

Surat Gas Project Stage 2 - Offset Area Management Plan

EPBC Approval 2010/5344

arrow energy

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Acronyms / Abbreviations

Acronyms / Abbreviations	Definition
AU	Assessment Unit
Arrow	Arrow Energy Ltd
BVG	Broad vegetation group
CHK	Core habitat known
CHP	Core habitat possible
CSG	Coal seam gas
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DEHP	Department of Environment and Heritage Protection (Qld)
DERM	Department of Environment and Resource Management (Qld) (former; now DES)
DES	Department of Environment and Science (Qld)
DOE	Department of Environment (former; now DCCEEW)
DSEWPC	Department of Sustainability, Environment, Water, Population and Communities (former; now DCCEEW)
EIS	Environmental Impact Statement
EOP	Environmental Offsets Policy (October 2012) (EPBC Act)
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999* (Commonwealth)
EPBC Regulation	*Environment Protection and Biodiversity Conservation Regulations 2000* (Commonwealth)
ESE	Ecosmart Ecology and 3D Environmental
GDA	Geodetic Datum of Australia
GH	General habitat
Ha	hectares
MHQS	Modified Habitat Quality Score
MNES	Matters of National Environmental Significance
OAG	Offset Assessment Guide (DCCEEW)
OAMP	Offset Area Management Plan
Offset Area	Site that has been calculated to meet the requirements of the offset for the impacts on MNES from the Project
PL	Petroleum Lease
PMAV	Property Map of Assessable Vegetation
PPL	Petroleum Pipeline Licences
RE	Regional ecosystem
ROW	Right of Way
SGP	Surat Gas Project
SIMP	Species Impact Management Plan
SREIS	Supplementary Report to the EIS
TEC	Threatened ecological community
The Project	Surat Gas Project
VMA	*Vegetation Management Act 1999* (Qld)

Applicant details

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EPBC Referral Number	EPBC 2010/5344

Declaration

I, Matthew Jeffries, 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* (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* (EPBC Regulation) 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.

Matthew Jeffries

Matthew Jeffries
Vice President External Affairs

Executive Summary

Arrow Energy Pty Ltd (Arrow) has been operating a strong domestic gas supply business since 2004, and we are expanding our coal seam gas (CSG) operations in the Surat Basin through the Surat Gas Project (SGP) (the Project). Arrow lodged a referral to the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the SGP on 27 January 2010 (EPBC 2010/5344). An Environmental Impact Statement (EIS) and Supplementary Report to the EIS (SREIS) were completed in March 2012 and June 2013, respectively. The SGP was granted approval from the Queensland Government in October 2013. The Minister for the Environment of the Australian Government provided their approval for the SGP on 19 December 2013.

The SGP comprises up to 6,500 coal seam gas production wells and associated infrastructure and the tenure covers an area of approximately 6,100 km^2, extending from the township of Wandoan in the north towards Millmerran in the south. Agricultural land uses in the Surat Basin are predominantly dryland and irrigated cropping. Some cattle grazing also occurs and remnant vegetation exists largely within State Forests and Road reserves.

The EPBC Act approval for the SGP specifies 'Whole of Project' and 'Stage 2' maximum disturbance to core habitat limits for specified Matters of National Environmental Significance (MNES). The approval defines Stage 2 as all activities following Stage 1, including the installation of gas wells and associated gathering lines, access tracks and gas and water aggregation and transmission infrastructure until 710 gas wells have been installed. (refer to **Figure 1.1**).

There have been seven variations to the original approval (dated 29 March 2017, 29 May 2018, 31 October 2018, 2 July 2019, 29 March 2022, 27 February 2025 and 9 June 2025). These variations include the requirement to provide a detailed Offset Area Management Plan (OAMP) to be submitted within 12 months of project commencement. The purpose of this OAMP is to address the requirements of approval (EPBC 2010/5344; dated 9 June 2025) conditions 10A and 10B for Stage 2 of the Project.

Arrow will secure Stage 2 offsets proposed for the residual significant impacts to the EPBC-listed species and communities through direct land-based offsets, as described in this report. Any remaining areas not utilised within the offset properties identified for Stage 1 will be used for Stage 2. The approved disturbance limits and actual disturbance limits for Stage 2 and the associated offset are summarised in **Table 1.1**. The reconciliation of the Maximum Disturbance Limits, Stage 2 disturbance limits and the actual disturbance limits for Stage 2 are in **Appendix 1** and will be updated in each OAMP for each Stage of the Project.

The property known as Toondoon, being Lot 17 on Plan SP331858 (the Offset Study Area), located approximately 30 km southwest of Mundubbera, has been identified to supply the SGP Stage 2 offset area. Refer to **Figure 4.2**). The balance of area available on Toondoon will be utilised for SGP Stage 3 offsets.

Field surveys of both the impact and offset areas have been undertaken. The surveys on the impact sites were undertaken using the *Guide to determining terrestrial habitat quality, A toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy v1.2* (Department of Environment and Heritage Protection (DEHP), 2017, now Department of the Environment, Tourism, Science, and Innovation (DETSI)). These detailed surveys were conducted by suitably qualified ecologists from Ecosmart Ecology and 3D Environmental (ESE) during both the dry season (September 2016) and wet season (February/March 2017) (ESE, 2017; Ecosmart 2021).

The surveys on the offset property were conducted by suitably qualified ecologists from Arrow (January - April) 2026. The surveys on the offset area were undertaken using the Guide to determining terrestrial habitat quality (DES, 2020). The technical memo is 'Toondoon' Habitat Quality Assessment (Queensland) and Modified Habitat Quality Assessment (Federal) (Ecosmart, May 2026).

An overview of the terrestrial ecology of the impact areas for Stage 1 and Stage 2 are summarised in **Table 1.1**, detailed in **Section 3** and **Attachment 1**, and all of the terrestrial ecology reports are provided in full in **Attachment 2**.

The offset meets the conditions of approval and the offset policy requirements of a 100% direct offset. Risks to successfully achieve the objectives of the OAMP are included in this report and include vegetation clearing, uncontrolled fire, inappropriate grazing and drought. Management actions that will be implemented at the Offset area as part of the OAMP are described in **Section 6.** The risks to planned success have been rated, on the basis of current practice (before) and after the management actions have been implemented. The primary strategies (management actions) to manage the risks are outlined in **Section 6** of this OAMP. These include feral animal control, weed management, legally securing the area, fencing and managing grazing, and fire management. The performance and success of management actions will be subject to a monitoring regime that includes regular inspections for weeds, pest animals and fuel load monitoring, as well as habitat quality assessments and flora and fauna presence/absence surveys.

The OAMP is divided into 2 parts, *Part A - Project Details and Impact Areas* and *Part B - Offset Land Management Details*. Collectively, Parts A and B describe the Stage 2 impacts to MNES and demonstrate that the proposed offset area on the Offsets areas meets the principles of the EPBC Act Environmental Offsets Policy (EOP) and is a suitable offset for approved impacts resulting from Stage 2.

Part A: Project detail and Impact areas

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1 Introduction

Arrow Energy Pty Ltd (Arrow) has been operating a strong domestic gas supply business since 2004, and it is expanding its coal seam gas (CSG) operations in the Surat Basin through the Surat Gas Project (SGP) (the Project).

Arrow lodged a referral to the Australian Government under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the SGP on 27 January 2010 (EPBC 2010/5344, the Approval). An Environmental Impact Statement (EIS) and Supplementary Report to the EIS (SREIS) were completed in March 2012 and June 2013, respectively. The Minister for the Environment of the Australian Government provided their approval for the SGP on 19 December 2013.

The controlling provisions for the action relevant to offsets are listed Threatened species and Communities (Sections 18 and 18A of the Act). Table 1 of the Approval lists the maximum disturbance limits for species and communities for the whole of the SGP. **Table 1.1** below provides a reconciliation of the respective SGP Stage 1 and Stage 2 impacts to threatened species and communities subject to this document.

Arrow's continued comprehensive ecological surveys conducted after the EIS was approved has detected the presence of additional EPBC Act-listed species in the SGP project area. For example, the Koala (*Phascolarctos cinereus*), Greater Glider (*Petauroides volans*), and Painted Honeyeater (*Grantiella picta*). Residual significant impacts to these species and others if/when more become listed over time will be assessed as State matters.

This Offset Area Management Plan (OAMP) demonstrates how Arrow will meet the requirements for Approval conditions 10A and 10B and provides environmental offsets consistent with the Environmental Offsets Policy (EOP) to compensate for the clearing of habitat for Stage 2. Stage 3 is anticipated to commence in Q1 2027 following the completion of SGP Stage 1 and Stage 2, with Stage 1 comprising of 350 wells. Stage 2 scope covers all activities following the completion of Stage 1 including the installation of gas wells and associated gathering lines, access tracks and gas and water aggregation and transmission infrastructure up to a total project Stage 2 maximum of 710 gas wells.

1.1 Project Location

The SGP covers an area of approximately 5,385 km^2, extending from the township of Wandoan in the north towards Millmerran in the south, within the Brigalow Belt Bioregion of Central Queensland. The proposed Stage 2 activities are clustered in three (3) distinct groups. The northern section is to the north and east of Miles, the central section runs from the western boundary of Dalby State Forest westwards crossing the Kogan Condamine Road, northwest of the locality of Kogan, and the southernmost section is within the northeastern corner of Kumbarilla State Forest, extending eastwards towards the locality of Cecil Plains. Refer to **Figure 1.1** for context. Detailed maps of the impact areas for Stage 2 are located in **Appendix 2**.

1.2 OAMP Purpose

The purpose of this document is to address the requirements of approval (EPBC 2010/5344) conditions 10A and 10B (9 June 2025). These requirements are provided in **Table 1.2**, and the reference to the relevant section of this OAMP for each requirement is also provided.

Table 1.1 – Reconciliation of SGP Stage 1 and Stage 2 impact area by EPBC species and communities

Common name ***Scientific name***	**Whole of SGP project maximum disturbance limits (ha)**	**Total Stage 1 impact area (ha)**	**Stage 1 approval limit (ha)**	**Stage 1 OAMP impact area Approved (ha)**	**Impact area remaining - in excess of Stage 1 (ha)**	**Proposed impact area Stage 2 (ha)**
South-eastern Long-eared Bat, *Nyctophilus corbeni*	4,080	467.84	485.52	485.52	17.68	650.13
Dunmall's Snake, *Furina dunmalli*	4,400	166.69	300	150	-16.69*	676.78
Five-clawed Worm-skink *Anomalopus mackayi*	560	0	2	0	0	0
Squatter Pigeon (southern) *Geophaps scripta scripta*	3,261	0	203	0	0	0
Regent Honeyeater *Anthochaera phrygia*	20	0	1	0	0	0
Collared Delma, *Delma torquata*	90	0	11	0	0	0
Yakka Skink, *Egernia rugosa*	310	0	19	0	0	0
EPBC Communities						
Brigalow (*Acacia harpophylla* dominant and co-dominant)	106	0.28	39	4.63	4.35	8.06
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	8	0	8	8	0	0

**It is noted that, for the Dunmall's Snake, the stated impact area of 150 ha in the approved OAMP will be exceeded by 16.69 ha. This discrepancy is due to the application of updated, more conservative mapping rules since the original Stage 1 OAMP was drafted and approved. Arrow commits to making up this shortfall in the subsequent round of offsets for Stage 2.*

Table 1.2 - Conditions of approval addressed in this document

Approval Condition	Document Section
10A. Offsets for development stages must be provided in accordance with the mechanism identified in the approved Offset Strategy and must be registered and legally secured in accordance with Queensland legislation prior to commencement of any subsequent development stage.	**Section 6** **Section 12**
10B. Within 12 months of project commencement or the Minister approving the Offset Strategy for a subsequent development stage, the approval holder must submit for the approval of the Minister an Offset Area Management Plan which includes:	This document
a. a description of the management measures that will be implemented to protect of EPBC listed threatened species and EPBC communities in each offset area,	**Section 8**
b. details of how the proposed offset/s and Offset Area Management Plan are consistent with the principles of the EPBC Act Offsets Policy;	**Section 2.1**
c. field validation survey and baseline description of the current condition (prior to any management activities) of the offset area/s, including existing vegetation;	**Section 1** **Attachment 5**
d. a description and map (including shapefile/s) to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes;	**Section 6.1** **Section 6.2** **Section 6.3**
e. information about how the offset area/s provide connectivity with other relevant habitats and biodiversity corridors including a map depicting the offset areas in relation to other habitats and biodiversity corridors;	**Section 5.1**
f. details of how proposed management measures consider relevant approved conservation advice and are consistent with the measures contained in relevant recovery plans and threat abatement plans;	**Section 2.2** **Section 8**
g. completion criteria and performance targets for evaluating the effectiveness of Offset Area Management Plan implementation, and criteria for triggering corrective actions (if necessary);	**Section 5** **Section 10**
h. a program to monitor, report on and review the effectiveness of the Offset Area Management Plan;	**Section 6** **Section 11** **Section 13**
i. a description of potential risks to the successful implementation of the offset/s and Offset Area Management Plan, and contingency measures that would be implemented to mitigate against these risks.	**Section 7** **Section 8**
11A. The approval holder must not commence the subsequent development stage until the Offset Area Management Plan for the current development stage has been approved in writing by the Minister.	
Note 1: The Minister may determine that a plan, strategy or program approved by the Queensland Government satisfies the requirements for the EPBC Species Management and Offset Plan under these conditions.	
Note 2: Offsets for some species may be accommodated within ecological communities or overlap State approval requirements or other species habitat requirements, as long as they meet the requirements of these conditions of approval in respect of each individual species being offset.	

1.3 Surat Gas Project Offset Acquittal

Arrow has selected a number of properties to acquit offset requirements for project development associated with the SGP. Arrow has already secured an offset property (Killara) to address the offsets required for impacts to Matters of National Environmental Significance (MNES) associated with the pipelines that transfer gas and water from Arrow's tenements to the neighbouring QGC-operated facilities (Petroleum Pipeline Licences (PPLs) EPBC 2018/8223). Killara has also been utilised to acquit the offsets required for Stage 1 of the SGP (EPBC 2010/5344).

The offset property for Stage 2 is referred to as Toondoon (the Offset Study Area). The Offset area within the Offset Study Area is the subject of this OAMP, proposed to acquit Stage 2 impacts of the SGP conducted on Arrow Petroleum Lease (PL) tenements. However, remaining areas within both Killara and Toondoon that have been secured but not utilised for Stage 1 and Stage 2[1] will be used for Stage 3.

Co-locating the offset obligations from these Arrow projects on the same large offset properties will improve the biodiversity value of each offset individually and strengthen other values such as connectivity and resilience. Optimal management for each offset will be achieved where the management actions, reporting timeframes and monitoring, can be aligned, where appropriate.

This will achieve efficiencies in managing many aspects of the cumulative offset area, for aspects such as weeds, feral animals, fire and monitoring.

1.4 Structure of the OAMP

The OAMP is divided into 2 parts. Part A Project Details and Impact Areas and Part B Offset Land Management Details.

Part A - Project Details and Impact Areas contains:

- Project details of the SGP (**Section 1.6**);
- How the offsets address the EOP and EPBC Conservation Advice (**Section 1.7**); and
- Impact area description (**Section 3**).

