they can be found in drier habitats, and they favour forests with a diversity of Eucalypt species with seasonal growth variation for year-round foraging. They require large, old trees with hollows for dens (Department of Climate Change, Energy, the Environment and Water, 2023).	E	E	Known – species has been detected during previous work within the site (LEC, 2023). OIA contains suitable habitat.
Petaurus australis australis	Yellow-bellied Glider	Occurs disjunctly from Mackay in Queensland through New South Wales and to far south-eastern South Australia. The species is generally along the coastline, with some isolated populations inland along the western slopes of the Great Dividing Range in parts of New South Wales and Queensland. The species is found in woodlands and wet and dry sclerophyll forests dominated by Eucalypts, with a preference for old growth forests that have seasonal growth variation for year-round foraging and an abundance of winter-flowering and smooth-barked Eucalypts. They require large hollows, generally over one metre wide, in old trees for dens (Department of Climate Change, Energy, the Environment and Water, 2023).	E	E	Unlikely – no records within 10 km and OIA does not contain suitable habitat.
Phascolarctos cinereus	Koala (combined populations of	For the combined population considered here, occurs from the Wet Tropics in Queensland south to the New South Wales and Victoria border, and inland to up to approximately 600 km,	E	E	Known – species has been detected during previous work within the

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
	Queensland, New South Wales and the Australian Capital Territory)	including the Australian Capital Territory. The distribution is not continuous and isolated populations are often in low density. The species is restricted to Eucalypt sclerophyll forest and woodlands where preferred food trees occur (Eucalyptus, Lophostemon, Melaleuca, Angophora, Corymbia sp). They prefer habitats with higher tree species richness in proximity to creek lines (Department of Climate Change, Energy, the Environment and Water, 2023).			site (LEC, 2023). OIA contains suitable habitat.
Pteropus poliocephalus	Grey-headed Flying-fox	Occurs from Ingham in Queensland south to Adelaida in South Australia in coastal and subcoastal regions below 200 m elevation. Habitat is varied, though tends to include rainforests, open forests, woodlands, Melaleuca swamps and Banksia woodlands close to water with an abundance of exposed branches for roosting. The species follows the flowering cycle of the preferred food source, Eucalypt and related species, and thus can be temporarily absent in parts of the distribution (Department of Climate Change, Energy, the Environment and Water, 2023).	V	-	Potential – no records within 10 km however the OIA contains suitable habitat.
Reptiles					
Delma torquata	Collared Delma	Occurs sporadically in Queensland with known locations including Bunya Mountains, Blackdown Tablelands National Park, Expedition National Park, Western Creek, Toowoomba Ranges, and the western suburbs of Brisbane. The species inhabits Eucalypt-dominated woodlands and open forests on Land Zones 3, 9 and 10, and is associated with RE's 11.3.2, 11.9.10, 11.10.1, and 11.10.4. The species requires rocks, coarse woody debris, bark and leaf litter (generally 30–100 mm thick) (Department of Climate Change, Energy, the Environment and Water, 2023).	V	V	Unlikely – no records within 10 km and OIA does not contain suitable habitat.
Crocodylus porosus	Salt-water Crocodile, Estuarine Crocodile	The saltwater crocodile has a tropical distribution that extends to northern Australia, where it currently inhabits coastal areas ranging from Broome in north-west Western Australia, across the Northern Territory, and down the east coast of Queensland	M	SL	Unlikely – no records within 10 km and OIA does not contain suitable habitat.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
		to Rockhampton (Webb & Manolis 1989). Saltwater crocodiles can be found in tidal rivers, coastal floodplains and channels, billabongs, swamps up to 150 kilometres inland from the coast, as well as far out to sea (Webb et al. 1987). High densities of saltwater crocodile are found in and adjacent to the North Marine Region, primarily in the Mary River and other river systems throughout Kakadu and the Gulf of Carpentaria (Fukuda et al. 2007).			
Denisonia maculata	Ornamental snake	The species is known only from the Brigalow Belt North and parts of the Brigalow Belt South biogeographical regions. The core of the species' distribution occurs within the drainage system of the Fitzroy and Dawson Rivers. The Ornamental Snake's preferred habitat is within, or close to, habitat that is favoured by its prey - frogs. The species is known to occur in RE 11.4.3, 11.4.6, 11.4.8, 11.4.9, 11.3.3, and 11.5.16 (Department of the Environment 2015).	V	V	Known – the species has been recorded within the OIA and suitable habitat is present.