Part B - Offset Land Management contains:

- Offset property information, including the landscape values (refer to **Section 4** and **Section 5**);
- Offset regional ecosystems (REs) and Modified Habitat Quality Scoring (MHQS) (refer to **Section 5** and **Section 6**);
- Risk analysis (**Section 7**);
- Offset management measures (**Section 8**);
- Completion criteria and performance targets (**Section 5**); and
- Monitoring and reporting (**Section 6**).

1.5 Reconciliation of the SGP Stage 1 Impacts

As per condition 8A of the EPBC Act approval, if the approval holder has provided an offset in respect of impacts to protected matters predicted for a development stage of the project which subsequently are not realised, such parts of the offset in excess of the obligation for that development stage can be applied towards offsets required for the impacts to protected matters of subsequent development stages.

[1] Surat Gas Project (SGP) Stage 1. Offset Area Management Plan. EPBC Approval 2010/5344. February, 2025.

In Accordance with Condition 8A, Arrow seeks to carry over the following secured offsets on Killara that are in excess of Stage 1 offset requirements to contribute to Stage 3 offset requirements:

- 57.11 ha of Brigalow Threatened Ecological Community (TEC);
- 1179.62 ha of Dunmall's Snake core habitat; and
- 53.18 ha South-eastern Long-eared Bat core habitat.

The approved SGP Stage 1 Offset Strategy and OAMP utilised a report (Umwelt, 2020) describing the inherent vegetation and habitat values of the Killara property. Subsequently, to address newly listed species, a more comprehensive study was undertaken on Killara (Ecosmart, 2025) and found that the original 2020 report underestimated the extent of available vegetation and habitat in the offset area. The updated areas presented in this document reflect the amended values presented in the more contemporaneous Ecosmart (2025) report.

Details regarding the reconciliation of Stage 1 offsets, and calculation of offsets in excess of Stage 1 is provided in **Table 1.3**.

Table 1.3 – Calculation of Stage 1 Offsets in Excess of Stage 1 disturbance

EPBC Species/Community	Total Stage 1 Impact Area (ha)	Stage 1 Approval Limit (ha)	Stage 1 OAMP Impact Area Approved (ha)	Impact Area Remaining – in Excess of Stage 1 OAMP (ha)	Excess offsets available on Killara from Stage 1 for future stages
Brigalow TEC	0.28	39.0	4.63	4.35	57.11
Coolibah – Black Box TEC	0	8.0	0	0	0
Dunmall's Snake	166.69	300.0	150	-16.69*	1179.62
South-eastern Long-eared Bat	467.84	485.52	485.52	17.68	53.18
Five-clawed Worm-Skink	0	2.0	0	0	0
Squatter Pigeon (southern)	0	203.0	0	0	0
Regent Honeyeater	0	1.0	0	0	0
Collared Delma	0	11.0	0	0	0
Yakka Skink	0	19.0	0	0	0

*It is noted that, for the Dunmall's Snake, the stated impact area of 150 ha in the approved OAMP will be exceeded by 16.69 ha. This discrepancy is due to the application of updated, more conservative mapping rules since the original Stage 1 OAMP was drafted and approved. Arrow commits to making up this shortfall in the subsequent round of offsets for Stage 2.

1.6 Overview of the SGP Stage 2 Impact Area

Stage 2 of the Project refers to the activities which involve the installation of approximately 360 CSG production wells and associated gathering lines and access tracks in the areas shown in **Figure 1.1**.

The SGP project commenced on 22 October 2020, with the SGP Stage 2 Offset Strategy approved on 19 June 2025. Hence this OAMP is required to be submitted to DCCEEW on or before 18 June 2026 as per Condition 10B of the Approval. Offsets for the Project will be staged in line with the approval. The benefit of staging the project offsets is the continued focus on reducing the impacts to MNES by means of continuous improvement in the refinement of infrastructure locations (i.e. field development layouts) and increasing

knowledge of preferred habitats for MNES gained by ongoing preclearance surveys and monitoring of construction activities (e.g., fauna spotter-catcher observations and records of any reptiles removed from the gathering line open trenches).

The ecology reports for the Stage 2 impact sites are provided in **Attachment 2**. Stage 2 activities will impact two (2) listed MNES species and one (1) MNES threatened ecological community (refer to **Table 1.1**). The following provides an overview of the Stage 2 impact areas; details are provided in the **Section 181.7**.

Impacts to MNES have been minimised by:

- Selecting well pad and pipeline alignments to avoid remnant vegetation and fauna habitat values where practicable;
- Seeking opportunities to co-locate pipeline rights-of-way (ROWs) with existing pipelines, and therefore reducing the width of new easements and habitat fragmentation;
- Completing field surveys in remnant vegetation to understand the likelihood of this vegetation to provide habitat for the listed species; and
- Reviewing effective impact minimisation and mitigation measures based on scientific evidence for wildlife.

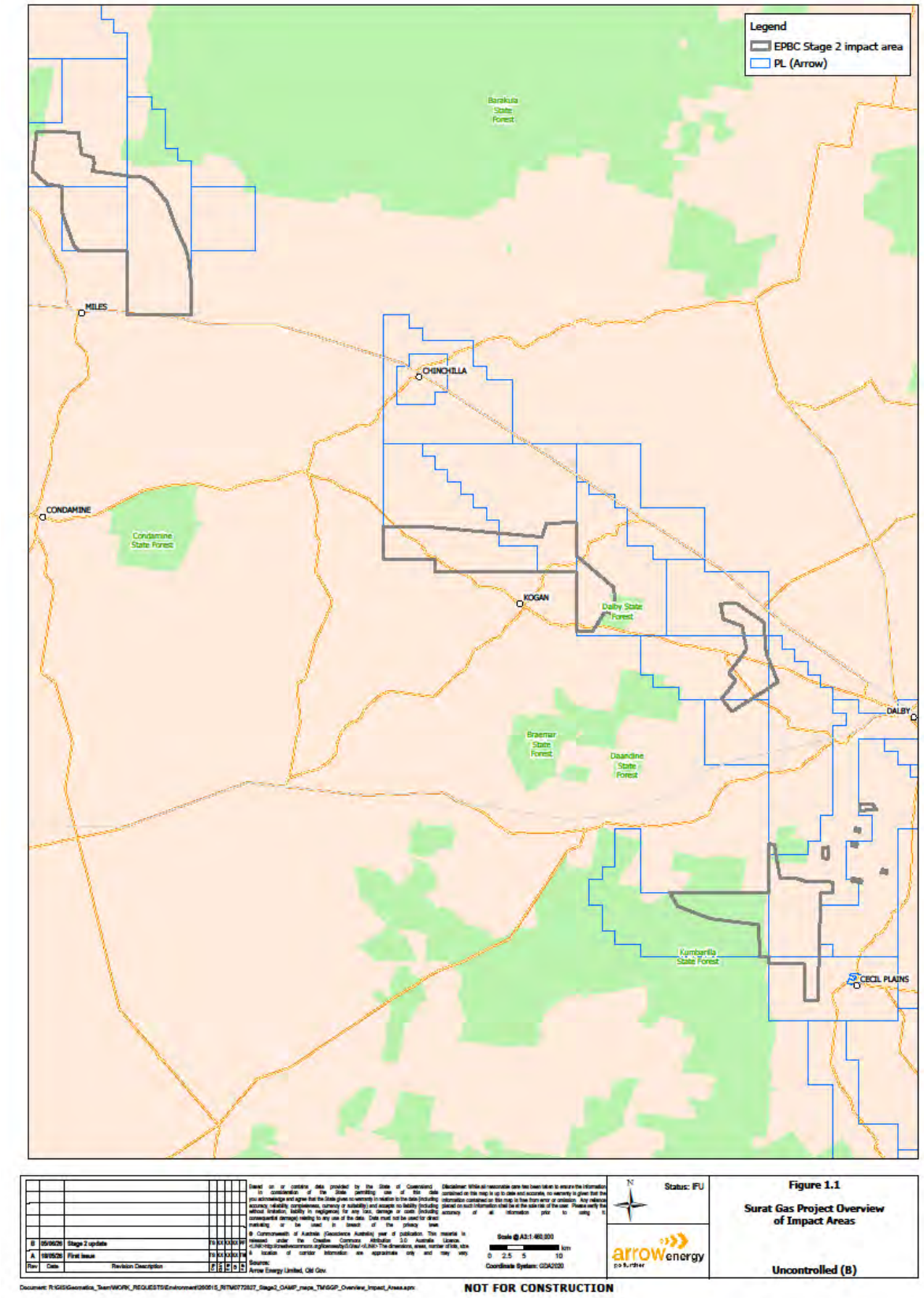
The total disturbance footprint area for the SGP Stage 2 is around 1443.6 ha, comprised of approximately 836 ha (57.9 %) of land that contains remnant or regrowth vegetation, and the remainder 607.5 ha (42%) is non-remanent (i.e. previously cleared, disturbed land). This highlights that Arrow has been quite successful in locating infrastructure on previously cleared areas. Some impacts are unavoidable because of the need to locate infrastructure in State Forests and traverse linear strips of vegetation in road reserves and waterway crossings.

A range of mitigations have been implemented to minimise impacts to MNES, as detailed in Sections 3 and 4 of the Surat Gas Project Species Impact Management Plan (Rev 4.0) (SIMP) (20 November 2018)[2].

The mitigation measures detailed in the SIMP are being followed by Arrow in the development of Field Development Plans and will be followed in the execution of the SGP. These mitigation measures are described in full detail in the SIMP (refer to Tables 3.1 and 4.1 of the SIMP). These tables are shown in full at **Attachment 3**.

[2] Available from: https://www.arrowenergy.com.au/wp-content/uploads/2025/08/Species-Impact-Management-Plan.pdf.

Figure 1.1 - Surat Gas Project Overview of Impact Areas



2 EPBC Act Environmental Offsets Policy

This section describes how the proposed offset package meets the requirements of the EPBC Act EOP (October 2012).

2.1 Application of EOP Principles

The EOP sets out eight key overarching principles to be applied to determine the suitability of an offset. **Table 2.1** outlines how each of the policy principles has been considered in this OAMP with a description of how the principle has been addressed and a reference to the relevant OAMP section.

Given the EOP principles in relation to the offset requirements of the Project, the selected offset area is considered to supply the values required. Consideration was also given to offset property development planning and any potential conflicting future use of the property to minimise the potential for conflicting land use pressures with the offset area.

Table 2.1 - EPBC Act Environmental Offset Principles

Policy Principle	Project Offsets
Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matters.	The brigalow portion of the offset area was selected because the Brigalow TEC and regrowth is present, as is habitat for the Dunmall's Snake and South-eastern Long-eared Bat. The balance of the offset area is remnant vegetation; however, is currently subject to native timber harvesting which is having a significant impact on the habitat quality. The cessation of the development actions (i.e., the chemical treatment of young brigalow regrowth, and the timber harvesting) along with appropriate offset management will enable significant uplift in habitat value. The offset for the Project will acquit 100% of the project's previously required direct offsets for impacts to the matters as listed in **Table 1.1**. Calculations have been undertaken based on ecological reports that included both flora and fauna surveys undertaken on both the impact and offset areas informing inputs to the Offset Assessment Guide. The proposed offset area will be managed to mitigate the risks, to increase the extent and condition of the habitat, and improve the viability of the species within the proposed offset area, as per the offset area management measures (refer to **Table 8.1**).
Suitable offsets must be built around direct offsets but may include other compensatory measures.	100% of the Project's MNES offset obligations will be acquitted by the proposed direct land-based offsets (refer to **Figure 2.1**).
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	The subject fauna species of this OAMP as listed in **Table 1.1** are listed as Vulnerable (V) under the *EPBC Act*. The Brigalow threatened ecological community (TEC) is classified as 'endangered' (E). The status of the impacted threatened species has been accounted for, by using the offset assessment guide to calculate the offset area required.
Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.	The extent of the offset has been calculated using ecological reports that include both flora and fauna surveys, for both the impact and offset areas. The reports have been used to inform inputs into the offset assessment guide. The inputs to the offset assessment guides for each of the protected matters impacted are in **Table 6.4**.

Policy Principle	Project Offsets
Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	The risks associated with the offset have been assessed (refer to **Table 7.1**) and appropriate management and corrective actions proposed in the offset area management measures (refer to **Table 8.1**. **Table 10.1** sets out the interim habitat quality criteria to be met at each 5-year interval. Monitoring will ensure management measures are enabling the achievement of the required outcomes, including the habitat quality score increases, and progress will be reported on, as outlined in **Section 11**.
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 in regulated vegetation areas as a Native Forest Practice, broadscale clearing in vegetation that is not regulated, and grazing on the offset area are activities that are not currently prohibited by legal mechanisms at either the local, state or Australian government legislative level. The area is zoned rural, and disturbed areas are predominantly the result of previous clearing, timber harvesting and cattle grazing activities. Areas of the offset property have been subject to vegetation clearing[3] since the 1950s. The current remnant, regrowth and non-remnant vegetation in the offset area will be secured through the use of a declared area that has its head of power under the *Vegetation Management Act 1999* (QLD) (VMA), which will prevent clearing and require that the management activities in **Table 8.1** are implemented. This will ensure the offset site is managed for habitat quality improvement (Refer to **Section 11**).
Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable.	The proposed offsets will be implemented efficiently and in a timely way, as this OAMP is required to be submitted to the Minister for approval and be legally secured prior to the commencement of any subsequent stage[4]. Terrestrial ecology reports for the impact and offset areas (refer to **Attachment 1**) provide data on habitat quality and species presence, using an established and robust BioCondition assessment methodology (Queensland's terrestrial habitat quality assessment guide (2017 and 2020) and BioCondition assessment manual). The information is scientifically robust, demonstrating the level of impact, as well as the suitability of the offset for the impacted protected matter. Along with an assessment of the offset area using the EPBC Act Offset Assessment Guide, this provides transparency about the offsets' scale and suitability. Refer to **Table 8.1** for further application of the Offset Assessment Guide.
Suitable offsets must have transparent governance arrangements including being able to be readily measured,	Monitoring and reporting, outlined in **Section 11**, will ensure that the offset management plan is being implemented by the approval holder. Arrow, as the approval holder, will have oversight of the progress of the required outcomes being attained at the offset site and any corrective actions undertaken. The approval holder will

[3] *Vegetation Management Act 1999*, Schedule Dictionary.
[4] Condition 11A; Variation to Conditions attached to Approval Surat Gas Expansion Project (EPBC 2010/5344) dated 9 June 2025.

Policy Principle	Project Offsets
monitored, audited and enforced.	undertake annual compliance reporting, as detailed in **Section 11,** as well as any independent audits, if deemed necessary. Habitat assessments in this OAMP have been undertaken in accordance with the published guidelines outlined in **Section 11**. Monitoring and reporting, detailed in **Section 11,** will assess the Offset Area Management Actions in **Table 6.4**, taking into consideration the start condition. The offset will be protected from clearing and secured through the use of a declared area that has its head of power under the VMA (refer to **Section 12**).

2.2 Addressing Relevant EPBC Plans and Advice

The EOP states that an offset should address key priority actions for the impacted MNES in any approved recovery plans, threat abatement plans, conservation advice, ecological character description or approved Commonwealth Management Plan. Approval condition 10B (f)[5] also requires that management measures consider the relevant approved conservation advice and are consistent recovery plans and threat abatement plans for the respective species and TECs. **Table 3.1** summarises how this plan addresses the relevant Conservation Advice for the relevant species and TEC, on the offset area.

[5] Condition 10B (f); Variation to Conditions attached to Approval Surat Gas Expansion Project (EPBC 2010/5344) dated 9 June 2025.

Table 2.2 - Conservation Advice Addressed in this Document

Document	Key threats	Section addressed in documents
Approved Conservation Advice for *Furina dunmalli* (Dunmall's Snake). (Department of Environment (DoE) 2014.	**Land clearing and habitat modification** The main identified threat to Dunmall's Snake is a continued legacy of past broadscale land clearing and habitat modification. The preferred habitat for this species has been extensively modified and continues to be threatened by overgrazing by stock, modification for grazing and agriculture, pasture improvement, crop production and urban development. Drainage of swamps may also be a threat to this species.	**Table 8.1** - Forestry and native vegetation - clearing not allowed. No forestry or timber harvesting activities, or clearing for cropping, pasture or grazing, during the period of the Approval (until 31 December 2080)**.**
	Predation by feral animals Predation by feral animals has also been identified as a potential threat (DERM, 2007).	**Table 8.1** - Feral animals – monitoring and control as detailed. Existing populations of feral animals (feral cats, dogs and pigs) will be controlled within the offset areas in accordance with the *Biosecurity Act 2014* (Qld). Quarterly inspections to record the presence of wallow holes, tracks and visual incidents in the offset area will be undertaken. On being notified or becoming aware of the presence of large numbers, for example, approximately 10 feral animals or multiple tracks in the offset area at any one time, the approval holder is to implement feral animal control measures within three months.
Approved Conservation Advice for *Nyctophilus corbeni* (South-eastern Long-eared Bat). Canberra: Department of the Environment (DoE) (2015).	**Habitat loss and fragmentation** Extensive clearing of woodland and mallee vegetation is likely to have been a major factor in the decline of the South-eastern Long-eared Bat. Habitat loss threatens the species by reducing habitat availability, such as important roosting sites (Schulz and Lumsden 2010).	Refer to **Table 8.1** - Forestry and native vegetation - clearing is not allowed under the management plan. No forestry or timber harvesting activities are to be conducted during the period of the declared area under the VMA. Forestry and native timber harvesting practices in the offset area remove large trees that provide shelter and food and may also contain hollows and deadwood. It is therefore considered a potential threat to the quality of the habitat.

Document	Key threats	Section addressed in documents
Commonwealth Listing advice for ten species of bats. Threatened Species Scientific Committee (TSSC) (2001).	**Fire** Bushfires are suspected to be a threat in the remaining uncleared areas of the South-eastern Long-eared Bat's habitat (Duncan et al., 1999). Bushfires pose a threat to the conservation of the species by both causing direct mortality during bushfire events and through the loss of foraging habitat and roosting sites, which take a long time to develop (Schulz and Lumsden 2010).	Refer to **Table 8.1** - Fire is not permitted in the offset area. Fuel reduction burns in surrounding country will be used as a last resort, and if utilised will be planned to be low intensity with no canopy scorch, with the aim to reduce fuel load in the ground cover layer. This practice aims to prevent unplanned high intensity burns that result from a build-up of fuel.
	Reduction in hollow availability Hollows can be lost through general habitat loss and either purposely or incidentally during routine forestry practices (Schulz and Lumsden 2010). The loss of hollows is a threat on its own to the species; however, habitat loss also leads to increased competition for remaining hollows from other animals (Reardon 2012).	Refer to **Table 8.1** - Forestry and native vegetation. No forestry or timber harvesting activities are to be conducted during the period of the declared area under the VMA. Forestry and native timber harvesting practices in the offset area remove large trees that provide shelter and food and may also contain hollows and deadwood
	Grazing Grazing in the habitat of the South-eastern Long-eared Bat is a suspected threat in the uncleared areas of habitat (Duncan et al., 1999) as it may reduce foraging habitat through the removal of shrubs and by limiting regeneration, as well as potentially causing significant changes to the structure and diversity of such habitats (Schulz and Lumsden 2010). The relative impact of grazing as a threat to the species is unknown however and requires further investigation.	Refer to **Table 8.1** - Grazing – grazing is not permitted during the wet season; ground cover levels will be monitored and managed. 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 (i.e. compaction and deformation of soil resulting from trampling by animals, leading to soil structure breakdown and reduced pasture quality).
	Predation by feral animals Predation of South-eastern Long-eared Bat by introduced species, such as the feral cat or red fox, has not been demonstrated (Woinarski et al., 2014) and therefore the risk to the species is unknown. Schulz and Lumsden (2010) note that predation is a possible threat for the sympatric Lesser	**Table 8.1** - Feral animals – monitoring and control as detailed. Existing populations of feral animals (feral cats, dogs and pigs) will be controlled within the offset areas in accordance with the *Biosecurity Act 2014* (Qld). Quarterly inspections to record the presence of wallow holes, tracks and visual incidents in the offset area will be undertaken. On being notified or becoming aware of the

Document	Key threats	Section addressed in documents
	Long-eared Bat. The impact of predation by feral animals needs to be assessed for this species.	presence of large numbers, for example, approximately 10 feral animals or multiple tracks in the offset area at any one time, the approval holder is to implement feral animal control measures within three months.
Commonwealth Listing Advice on Brigalow (*Acacia harpophylla* dominant and co-dominant). (TSSC). 2001. Approved Conservation Advice for the Brigalow (*Acacia harpophylla* dominant and co-dominant) ecological community. (DoE) 2013.	**Vegetation clearing for cropping and pasture and grazing** The brigalow ecological community was listed as endangered on the basis of extensive clearing. This has altered the ecological community's typical landscape context, with most remnants now occurring as fragments within substantially modified landscapes, or on small clay pans or the toe-slopes of jump-ups and escarpments. As clearing has mostly occurred after 1960, effects on biodiversity in the brigalow ecological community are likely to be ongoing for some time yet, with equilibrium between the number of species supported and the much-reduced area of available habitat probably still in the process of being re-established (McAlpine et al., 2002).	Refer to **Table 8.1** which provides that clearing is not permitted within the offset area, except for ecological thinning, on the advice of a suitably qualified expert. The offset area will be protected from clearing by this OAMP through the use of a declared area under the VMA which will be registered on the title of the property.
	Fire The low density of herbage in most types of brigalow vegetation suggests that fire has been historically rare in the brigalow ecological community. It becomes a serious threat to remnant brigalow where fuel characteristics have been changed (e.g. by the presence of high biomass introduced grass pasture species such as Buffel Grass (*Pennisetum ciliare* syn. *Cenchrus ciliaris*), Rhodes Grass (*Chloris gayana*) or Green Panic Grass (*Megathyrsus maximus* syn*. Panicum maximum*)) in, or adjacent to, brigalow woodlands (Butler,	Refer to **Table 8.1** - Fire – fire is not permitted in offset areas. Strategy: Maintain fire management of surrounding country so that wildfires will be very limited in extent. Protection from fire is necessary. Issues: *Casuarina cristata* (Belah) is fire sensitive, although germination can be good in bare areas. Brigalow is soft seeded, so germination is not promoted by fire. Buffel and Green Panic Grass invasion will increase risk from fire. High-intensity fires will cause damage to over-storey.

Document	Key threats	Section addressed in documents
	2007). Generally, the most appropriate fire regime for brigalow stands is fire-exclusion (Butler, 2007). It is possible that grazing can be used to manage grass fuel loads. It may also be possible in some cases to develop techniques with cool fires that reduce fuel loads without killing brigalow. Fragmentation and disturbance can interact lead to higher densities of invasive grasses to thereby increasing the risk of fire to within remnant brigalow woodlands. Linear brigalow remnants, such as those occurring on roadsides, possess large edge to area ratios and often grow in a matrix of introduced pasture grasses. Fire associated with exotic grass invasion is more problematic in the more open brigalow woodland types in the west and north.	Grazing may be an option for reducing fuel loads where exotic grasses such as buffel have invaded.
	Plant and animal pests Pest plants can alter the structure and function of brigalow ecosystems and affect their suitability as habitat for native species. Introduced grasses, such as Buffel Grass, Rhodes Grass and Green Panic Grass pose the greatest threat by drawing fires into the brigalow ecological community and increasing fire severity (Butler, 2007). Feral pigs are probably the most widespread and problematic pest animal in the ecological community, although goats, cane toads, cats and foxes are also serious threats (Butler, 2007).	Refer to **Table 8.1** - Pest plants – reduce to no more than 10% of ground cover across the offset area. The 10% level is adopted as a reasonable aspirational target to be achieved over the term of the management plan based on surrounding land use and regional weed loading. Refer to **Table 8.1** - Feral animals. Trigger levels and corrective actions are detailed in **Table 7.1**

Document	Key threats	Section addressed in documents
	Climate Change The broad environmental tolerance of the Brigalow TEC and associated species gives it some capacity to cope with climate change (Butler, 2007). However, the rate of change is expected to be higher than previously experienced and future climate may differ from that which the Brigalow TEC was subject to in the past. Furthermore, the landscapes within which the Brigalow TEC faces climate change are radically different from those within which it endured preceding changes, and this may compromise adaptability. For example, animals living in fragmented brigalow landscapes will be particularly vulnerable to the effects of hotter and drier conditions as the fragments of habitat are too few and far between to allow animals to move further afield to find scarce resources (Butler, 2007). The same constraints apply to flora. Climate change may exacerbate existing threats such as fire, as well as slowing recovery.	Extended periods of lower rainfall – refer to **Table 8.1** - Fire Strategy: Maintain fire management of surrounding country so that wildfires will be very limited in extent. Protection from fire is necessary. Issues: *Casuarina cristata* (Belah) is a species commonly found in RE 11.9.5 and is fire sensitive, although germination can be good in bare areas. Brigalow is soft seeded, so germination is not promoted by fire. Buffel and Green Panic Grass invasion will increase risk from fire. High-intensity fires will cause damage to over-storey. Grazing may be an option for reducing fuel loads where exotic grass such as buffel have invaded. Extended periods of higher rainfall – refer to **Table 8.1 –** The dry season is normally between April and November; however, if unseasonal rainfall should occur, then grazing may be allowed outside of this time period only if there is no evidence of moisture in the stream order one gullies to ensure that “pugging” of the soil by livestock does not occur.

3 Impact Site Biodiversity Values

3.1 Description of the Project Site

Stage 2 of the SGP is located in the Surat Basin, Queensland, approximately 230 km west of Brisbane (refer to **Figure 1.1**). The Project area is rural in nature, comprising predominantly cultivated land including intensive farming, and low intensity grazing in the west as land suitability and rainfall declines. There are five State Forests (Condamine, Braemar, Dalby, Daandine and Kumbarilla) in or within the vicinity of the project area, which are used for timber harvesting, and they are leased for cattle grazing (**Figure 1.1**).

The impact area was assessed by suitably qualified ecologists from ESE (2017) with further data collected in 2021 by the same highly qualified experts in flora and fauna ecology respectively. Arrow's own suitably qualified ecologists have been completing ecological assessments which inform our ground-verified impacts since 2011 and continue to do so.

There are five dominant terrestrial habitats in the wider project area:

- Previously cleared or highly modified areas;
- Alluvial creek flats that contain narrow riparian strips with mixed eucalypts (mainly *Eucalyptus tereticornis, E. populnea* and *E. camaldulensis*);
- Clay plains with cracking soils that contain Brigalow (*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest);
- Narrow strips of mixed eucalypts on undulating plains (mainly *E.* and *E. crebra*); and
- Large stands of mixed eucalypts, cypress pines and wattles on ironstone jump-ups within State Forests.

The Condamine River is the primary watercourse intersected by the Stage 2 project infrastructure. Additional watercourses with a stream order of 4 or greater (large streams or rivers) include Bottle Tree Creek, Braemar Creek, Dogwood Creek, Kogan Creek, Punch-bowl Creek, Wambo Creek, and Wikie Creek. Numerous smaller drainage lines are also present and contribute flow to these larger systems. The only waterbodies identified within the Stage 2 project area are artificial farm dams located within cultivated paddocks.

The crossing of the Condamine River will be undertaken using trenchless Horizontal Directional Drilling (HDD) methods.

3.2 Habitat Mapping of the Project Site

The EPBC Act approval for the SGP specifies Stage 2 maximum disturbance limits to core habitat for particular MNES. Core habitat is defined in the EPBC approval notice as 'core habitat known' and 'core habitat possible' as defined in the rules for habitat mapping for each individual species in the *Supplementary Report to the Surat Gas Project EIS (March 2012), Attachment 1 – Matters of National Environmental Significance'*.

These mapping rules from the SREIS were derived from the Biodiversity Assessment Mapping Methodology developed by the Queensland Environmental Protection Authority in 2002, and are as follows:

- **Core habitat known (CHK):** Identifies habitat where a spatially accurate confirmed record of a particular species exists (e.g., survey record). CHK is attributed to the particular habitat polygon in which it occurs, based on either Regional Ecosystem (RE) mapping or high-resolution habitat mapping developed for a specific purpose. CHK also applies to a 1 km buffer around all spatially accurate (<400 m accuracy) species records.
- **Core habitat possible (CHP):** Previous records of a particular species are not known to occur in a given area or habitat, although specific habitat features are present which are known to be favoured by the species and the habitat occurs within the species' known geographic range.
- **General habitat (GH):** Where a species has not been recorded in a given location and habitat accounts for some of the features favoured by a particular species. The habitat occurs on the

margins of a species' known geographic range. Otherwise, the habitat is suitable for the species although has been subject to intensive survey and the species has not been recorded.

- **Absence suspected:** The species has not been recorded in a given location and habitat features are not suitable (or sub-optimal) for survival of a given species or population.

Mapping work undertaken as a part of terrestrial ecology studies and surveys for the SGP has been based on these mapping rules. Detailed descriptions of how CHP and CHK criteria apply to each MNES impacted are shown in **Table 3.1**.

Maps showing the Stage 2 impact areas for each individual species and the Brigalow (*Acacia harpophylla* dominant and co-dominant) (Brigalow TEC) are provided in **Appendix 2**.