Egernia rugosa	Yakka Skink	The Yakka Skink is commonly found in cavities under and between partly buried rocks, logs or tree stumps, root cavities and abandoned animal burrows. The species often takes refuge in large hollow logs and has been known to excavate deep burrow systems, sometimes under dense ground vegetation. In cleared habitat, this species can persist where there are shelter sites such as raked log piles, deep gullies, tunnel erosion/sinkholes and rabbit warrens. The species has also been found sheltering under sheds and loading ramps. This species is not generally found in trees or rocky habitats (Department of Sustainability Environment Water Population and Communities 2011).	V	V	Unlikely – no records within 10 km and OIA does not contain suitable habitat.
Elseya albagula	Southern Snapping Turtle	The Southern snapping turtle is only found in the Burnett, Fitzroy, Raglan and Mary River drainages of south-east Queensland. It prefers permanent flowing water habitats where	CE	CE	Potential – no records within 10 km however the OIA contains suitable habitat.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
		there are suitable shelters and refuges (e.g. fallen trees). (Department of Environment and Heritage Protection 2014)			
Hemiaspis damelii	Grey snake	Occurs from the coastal areas of Rockhampton in Queensland down to the eastern then central interior of New South Wales to the southern state border. The species has a fragmented range, and the core area is the Brigalow Belt between Dalby and Glenmorgan. The species floodplains and ephemeral wetlands with *Acacia harpophylla* (Brigalow) and *Casuarina cristata* (Belah) woodlands with logs and rocks. Grasslands over alluvial plains with cracking soil can also be utilised and cracking soils are required for foraging (Department of Climate Change, Energy, the Environment and Water, 2023).	E	E	Potential – no records within 10 km however the OIA contains suitable habitat.
Rheodytes leukops	Fitzroy River Turtle	The Fitzroy River Turtle is found in rivers with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles. Preferred areas have high water clarity, and are often associated with Ribbonweed (*Vallisneria sp.)* beds (Cogger et al. 1993). Common riparian vegetation associated with the Fitzroy River Turtle includes Blue Gums (*Eucalyptus tereticornis),* River Oaks (*Casuarina cunninghamiana*), Weeping Bottlebrushes (Callistemon viminalis) and Paperbarks (*Melaleuca linariifolia*) (Tucker et al. 2001).	V	V	Potential – no records within 10 km however the OIA contains suitable habitat.
Plants					
Cadellia pentastylis	Ooline	Occurs west from near Tenterfield and north from Terry Hie Hie (Royal Botanic Gardens, 2005). Grows mainly in vine thickets or dry rainforest, and more rarely occurs in woodlands. It is a relict rainforest species and tends to favour upper and mid slope positions, often with a northerly aspect. It commonly occurs on sandy-loam to clay soils of low to medium fertility. It can occur in pure stands or in a mixed community on the slopes of residual sandstone ranges and scarps (Department of Environment and Conservation, 2006).	V	V	Unlikely – no records within 10 km and OIA does not contain suitable habitat.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
Cycas ophiolitica	-	*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, and is associated with species such as *Corymbia dallachiana*, *C. erythrophloia*, *C. xanthope* and *Eucalyptus fibrosa*. *Cycas ophiolitica* has also been found on mudstone in association with *Corymbia dallachiana, C. erythrophloia* and *Eucalyptus crebra*, and on alluvial loams with *Corymbia intermedia, Eucalyptus drepanophylla* and *E. tereticornis* (Hill 1998a; Queensland Herbarium 2007). Climate in the habitat of the species is tropical with hot, humid summers and mild, dry winters. Rainfall is about 1500 mm per annum falling mainly in summer and autumn (Jones 1993a).	E	E	Unlikely – no records within 10 km and OIA does not contain suitable habitat.
Denhamia megacarpa	Large-fruited Denhamia	*Denhamia megacarpa* is known to exist in three subpopulations at Newlands, Junee and Mackenzie. It persists on sandy or gravelly soils that support open eucalypt woodland or *Acacia* forests (Regional Ecosystems 11.5.9b and 11.7.2) (DCCEEW, 2022).	E	E	Unlikely – no records within 10 km and OIA does not contain suitable habitat.