Table 3.1 - Core Habitat Mapping Criteria for Stage 2 Impacted MNES

MNES	Core habitat possible (CHP)	Core habitat known (CHK)	Impacted area (ha)
Dunmall's Snake	All remnant vegetation >50 ha in extent and within 500 m of a larger vegetation patch of REs 11.3.1, 11.3.17, 11.3.18, 11.4.3, 11.5.1, 11.5.4, 11.5.20, 11.7.4, 11.7.6, and 11.7.7 are classed as CHP.	CHP within 1km of a recent (1975+), accurate (±500 m) record is classed as CHK.	676.78
South-eastern Long-eared Bat	Only remnant vegetation which contributes to significantly large contiguous vegetation patches (>500 ha) is considered suitable. Within these larger continuous vegetation patches. REs 11.3.14, 11.3.18,11.5.1, 11.5.4, 11.5.20, 11.5.21, 11.7.4, 11.7.6, 11.7.7, and 11.9.10 are mapped as CHP. .	All CHP or General Habitat (GH) within 1km of a recent (1975+), accurate (± 500 m) record is classed as CHK.	650.13
TEC	**Mapping criteria**		**Impacted area (ha)**
Brigalow TEC	All remnant vegetation mapped as REs 11.3.1, 11.4.3 and 11.9.5, and mature regrowth derived from these ecosystems (i.e. brigalow vegetation >15 years old).		8.06

3.3 Dunmall's Snake habitat in the impact area

Furina dunmalli, Family Elapidae, also known as Dunmall's Snake, is a small to medium sized snake, growing to a total length of 60 cm. It is a dark grey-brown snake with a white underbelly (Cogger, 2000). Dunmall's Snake is confined to the Brigalow Belt bioregion of south-eastern Queensland and north-eastern New South Wales, occurring north to Clermont and near Rockhampton. Most records are from the Dalby-Tara area of the Darling Downs (Hobson 2012a).

The Dunmall's Snake has been recorded from a number of locations surrounding the SGP including two records approximately 6 to 7 km to the west. One of these is undated, and likely very old, while the second is dated as the year 2000. Three records fall within the SGP, two at Lake Broadwater (dated as 1984 and 1993) and a third more recent record (post 2015) to the north (-26.425189, 150.182572). The species is cryptic and difficult to detect, even during suitable conditions. Despite Arrow's extensive survey effort over several years, no individuals of the species have been located or observed.

Consistent with the habitat mapping (see **Section 3.2)**, the total area of impact to core habitat for Dunmall's Snake is presented in Table 3.1. A map showing these impact areas is in **Appendix 3**. Habitat quality scores for the impact area are shown in **Appendix 6**.

3.4 South-Eastern Long-Eared Bat Habitat in the Impact Area

The South-eastern Long-eared Bat is a relatively large solid bat with a broad, robust skull long ears, approximately 30 mm in length, which are erect when the bat is alert but fold back when at rest (Reardon 2012). The species' fur is a light brown to a dark grey-brown (Reardon 2012).

Records of South-eastern Long-eared Bat occur to the north, south and west of the SGP, however the species is absent from open and modified habitats on the Condamine River flood plains which stretch along the central-east and south-east boundary of the SGP. Suitable habitat east of the SGP is only present in the very north (i.e., near Barakula State Forest). Therefore, while large areas of suitable habitat occur within the SGP, it is situated at the eastern distributional limit of the species.

Consistent with the habitat mapping described in **Section 3.2**, the total area of impact to core habitat for the South-eastern Long-eared Bat is presented in Table 3.1. A map showing these impact areas is in **Appendix 4**. MHQS for the impact area are shown in **Appendix 7**.

3.5 Brigalow TEC in the impact area

In the SGP area, brigalow communities (RE 11.3.1, RE 11.4.3 and RE 11.9.5a) have been cleared to the margins of adjacent vegetation types and generally exist as small unviable remnants, slivers along the margins of riparian forest types, or as secondary forests with limited structural complexity or floristic diversity. Native ground covers, although naturally sparse in these communities are often displaced by exotic species including prickly pear (*Opuntia stricta*), mother of millions (*Bryophyllum delagoense*) and harrisia cactus (*Harrisia martinii*). Dense infestations of velvet tree pear are typical in brigalow habitats, forming up to 20% cover in the taller shrub layer of many occurrences (ESE 2017; Ecosmart Ecology 2021).

The mapping rule for core habitat for the Brigalow TEC includes all remnant vegetation mapped as REs 11.3.1, 11.4.3 and 11.9.5a, and mature regrowth derived from these ecosystems (i.e. brigalow vegetation >15 years old). Based on this, the total area of impact to this TEC has been determined and is presented in Table 3.1. A map showing these impact areas is in **Appendix 5**. MHQS for the impact area are shown in **Appendix 8**.

Part B: Offset Land Management Plan

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4 Offset Property Overview

The offset area for the SGP Stage 2 land-based offset is located on the property called "Toondoon". **Figure 4.1** shows the location of Toondoon in relation to the SGP Stage 2 impact area. **Figure 4.2** shows the location of the property in terms of the lot on plan targeted by Arrow for EPBC offsets, the size of the property and the connectivity with the adjacent Allies Creek State Forest. Specific Assessment Units (AUs) within the property are also labelled on **Figure 4.3** to show the location of areas that are suitable for the different MNES. The proximity of the property to bioregional corridors is shown in **Figure 4.4**.

Table 4.1 identifies the specific areas in the Offset Study Area that are suitable for each MNES (refer to **Section 6** for further details).

Table 4.1 - Assessment Units for MNES Offsets in the Offset Study Area

Lot on Plan	AU	RE	Condition	MNES Being Offset		
				South-eastern Long-eared Bat	Dunmall's Snake	Brigalow TEC
17SP331858	AU01	11.11.15	Regrowth		✓	
	AU02	11.11.15	Regrowth		✓	
	AU03	11.11.3c	Regrowth		✓	
	AU04	11.11.3	Regrowth		✓	
	AU05	11.11.3	Remnant		✓	
	AU06	11.12.1	Regrowth		✓	
	AU07	11.3.25	Remnant		✓	
	AU08	11.3.4	Remnant		✓	
	AU09	11.5.20	Regrowth		✓	
	AU10	11.7.4	Remnant	✓	✓	
	AU11	11.7.6	Regrowth		✓	
	AU12	11.7.6	Remnant		✓	
	AU13	11.9.5a	Regrowth	✓	✓	✓

Note that the grey-shaded rows represent AUs that are to be used for offsets for Stage 3 of the Project.

The Offset Study Area is approximately 190 km north of the centre of the SGP Stage 2 impact area (refer to **Figure 4.1**), within the Brigalow Belt bioregion. The property was selected because:

- property management objectives align with the offset management objectives;
- suitable values are present on the property, including field verification of the Brigalow TEC (regrowth) and habitat for Dunmall's Snake and South-eastern Long-eared Bat where the property is within the species' modelled distribution and 60 km of known records (see **Figure 5.7**); and
- there is potential to provide future offsets on the same property for other Arrow projects.

For context, the Toondoon property adjoins both Cadarga Creek and Toondoon Creek, which are recognised biodiversity corridors of State significance (**Figure 4.4**). The property also adjoins areas of state significance, including the Allies Creek State Forest. Vegetation within the property, including portions of the offset area, is contiguous with remnant vegetation mapped as part of a regional biodiversity corridor.

Additional offset areas for future stages of the SGP are planned on the property. Locating offsets on this property provides an opportunity to enhance and extend patches of remnant and regrowth vegetation and improve connectivity in local and regional landscape.

The property has been utilised for timber harvesting and cattle grazing since the 1950s, which has continued to the current time. The regrowth vegetation present on the property is primarily utilised for cattle grazing. While some trees have been retained within the regrowth REs, these are sparse across the landscape. Consequently, the vegetation displays a distinct lack of large trees and hollows that would typically be present in the remnant condition of the vegetation community recorded. The clearing that resulted in the current regrowth vegetation occurred progressively across the property, with areas supporting more productive soil (e.g., regrowth RE 11.5.20) preferentially cleared to maximise cattle grazing yields (Landowner, personal communication, April 2026). Should the property not be utilised for offsets, all regrowth areas will be chemically treated to kill all woody vegetation and to promote introduced pasture species. This includes both the brigalow and eucalypt communities. All remnant areas will continue to be subject to timber harvesting to the limit allowed by the Native Forest Management Guidelines under the VMA.[6]

The property comprises *Eucalyptus crebra*, *E. tenuipes*, *E. moluccana*, *E. tereticornis, Blakella citriodora*, *B. watsoniana*, *Angophora leiocarpa* and *Acacia harpophylla* vegetation communities in both degraded remnant and regrowth condition. The REs on the offset property are shown in **Figure 4.3** and Table 4.1.

Two farm dams are located within the north-eastern portion of the offset area, providing an additional water source for all wildlife during periods of drought.

A detailed description of the offset area is in **Section 365**.

[6] Department of Natural Resources and Mines (2014). Managing a native forest practice: A self-assessable vegetation clearing code; refer to Table 1A.

Figure 4.1 - Location of SGP Stage 2 and the Offset areas

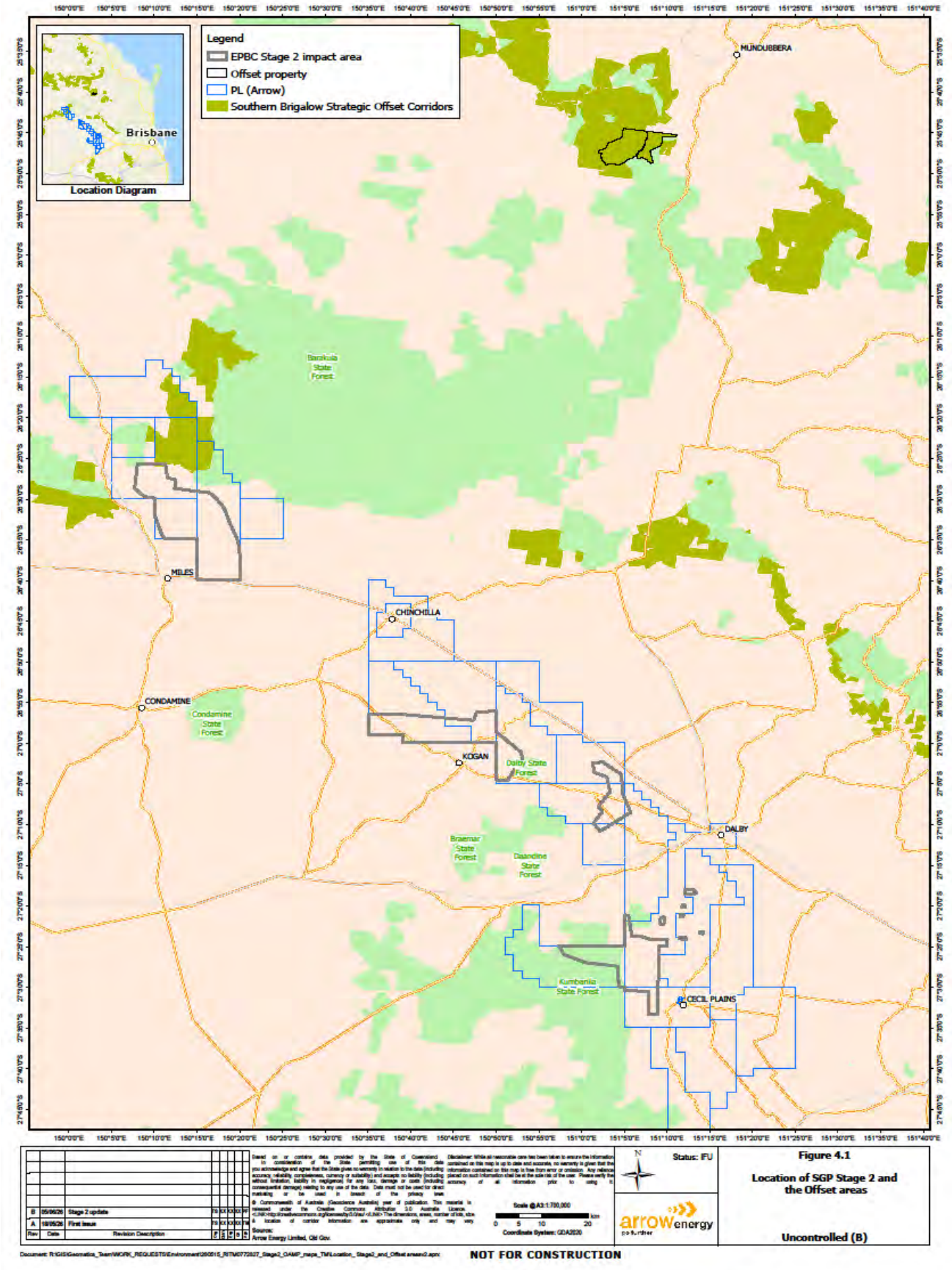


Figure 4.2 - The Offset areas: Regional Context

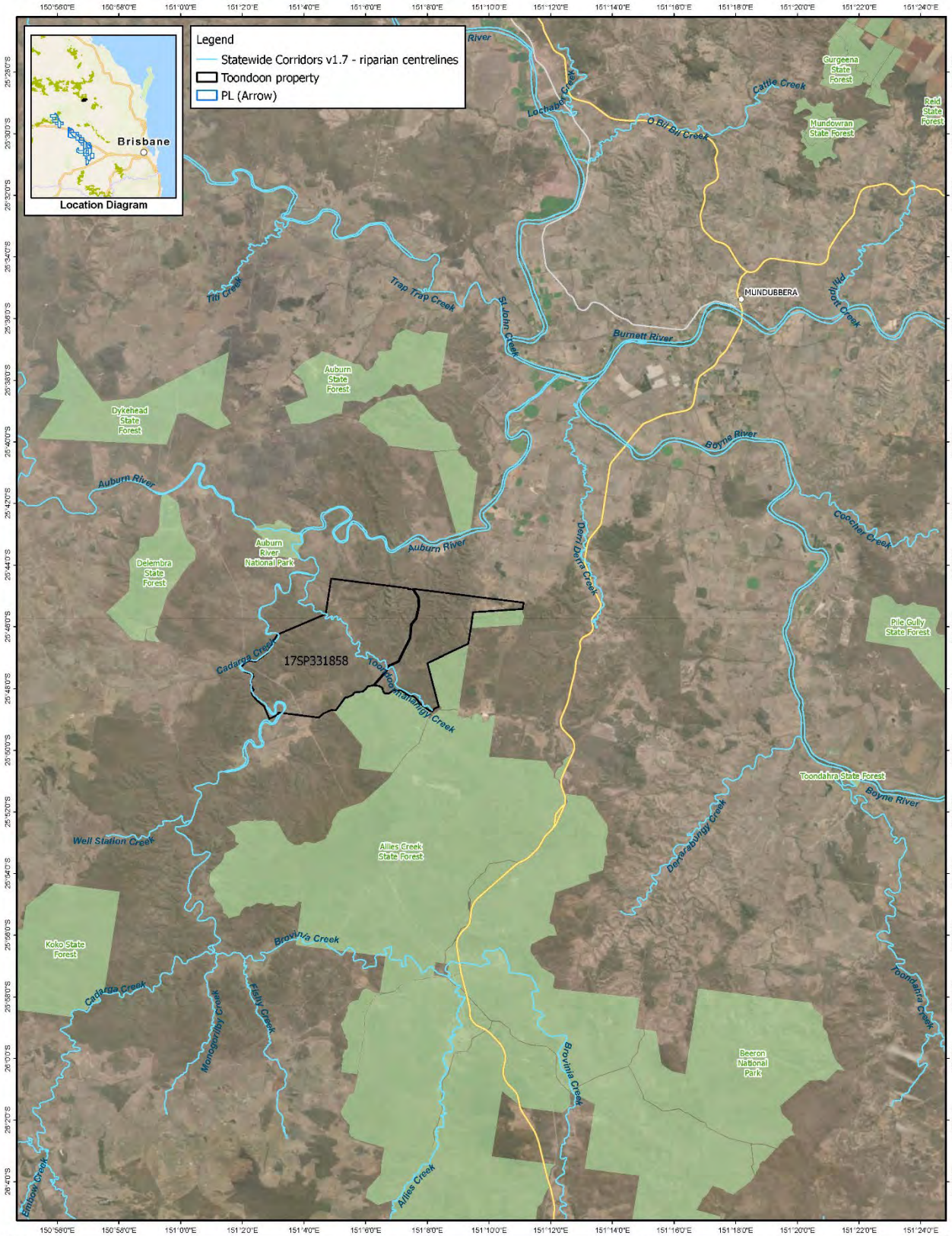


Figure 4.3 – Assessment units and ground-truthed REs on the Offset areas

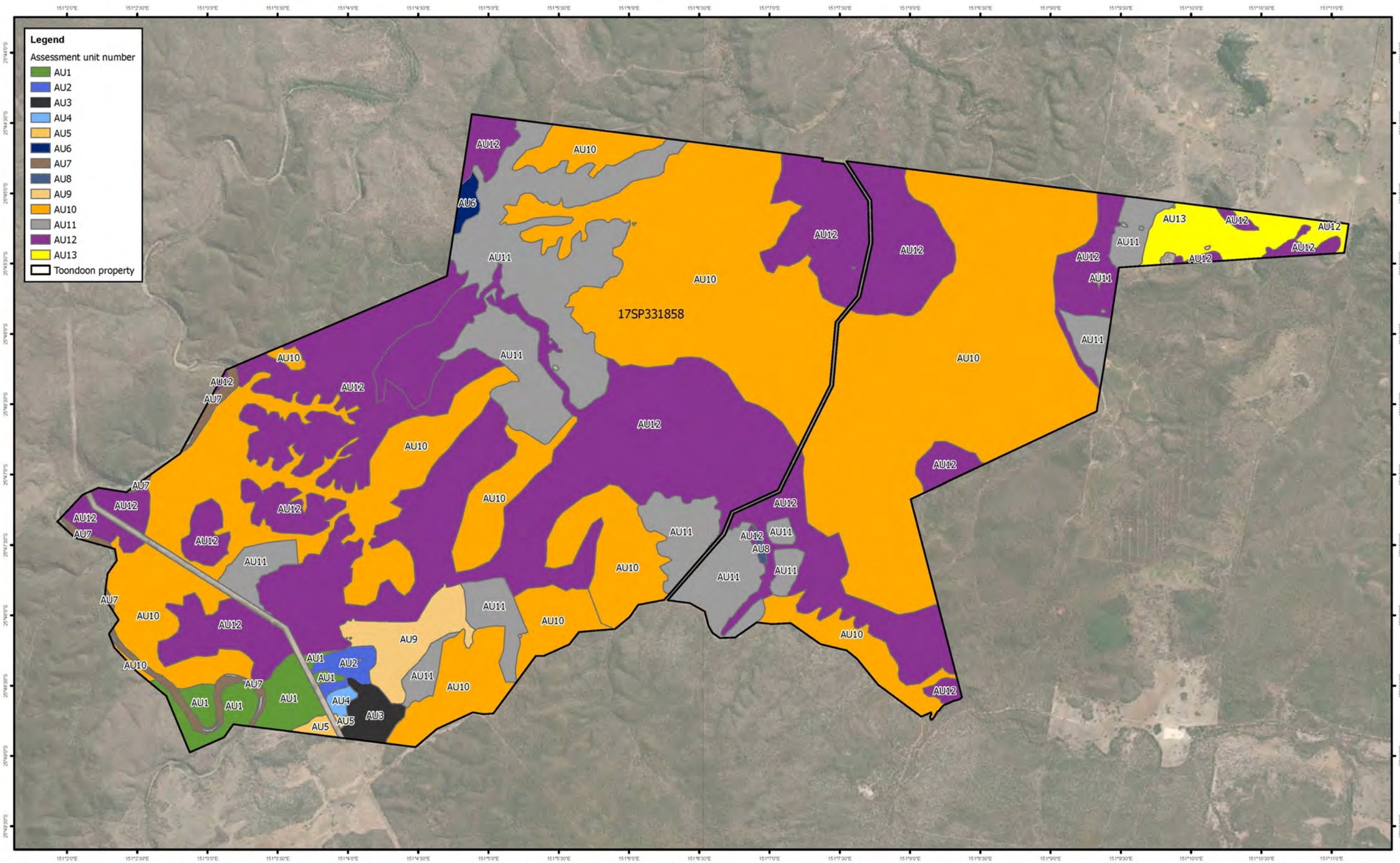
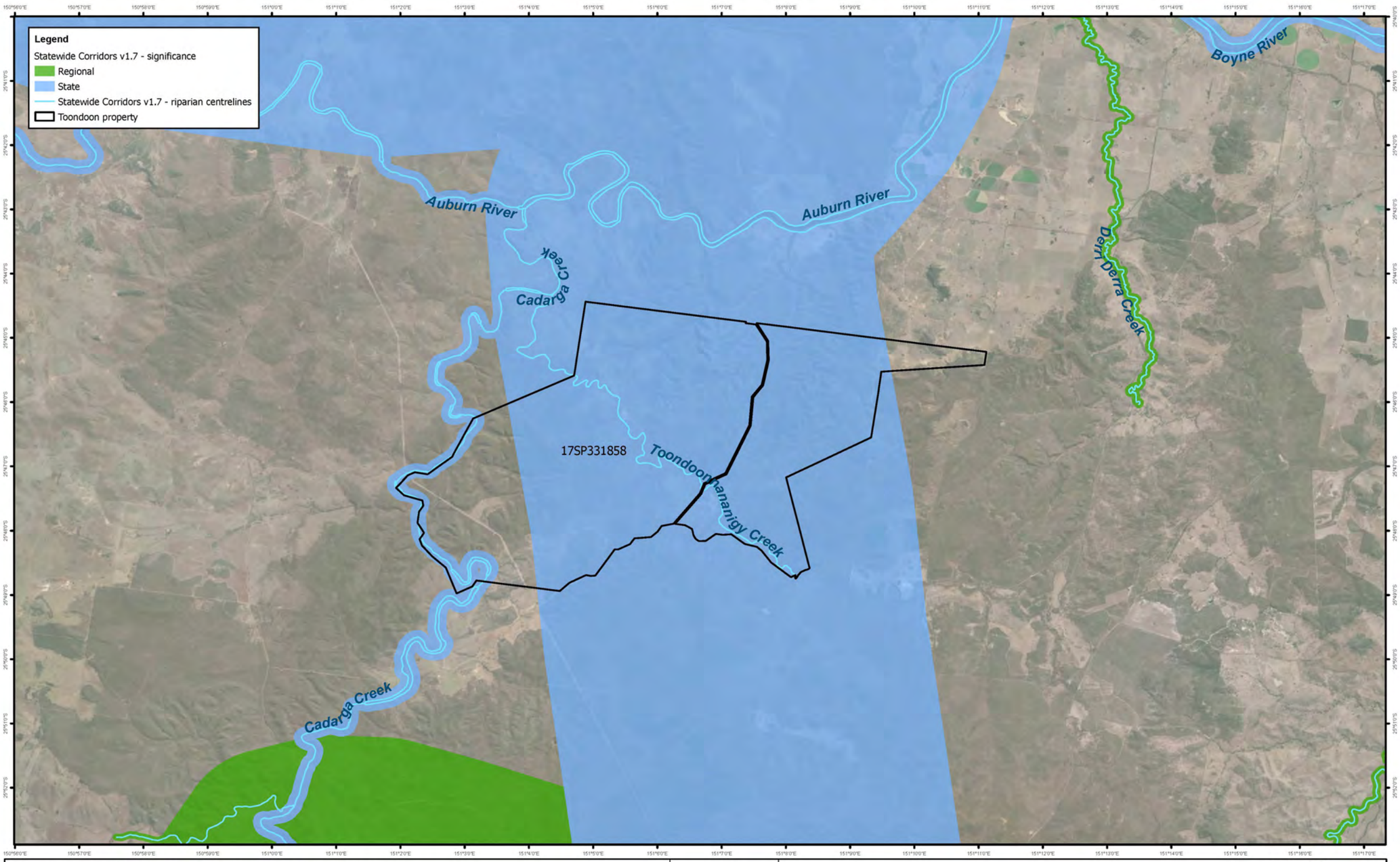


Figure 4.4 – State Biodiversity Corridors in Relation to the Offset areas



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Figure 4.4

State Biodiversity Corridors in Relation to the Offset areas

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5 Offset Area Description

5.1 Vegetation and Connectivity Values

The proposed offset area, on Lot 17 on Plan SP331858 (Toondoon), was selected for its potential to provide an offset for the Brigalow TEC, Dunmall's Snake and South-eastern Long-eared Bat habitat. It meets the principles of the offset policy by:

- Once protected, increasing the current available habitat;
- Contributing to improving landscape connectivity; and
- Improving habitat quality to enable more frequent use by these species, and other species such as Koalas and Greater Gliders that are being offset under Queensland Government legislation.

The Offset Study Area is composed of degraded tracts of regrowth and remnant vegetation. **Table 5.1** details the ground-truthed regional ecosystem (RE) and *Vegetation Management Act 1999* (VMA) Class of the vegetation communities available on Toondoon. **Figure 4.3** and Table 4.1 illustrate the location of the REs on the property.

Table 5.1 – Ground-truthed Regional Ecosystems (REs) in the Offset Study Area

Lot Plan	Description	VMA Class
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. (BVG1M: 16c).	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. (BVG1M: 16a).	Least concern
11.5.20	*Eucalyptus moluccana* or *E. microcarpa* or *E. woollsiana* woodland to open forest. (BVG1M: 13d).	Least concern
11.7.4	Mixed Eucalyptus spp. woodland on Cainozoic lateritic duricrusts. Species can include *Eucalyptus crebra, E. decorticans, Corymbia trachyphloia, E. tenuipes, C. watsoniana* and *Callitris glaucophylla*. (BVG1M: 12a).	Least concern
11.7.6	*Corymbia citriodora* and/or *Eucalyptus crebra* woodland. On adjacent foot slopes, scattered *E. crebra, C. clarksoniana* and *C. tessellaris* may occur. There is usually a distinct tall shrub layer often dominated by *Acacia* spp. The ground layer varies from sparse to moderately dense and is dominated by perennial grasses. Occurs on Cainozoic lateritic duricrust. Not a Wetland. (BVG1M: 10a).	Least concern
11.9.5a	*Acacia harpophylla* and/or *Casuarina cristata* or *Acacia harpophylla* open forest to woodland. (BVG1M: 25a).	Endangered
11.11.3	*Corymbia citriodora, Eucalyptus crebra* and *E. acmenoides* open forest often with a *Allocasuarina torulosa* and whipstick Lophostemon confertus and/or *Xanthorrhoea* spp. and *Macrozamia* spp. tall shrub or low tree layer. (BVG1M: 10a). 11.11.3c - *Eucalyptus moluccana* woodland on lower slopes in association with *Eucalyptus crebra* +/- *Corymbia citriodora* +/- Eucalyptus spp. Usually occurs on lower slopes or low rises of Devonian-Carboniferous metasediments, on clay soils. Not a Wetland. (BVG1M: 13d).	Least concern

Lot Plan	Description	VMA Class
11.11.15	*Eucalyptus crebra* +/- *Corymbia erythrophloia* +/- *E. populnea* +/- *E. melanophloia* +/- *C. tessellaris* +/- *C. clarksoniana* woodland to open woodland often with a shrubby layer. (BVG1M: 13c).	Least concern
11.12.1	*Eucalyptus crebra* +/- *Corymbia erythrophloia* woodland to open woodland. *E. melanophloia* is rarely present and may be locally dominant. Also includes localised areas may be dominated by *E. persistens*. (BVG1M: 13c).	Least concern
Note that the grey-shaded rows represent REs that are to be used for offsets for Stage 3 of the Project.		

Potential core habitat for Dunmall's Snake was identified across all REs within the property (**Figure 5.1**) (Ecosmart 2026). The Dunmall's Snake proposed offset area for the SGP Stage 2 has been mainly focused within RE 11.7.4, as this community provides the most suitable and contiguous habitat within the site (see **Figure 5.4**). South-eastern Long-eared Bat was identified across two REs (11.7.4 and 11.9.5a) within the property (**Figure 5.2**) (Ecosmart 2026). The proposed offset area for South-eastern Long-eared Bat is illustrated on **Figure 5.5**. The potential offset area for the Brigalow TEC on the property comprised of field-validated regrowth brigalow (*Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland) RE 11.9.5a (AU13) and is illustrated on **Figure 5.3**. The proposed offset area for brigalow is shown on **Figure 5.6**.

Landscape connectivity is essential to maintain functional links between habitat patches and permit dispersal of organisms and thus maintain healthy, viable populations (D'Eon et al. 2002). The Offset Study Area adjoins the Cadarga Creek and Toondoon Creek, part of a state bioregional corridor (refer to **Figure 4.4**). Allowing the regeneration of the regrowth and improvement of remnant vegetation will increase connectivity to the riparian corridors along the waterways and provide additional habitat for South-eastern Long-eared Bat and Dunmall's Snake that utilise the property. The state corridor traverses the Offset Study Area from the northern to the southern section, with an area on the western side located outside the mapped state corridor. Nevertheless, vegetation across the property remains well connected to a broader network of corridors of state and regional significance located south of the property (**Figure 4.4**). Furthermore, the Offset Study Area contains habitat values that will have the additional benefit to other EPBC threatened species, such as improving the local greater glider habitat (known occurrence).

Koala and Greater Glider have been recorded in the vicinity. While these species are being offset under state legislation, this demonstrates the role of the site in providing benefits for a broader range of threatened species. The eucalypt-dominated areas within the Offset Study Area are preferred habitat for the Koala and Greater Glider. The state biodiversity corridors (DES 2018) showing connectivity adjoining the offset area are illustrated in **Figure 4.4**.

The offset area will be a benefit to MNES species, as regeneration activities will enhance connectivity across the fragmented landscape. Utilising regrowth and currently degraded remnant communities as an offset will add significant value to the local area over time by extending the area of the available habitat and the Brigalow TEC. By implementing this OAMP, patches of habitat from the Cadarga Creek and Toondoon Creek biodiversity corridors and the remnant vegetation east of the offset site will become a continuous patch of habitat. Furthermore, the Offset Study Area connects directly to state forest extending the habitat for all species.

Detailed maps of the total areas within the Offset Study Area suitable for Dunmall's Snake, South-eastern Long-eared Bat, and the Brigalow TEC are provided in **Figure 5.1**, **Figure 5.2**, and **Figure 5.3**, respectively. The areas selected for offsetting the impacts for the SGP Stage 2 only are provided in **Figure 5.4**, **Figure 5.5**, and **Figure 5.6** for each MNES respectively. Known records of the species identified within the surrounding area are presented in **Figure 5.7**. The offset area has been determined utilising agreed outputs from the Department of Climate Change, Energy, the Environment and Water (DCCEEW) on the Offsets Assessment Guide (OAG).