Dichanthium queenslandicum	King Blue-grass	Occurs within South East Queensland, Brigalow Belt South, Brigalow Belt North, Central Mackay Coast, Desert Uplands, Mitchell Grass Downs and Einasleigh Uplands Bioregions. Three subpopulations are known from Hughen, Dalby, and from Nebo to Monto and west to Clermont and Rolleston. Persists in natural grassland communities.	E	V	Unlikely – no records within 10 km and OIA does not contain suitable habitat.
Dichanthium setosum	Bluegrass	Occurs from southern New South Wales to northern Queensland, often on black soil and red-brown loamy soil. The species has a wide, disjunct distribution and can be locally common. Habitat can include woodlands or open woodlands dominated by *Acacia* and/or *Eucalypt* species, grasslands and previously cleared areas such as road reserve and pasture (Office of Environment and Heritage, 2023).	V	LC	Unlikely – no records within 10 km and OIA does not contain suitable habitat.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
Eucalyptus raveretiana	Black Ironbox	This species is widely distributed throughout coastal and sub-coastal areas of Queensland. It is known to occur in two main areas; Nebo to Ayr and Aps Creek to Rockhampton. The species usually grows along watercourses, river flats or open woodland, on varied soil types (DCCEEW, 2008).	V	LC	Potential – no records within 10 km however the OIA contains suitable habitat.
Leichhardtia brevifolia	-	Occurs in north and central Queensland where it is known from near Townsville, Springsure and north of Rockhampton. Grows on serpentine rock outcrops or crumbly black soils derived from serpentine in eucalypt woodland, often with Broad-leaved Ironbark (*Eucalyptus fibrosa*) and *Corymbia xanthope* (Department of the Environment and Energy, 2017).	V	V	Unlikely – no records within 10 km and OIA does not contain suitable habitat.
Omphalea celata	-	Known from three sites in central east Queensland. Locations include Hazlewood Gorge, near Eungella; Gloucester Island, near Bowen; and Cooper Creek in the Homevale Station area, north-west of Nebo. Grows in fragmented semi-evergreen vine thicket along a watercourse on weathered metamorphics in a steep-sided gorge at an altitude of 560m (Department of the Environment and Energy, 2017).	V	V	Potential – no records within 10 km however the OIA contains suitable habitat.
Polianthion minutiflorum	-	*Polianthion minutiflorum* is known from five areas in east Queensland, from Redcliffe Vale, about 110 km west of Mackay, south to Kingaroy, covering a distance of approximately 800 km (BRI collection records, n.d.). It grows in forest and woodland on sandstone slopes and gullies with skeletal soil, or deeper soils adjacent to deeply weathered laterite (Kellermann et al., 2006).	V	V	Unlikely – no records within 10 km and OIA does not contain suitable habitat.
Samadera bidwillii	Quassia	Occurs from Mackay, south to Bauple, and inland to Biloela. It can be commonly found in lowland rainforests with *Araucaria cunninghamii*, rainforest margins, open forest and woodlands, with a tendency to be adjacent to ephemeral and permanent watercourses up to 510 m elevation. Common associations in woodlands and forests *Corymbia citriodora, Eucalyptus propinqua, Eucalyptus acmenoides, Eucalyptus tereticornis, Corymbia intermedia, Eucalyptus siderophloia, Eucalyptus moluccana, Eucalyptus cloeziana and Eucalyptus fibrosa*. The	V	V	Unlikely – no records within 10 km and OIA does not contain suitable habitat.

Species	Common Name	Description	EPBC Act	NC Act	Likelihood of Occurrence within the Offset Investigation Area (OIA)
		species occurs on lithosols, skeletal soils, loam soils, sands, silts and sands with clay subsoil (Department of Climate Change, Energy, the Environment and Water, 2023).			

Table X: Desktop Likelihood of Occurrence assessment for threatened ecological communities.

Threatened Ecological Community	Threatened Category	Likelihood of Occurrence within the Offset Investigation Area
Brigalow (*Acacia harpophylla* dominant and co-dominant)	Endangered	Known - RE 11.3.1 - *Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains is mapped within the OIA.
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Likely - RE 11.3.2 - *Eucalyptus populnea* woodland on alluvial plains is mapped within the OIA.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Unlikely – no relevant Regional Ecosystem types are mapped within the OIA.
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Likely - RE 11.3.21 - *Dichanthium sericeum* and/or *Astrebla* spp. grassland on alluvial plains. Cracking clay soils is mapped within the OIA.