Figure 5.1 – Potential Offset Areas for Dunmall's Snake Identified Within the Property

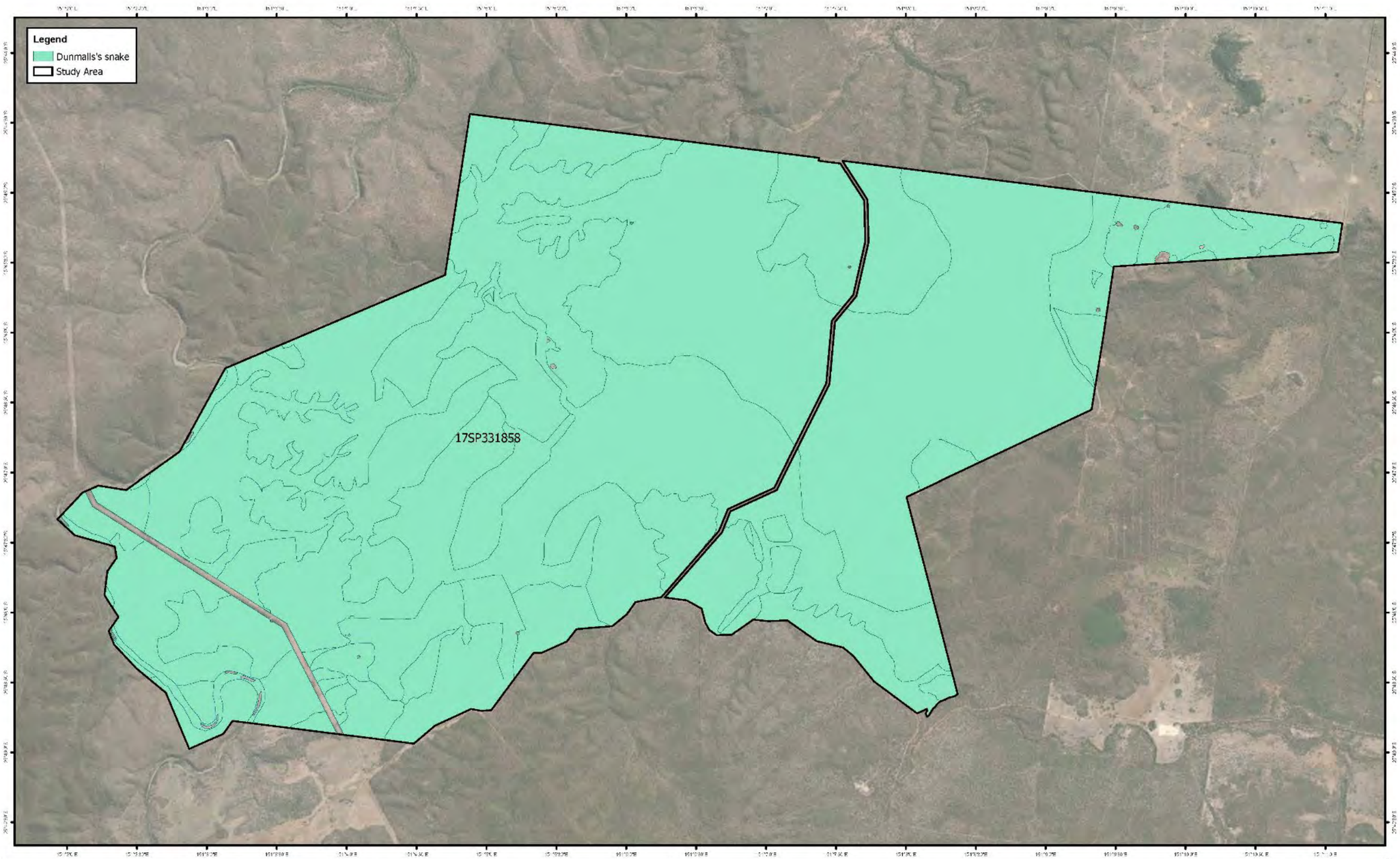


Figure 5.2 - Potential Offset Areas for South-eastern Long-eared Bat Identified Within the Property

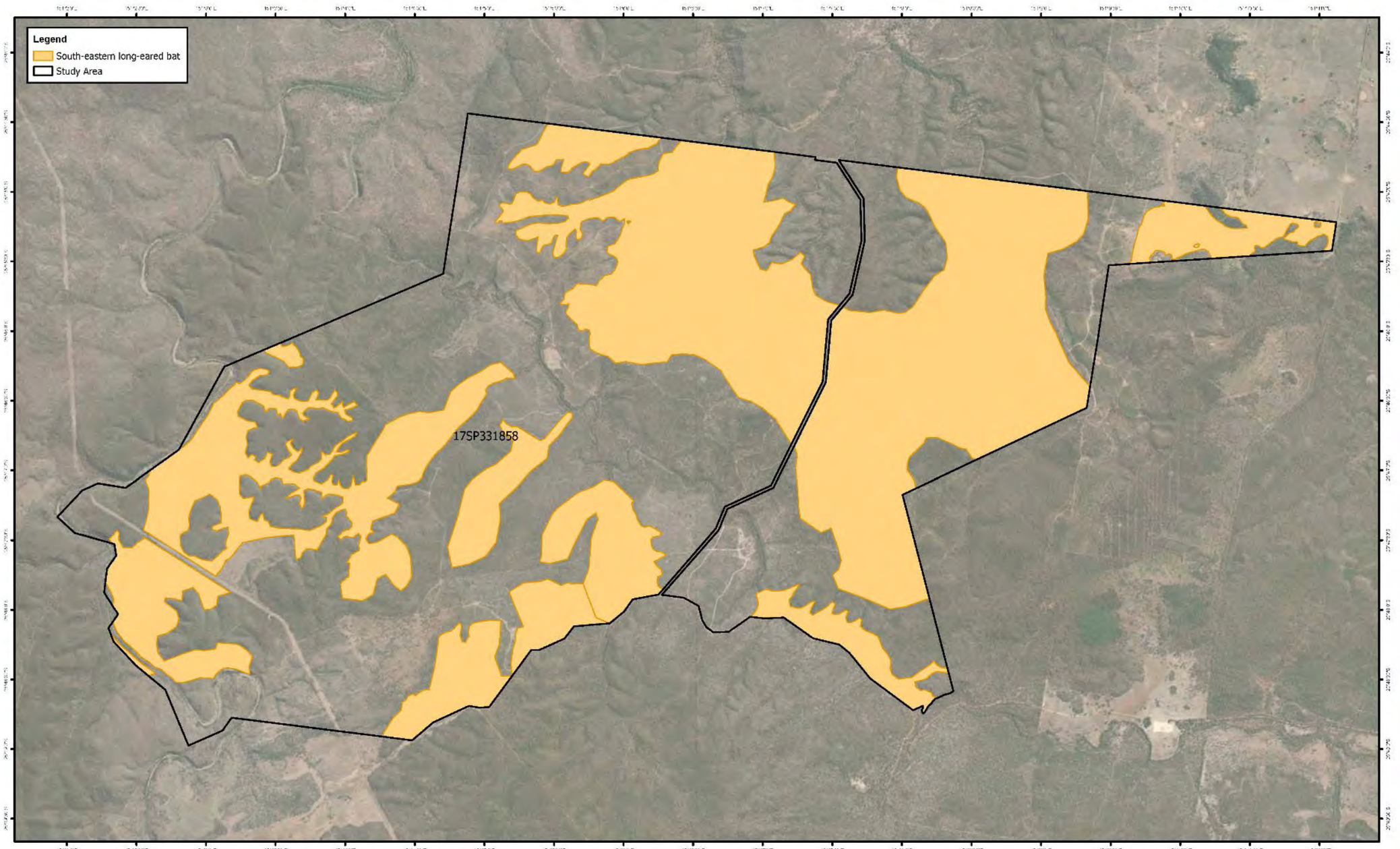


Figure 5.3 – Potential Offset Areas for the Brigalow TEC Identified Within the Property

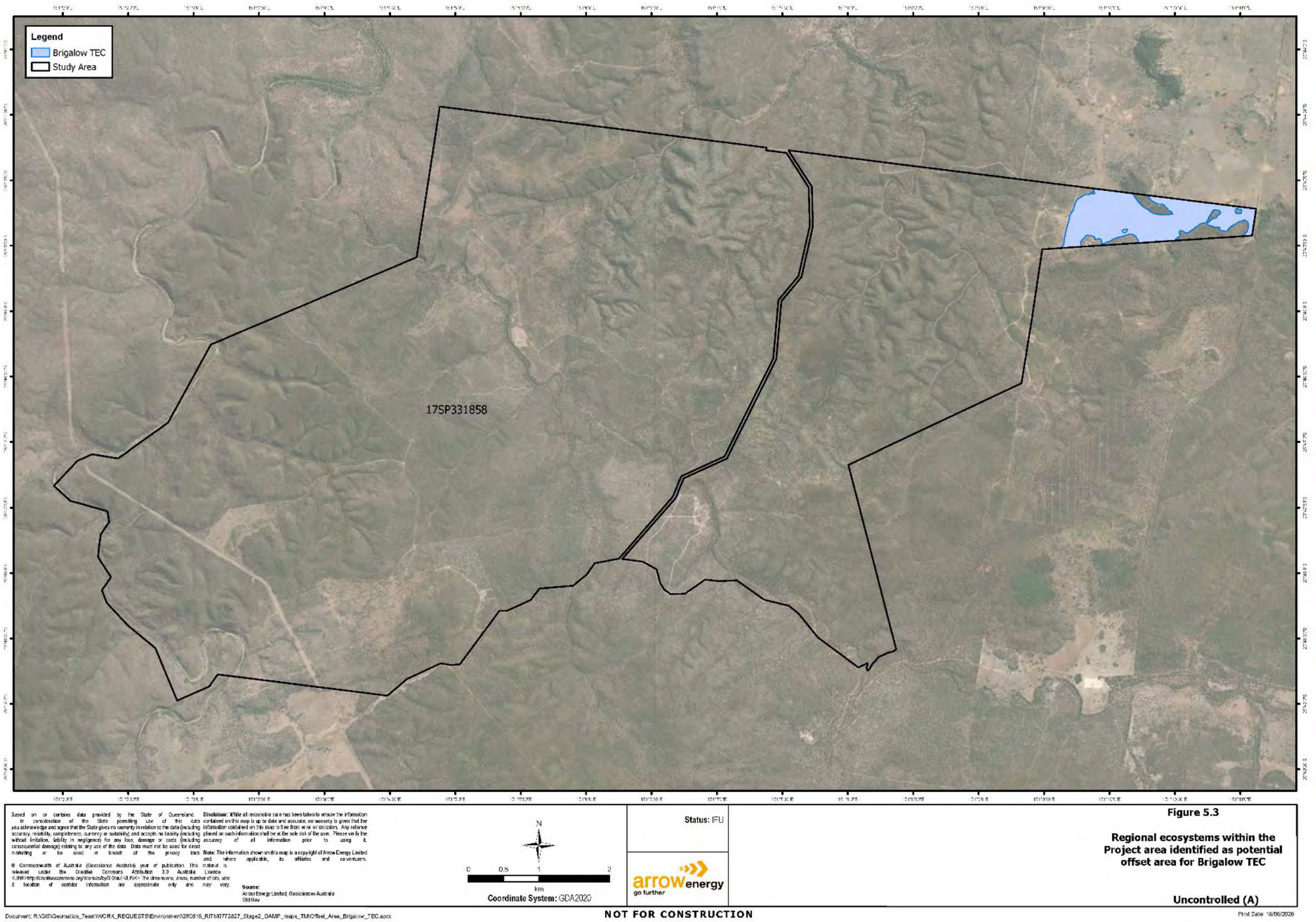
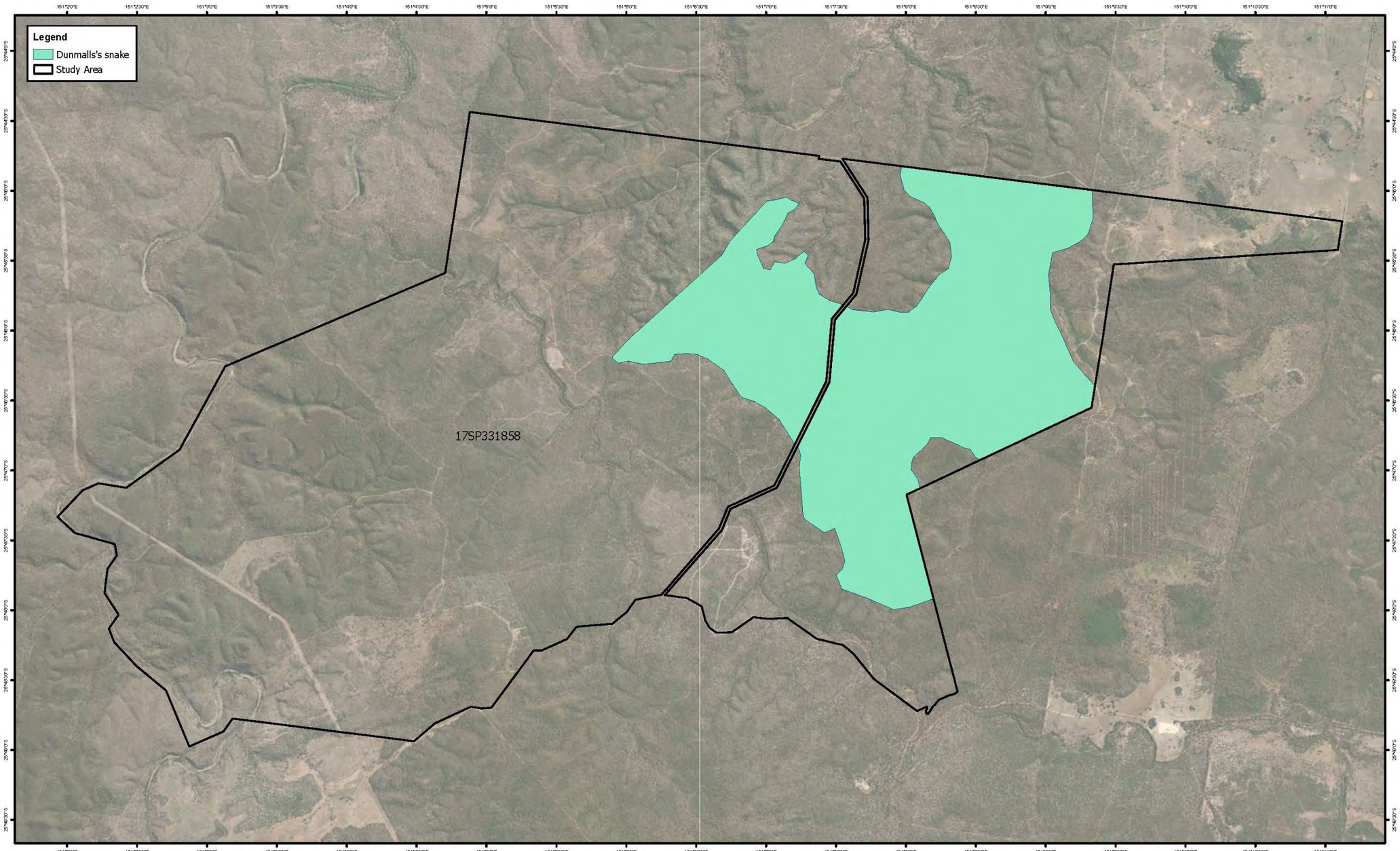


Figure 5.4 - Offset Area for Dunmall's Snake



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Figure 5.5

Offset Area for Dunmall's snake

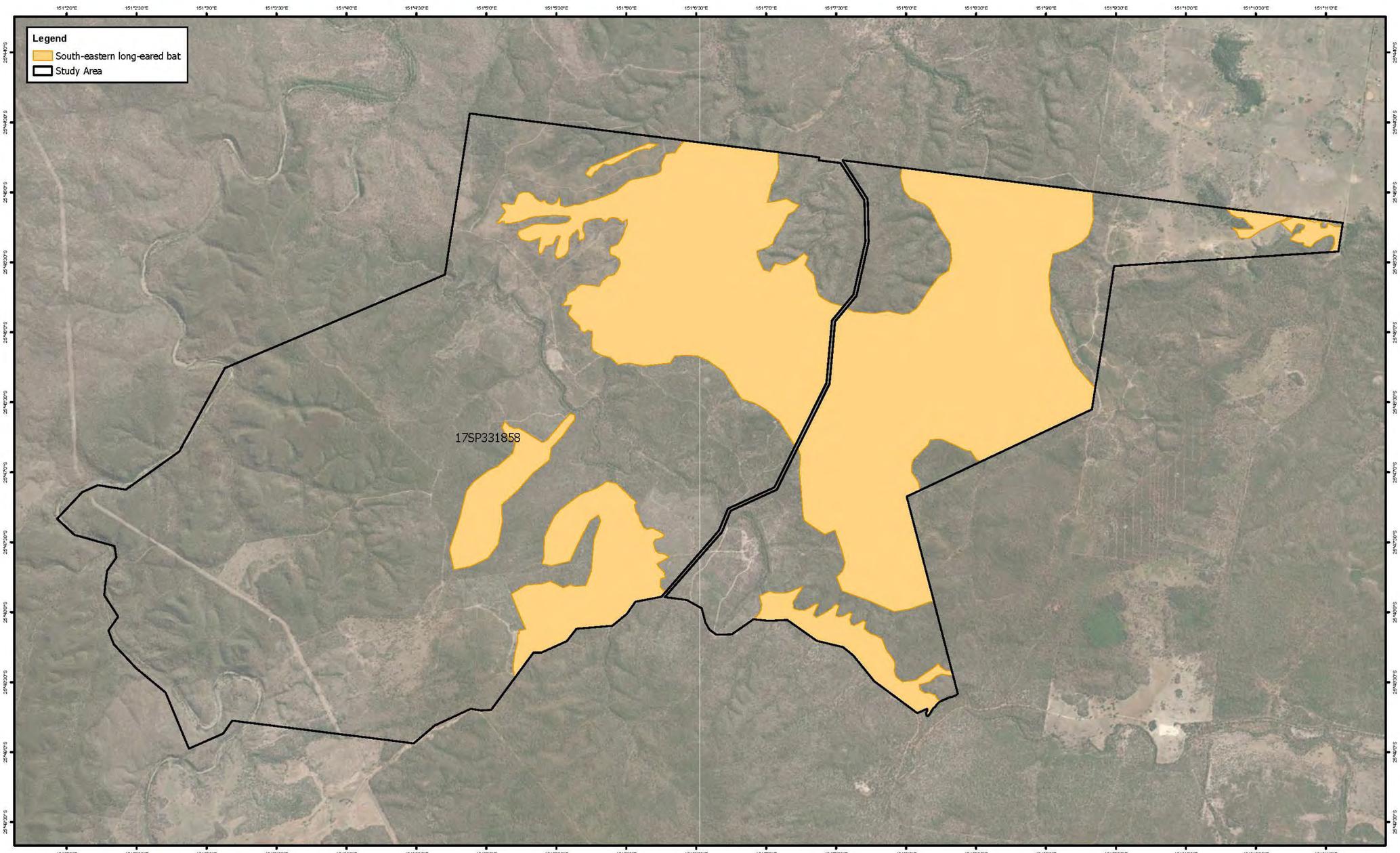
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Figure 5.5 - Offset Area for South-eastern Long-eared Bat



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Coordinate System: GDA2020

Status: IFU

Figure 5.6

Offset Area for South-eastern long-eared bat

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Figure 5.6 - Offset area for the Brigalow TEC

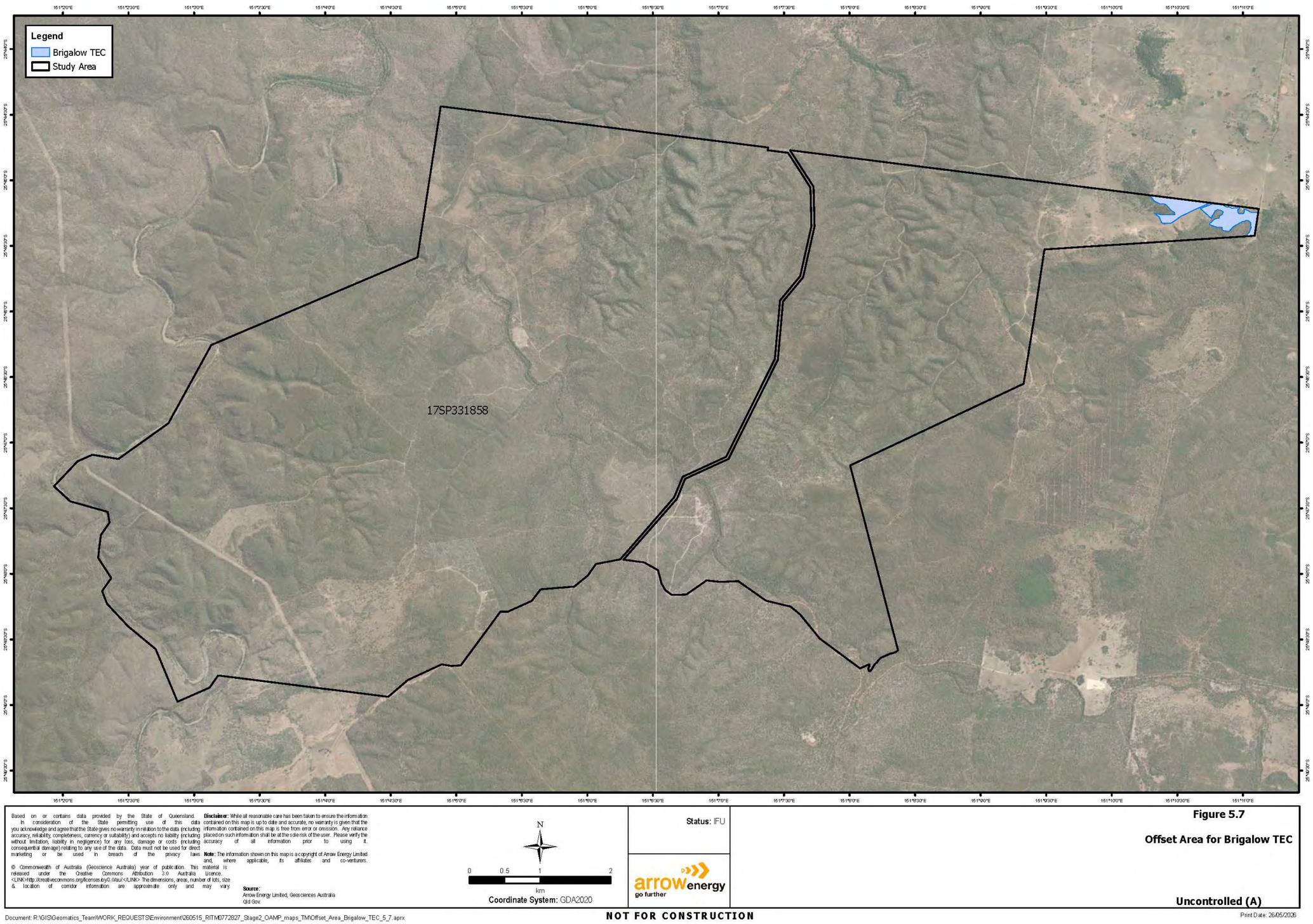
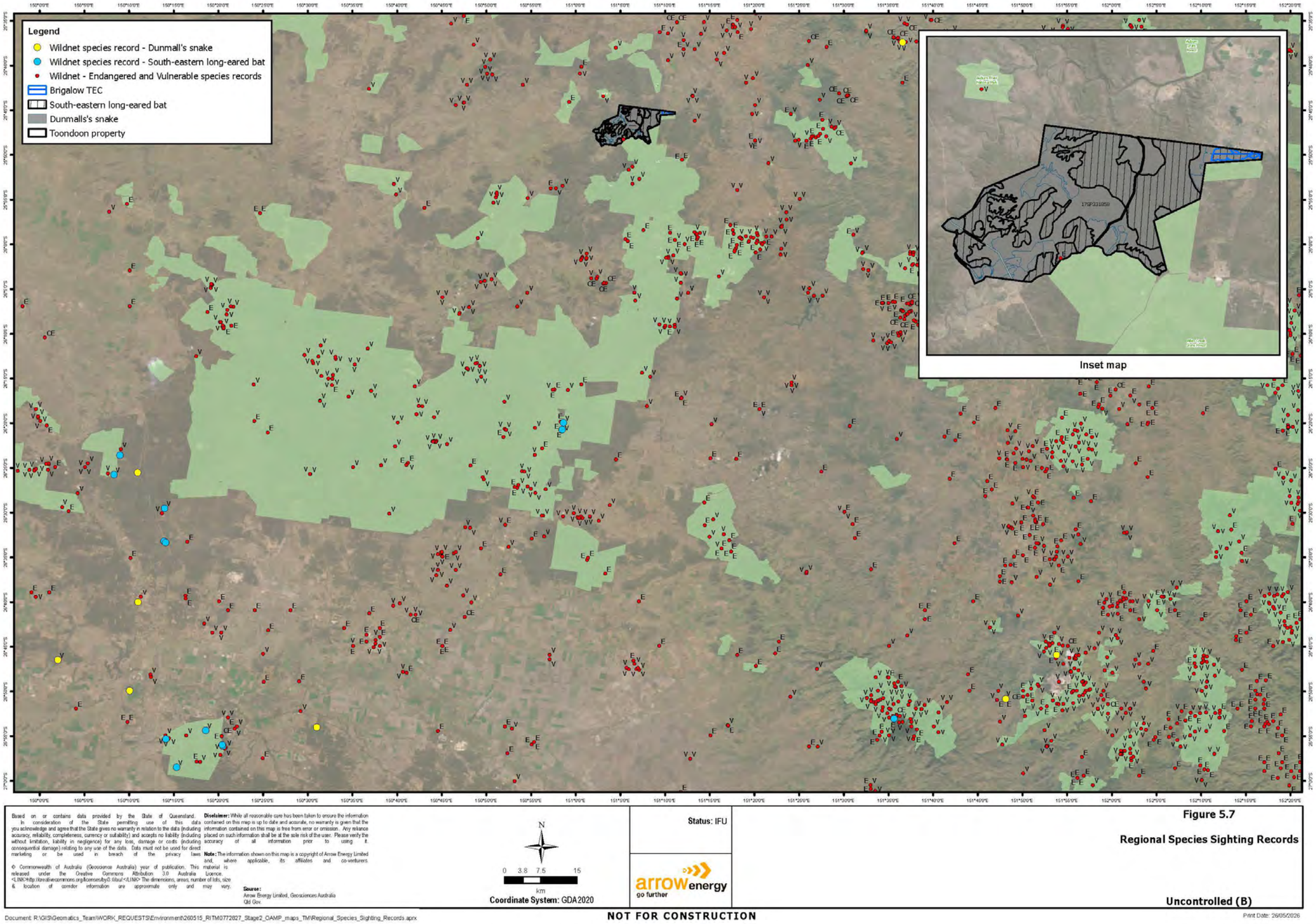


Figure 5.7 – Regional Species Sighting Records



6 Estimating Offset Area Required to Offset Impacts to Species Habitat and TEC

6.1 Dunmall's Snake

6.1.1 Habitat requirements

In Queensland, its range extends from Yeppoon and the Expedition Range in the north, to Oakey, Glenmorgan and Inglewood in the south. Most locality records are from between 200 and 500 metres above sea level. This species occurs within the Brigalow Belt Bioregion and may also occur in the Burdekin, Fitzroy, Desert Channels, Burnett Mary, Southeast, Condamine (QLD), Border Rivers Maranoa-Balonne, Southwest and the Border Rivers/Gwydir (NSW) Natural Resource Management Regions[7].

Dunmall's Snake is found in open forest, particularly Brigalow (*Acacia harpophylla*) forest and woodland growing on floodplains of deep-cracking black clay and clay loam soils (Covacevich et al., 1988, Cogger et al., 1993). Little is known about this species though it is thought to be genuinely uncommon within its limited range (Wilson, 2003). Captive specimens indicate that it is a nocturnal species, sheltering under fallen timber and in deep soil cracks and other cavities. Its diet consists of small skinks and geckos (DERM, 2007).

The distribution of this species is associated with the Brigalow (*Acacia harpophylla* dominant and co-dominant) EPBC Act-listed TEC. The offset is located within the distribution range and associated habitat for this species.

6.1.2 Offset area attributes

The Offset Area is located within the DCCEEW mapped distribution of the species. Dunmall's Snake records are inherently rare due to the highly cryptic nature of the species, and the nearest record is approximately 150 km southeast of the Offset Area near Miles, Queensland. It should be stressed that the species is very rarely encountered, even in areas of known habitat, and has been described as 'extremely secretive, rarely encountered, possibly genuinely scarce' (Wilson 2015).

Ecosmart recommended REs 11.11.15, 11.11.3,11.12.1, 11.3.25, 11.3.4, 11.5.20, 11.7.4, 11.7.6 11.9.5a as suitable habitat for the Dunmall's Snake[8] (Ecosmart 2026). The REs considered in the offset area listed within the ecology report are the Brigalow TEC and REs that are consistent with a higher fallen woody debris score. The modified habitat quality assessment results for offset area to be used for Dunmall's Snake are shown in **Table 6.1**. Detailed modified habitat quality scores for the property (start quality, quality without the offset, and quality with the offset) are shown in **Appendix 9**, **Appendix 10**, and **Appendix 11.**

[7] See Species Profile and Threats Database at http://www.environment.gov.au/cgi-in/sprat/public/publicspecies.pl?taxon_id=59254
[8] Table 2, Attachment 4, Habitat Quality Assessment, Toondoon Offset Area, Ecosmart 2026.

Table 6.1 - Dunmall's Snake Offset Area Modified Habitat Quality Assessment Results

AU	RE	Vegetation Condition	Description	Assessment Sites	Regulated Vegetation	Vegetation Condition Score	Start MHQS (AUs)	Area (ha)	Offset Contribution (%) of Final Area
AU10	11.7.4	Remnant	Mixed Eucalyptus spp. woodland on Cainozoic lateritic duricrusts. Species can include *Eucalyptus crebra, E. decorticans, Corymbia trachyphloia, E. tenuipes, C. watsoniana* and *Callitris glaucophylla*. (BVG1M: 12a).	T-05, T-06, T-10, T-20, T-32, T-34, T-37, T-41	Yes	2.78, 2.81, 2.84, 2.36, 2.48, 2.54, 2.64, 2.94	6.53	1,400	98.04
AU13	11.9.5a	Regrowth	*Acacia harpophylla* and/or *Casuarina cristata* or *Acacia harpophylla* open forest to woodland. (BVG1M: 25a).	T-03, T-04, T-15	No	0.74, 0.87, 0.99	2.22	28	1.96
Total and/or Weighted Score								**1,428**	**100.00**

6.2 South-eastern Long-eared Bat

6.2.1 Habitat requirements

The South-eastern Long-eared Bat is found in southern central Queensland, central western New South Wales, north-western Victoria and eastern South Australia, where it is patchily distributed, with most of its range in the Murray Darling Basin (Duncan et al., 1999; Turbill and Ellis 2006). Most records are from inland of the Great Dividing Range (Parnaby 2009). The species is uncommon within this distribution and is rarely recorded (Department of the Environment 2013), except in some areas including the Nandewar and Brigalow Belt South bioregions in New South Wales and Queensland.

In Queensland and New South Wales, it inhabits a variety of vegetation types, but it is distinctly more common in box, ironbark, and cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of New South Wales and southern Queensland (NSW OEH 2012). In Victoria most records are from *Eucalyptus gracilis* mallee, buloke and black box woodlands Lumsden 1994) while in South Australia it is confined to tall mallee shrublands (Duncan et al. 1999).

The species is more abundant in extensive stands of vegetation in comparison to smaller woodland patches (Turbill and Ellis 2006), suggesting its home range is probably large (Lumsden et al. 2008). The offset is located within the distribution range and associated habitat for this species.

6.2.2 Offset area attributes

The offset area contains REs 11.7.4 and 11.9.5a in regrowth and remnant forms. These REs align with the Ecosmart recommendations of suitable REs[9] (Ecosmart 2026).

At the offset area, regrowth RE 11.9.5a vegetation (AU13) received low BioCondition scores because this community has not yet developed sufficient understorey, tree canopy height or cover, even though other attributes were close to the benchmark for this community. BioCondition assessments also confirmed that shrub layer canopy cover was low, as was the incidence of fallen woody debris, reflecting the impacts from previous clearing, grazing and hot fires. Wildfire has occurred on the offset site, although its frequency/records have not been documented. The habitat quality assessment results for South-eastern Long-eared Bat habitat are shown in **Table 6.2**. Detailed habitat quality scores for the offset area (start quality, quality without the offset, and quality with the offset) are shown at **Appendix 12**, **Appendix 13**, and **Appendix 14**.

The offset area was selected due to the dominance of *E. crebra and E. tenuipes*, which provide suitable foraging and roosting habitat characteristics for the species. In addition, the area has the potential to develop larger hollow-bearing trees, increase canopy and shrub cover, and greater woody debris over time, thereby improving habitat complexity and delivering a net gain to habitat quality.

[9] Table 2, **Attachment 4**, Modified Habitat Quality Assessment, Toondoon Offset Area, Ecosmart 2026.

Table 6.2 – South-eastern Long-eared Bat Offset Area Modified habitat quality assessment results

AU	RE	Vegetation Condition	Description	Assessment Sites	Regulated Vegetation	Vegetation Condition Score	Start MHQS (AUs)	Area (ha)	Offset Contribution (%) of Final Area
AU10	11.7.4	Remnant	Mixed Eucalyptus spp. woodland on Cainozoic lateritic duricrusts. Species can include *Eucalyptus crebra, E. decorticans, Corymbia trachyphloia, E. tenuipes, C. watsoniana* and *Callitris glaucophylla*. (BVG1M: 12a).	T-05, T-06, T-10, T-20, T-32, T-34, T-37, T-41	Yes	2.78, 2.81, 2.84, 2.66, 2.48, 2.54, 2.64, 2.94	6.57	2,242	98.77
AU13	11.9.5a	Regrowth	*Acacia harpophylla* and/or *Casuarina cristata* or *Acacia harpophylla* open forest to woodland. (BVG1M: 25a).	T-03, T-04, T-15	No	0.71, 0.84, 0.99	2.20	28	1.23
Total and/or Weighted Score								**2,270**	**100.00**

6.3 Brigalow TEC

6.3.1 TEC requirements

Patches of brigalow vegetation in Queensland must meet the following characteristics and thresholds to be considered eligible as the EPBC Act-listed Brigalow TEC:

- The presence of *Acacia harpophylla* as one of the most abundant tree species in the patch. *A. harpophylla* is either dominant in the tree layer, or co-dominant with other species (notably *Casuarina cristata*, other species of Acacia, or species of Eucalyptus).
- The patch must be located In the Brigalow Belt Bioregion, and meet the Queensland Herbarium description of REs 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.9.6, 11.11.14 and 11.12.21.
- The patch must be larger than 0.5 ha in size.
- Exotic perennial plants must comprise less than 50% of the total vegetation cover of the patch.
- Regrowth brigalow vegetation can qualify as the Brigalow TEC if it is more than 15 years old and has the species composition and structural elements broadly typical of one of the identified REs.

The regrowth brigalow offset area on Toondoon falls within the mapped distribution area of the TEC and meets the criteria above except for the last two dot points which will be achieved through active management.[10]

6.3.2 Offset area attributes

The Brigalow TEC is located on Toondoon which adjoins the Allies Creek State Forest and comprises ground-verified Brigalow (*Acacia harpophylla* dominant and co-dominant) RE 11.9.5a (AU13). The offset area is entirely comprised AU13 (RE 11.9.5a) which links via other parts of the overall offset area to the Allies Creek State Forest, part of a state bioregional corridor (refer **Figure 4.4**). The habitat quality assessment results for the Brigalow TEC are shown in **Table 6.3**. Detailed habitat quality scores for the offset area (start quality, quality without the offset, and quality with the offset) are shown in **Appendix 15**, **Appendix 16**, and **Appendix 17**.

[10] See Species Profile and Threats Database at http://www.environment.gov.au/cgi-in/sprat/public/publicshowcommunity.pl?id=28&status=Endangered

Table 6.3 – The Brigalow TEC Offset Area Modified habitat quality assessment results

AU	RE	Vegetation Condition	Description	Assessment Sites	Regulated Vegetation	Vegetation Condition Score	Start MHQS (AUs)	Area (ha)	Offset Contribution (%) of Final Area
AU13	11.9.5a	Regrowth	*Acacia harpophylla* and/or *Casuarina cristata* or *Acacia harpophylla* open forest to woodland. (BVG1M: 25a).	T-03, T-04, T-15	No	1.58, 1.89, 1.96	3.35	28	100.00
Total and/or Weighted Score								**28**	**100.00**

6.4 Offset Area Start Values

The results of the modified habitat quality assessments of the two vegetation community assessment units (AUs) that occur within the offset areas are summarised in **Table 6.1**, **Table 6.2**, and **Table 6.3**. The field data is provided within the ecology report (refer to **Attachment 4**).

A detailed map of the offset areas for each MNES in this management plan are shown in **Figure 5.1**, **Figure**, **5.2**, and **Figure 5.3** and the known regional fauna species sighting records are in **Figure 5.4**. The offset area has been determined utilising outputs from the DCCEEW Offset Assessment Guide (OAG). The full OAG outputs for each MNES are shown in **Appendix 18**, **Appendix 19**, and **Appendix 20**.

The inputs used in the OAG for remnant and regrowth vegetation, to calculate the area required for the offset area, are outlined in **Table 6.4**.

Table 6.4 – Offset Assessment Guide inputs for each MNES

Attribute	MNES		
	Dunmall's Snake	**South-eastern Long-eared Bat**	**Brigalow TEC**
EPBC Status	Vulnerable	Vulnerable	Endangered
Impact Area (ha)	676.78	650.13	8.06
Impact Quality	3	5	4
Time until ecological benefit	20	20	20
Start area (ha)	1428	2270	28
Start quality (scale of 0-10)	6.44	6.51	3.35
Future quality without offset (scale of 0-10)	5	5	2
Future quality with offset (scale of 0-10)	7	7	5
Risk of Loss (ROL) without offset %	0	0	0
Confidence in ROL Result (%)	100	100	100
Confidence in Condition Result (%)	75	75	75
% of impact offset	101.37	100.65	153.93

7 Risk Analysis

The risk matrix (refer to **Table 7.1**) has been used to assess the risk that the plan's objectives will not be met and identify sources of those risks and strategies for managing them.

The following risks to achieving the management objectives and outcomes (refer to **Table 7.2**) have been considered for the plan:

- The risk of, and remedial actions that might result from, failure to achieve the offset completion criteria;
- Any real or potential risks associated with achieving the outcomes;
- The actions taken to minimise those risks; and
- Remedial action that will be undertaken if any of the risks occur.

Table 7.1 - 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-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		**Minor**	**Moderate**	**High**	**Major**	**Critical**
Likelihood	**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 7.2 - Risk Analysis

Number	Risk event or description	Relevant management actions to minimise risk	Residual risk			Trigger detection and monitoring events/activities	Remedial actions if risk occurs
			L	C	RL		
1	Failure to achieve and maintain offset completion criteria.	Monitor and report on attainment of interim environmental performance targets (**Section 11**).	Possible	High	Medium	Monitoring and reporting program undertaken, which includes annual reporting, vegetation and fauna assessments (refer to **Table 11.1).**	Review and enhance active management interventions, including an option of additional plantings to improve habitat quality if not meeting interim and/or completion criteria for two consecutive ecological surveys (the second ecological survey to be undertaken within 12 months), to consist of species, stocking rate and density to assist in achieving the regional ecosystem benchmark. Extend timeframe required to meet habitat quality completion criteria. Review and vary the OAMP (condition 31) in consultation with the approval holder and a senior ecologist with at least 5 years local knowledge and experience, to reflect implementation of enhanced management measures and ensure that the offset achieves completion criteria.
2	Alternative land use is undertaken on the offset sites.	The declared area under the VMA is used to legally secure the offset area as a Category A under the VMA. This will prevent clearing and timber harvesting.	Unlikely	Moderate	Low	Annual reporting to regulators.	If an alternative land use is approved by the Queensland Government, and the declared area is revoked, an alternative offset is required.

Number	Risk event or description	Relevant management actions to minimise risk	Residual risk			Trigger detection and monitoring events/activities	Remedial actions if risk occurs
			L	C	RL		
3	South-eastern Long-eared Bat, are not detected on the offset area during surveys.	Implement this OAMP to improve habitat quality for the South-eastern Long-eared Bat. Undertake regular surveys for the species on the offset area and in immediately adjacent properties with connecting habitat.	Unlikely	High	Medium	Implement fauna monitoring program (refer to **Table 11.1**).	If South-eastern Long-eared Bats are not detected on the offset area or fails to be detected in subsequent years during offset implementation or in immediately adjacent properties with connecting habitat, fauna monitoring program may require modifying methods and frequency. Implement enhanced active management measures to improve habitat quality for the species.
4	Feral animals, e.g. dogs, pigs, cats, kill or injure fauna species, and/or increase habitat degradation.	Feral animal control, particularly dogs, will be undertaken to reduce the risk of predation and/or injury to fauna species. Control of pigs will be undertaken to reduce the risk of habitat degradation. Other feral animal control will be undertaken, as needed, e.g. foxes, cats, rabbits, to improve habitat quality more broadly.	Possible	High	Medium	Monitoring quarterly and reported annually until the offset completion criteria are achieved (refer to **Table 11.1**). Targeted surveys for South-eastern Long-eared Bat and, Dunmall's Snake every 5 years.	Intensification of dog, or other feral animal control, to be undertaken to reduce numbers. BioCondition assessments to record habitat quality improvements following intensification.

Number	Risk event or description	Relevant management actions to minimise risk	Residual risk			Trigger detection and monitoring events/activities	Remedial actions if risk occurs
			L	C	RL		
5	Weed spread increases habitat degradation and prevents habitat quality improvements	Weed control will be undertaken as part of management actions, especially for pest plants that cause habitat degradation and impacts on habitat quality improvements, i.e. interim and final completion criteria.	Possible	Moderate	Medium	Monitoring quarterly and reported annually until the offset completion criteria are achieved (refer to **Table 11.1**).	Intensification of weed control, to be undertaken to reduce spread, targeted to nest time of year for maximum effect. BioCondition assessments to record habitat quality improvements following intensification.
6	High intensity fires/ *Force majeure* events passing through from the undermanaged State Forests have the potential to significantly reduce habitat quality.	Fire to be excluded wherever possible from the offset area. Maintaining firebreaks at appropriate widths to enable fires in adjoining areas to be prevented from entering on the offset area. Manage fuel loads through controlled grazing during the dry season. Fire control lines to be checked quarterly for condition and adequacy, and	Possible	High	Medium	Any uncontrolled fire. Fire damage to the offset area. All field monitoring (rapid and detailed) will report on any evidence of fire observed.	Destock the offset area, re-establish fire breaks and control lines and if appropriate, widen fire control lines and reassess fuel load reduction practices. Enhanced management measures, e.g. additional plantings of appropriate vegetation, to consist of species, stocking rate and density to assist in achieving the regional ecosystem benchmark.

Number	Risk event or description	Relevant management actions to minimise risk	Residual risk			Trigger detection and monitoring events/activities	Remedial actions if risk occurs
			L	C	RL		
		maintenance work is to be undertaken each 2 years at a minimum.					
7	Unauthorised land clearing. Standard forestry and native timber harvesting practices, as well as agricultural clearing, remove large trees that are shelter trees for the South-eastern Long-eared Bat. Hence forestry practices and timber harvesting are considered a potential threat to the quality of the vegetation community and habitat.	Forestry and native timber harvesting, and agricultural clearing of native trees and vegetation will not occur within the offset area. Clearing is excluded from the offset area under the declared area under the VMA.	Unlikely	Moderate	Low	Approval holder monitoring quarterly and reported annually until the offset completion criteria are achieved (refer to **Table 11.1**).	Reassess access protocols for any lessees etc. and general access.

Number	Risk event or description	Relevant management actions to minimise risk	Residual risk			Trigger detection and monitoring events/activities	Remedial actions if risk occurs
			L	C	RL		
8	High-density grazing destroys shrubs and native grass cover and slows the regeneration of habitat. The natural condition of the native ground cover is a moderate cover and hence any grazing undertaken is to enable the retention of a minimum of 30% grass cover at the end of the dry season.	Low-density grazing of domestic livestock may occur in the offset area only during the dry season for fuel reduction purposes with a minimum groundcover to be present at the end of the dry season of 30%. Groundcover (%) to be assessed at least once at all BioCondition assessment sites during late season grazing period. Stock rotation, as required, to ensure areas within the offset are not overgrazed or otherwise damaged, e.g. watering points.	Unlikely	Moderate	Low	Monitoring quarterly and reported annually until the offset completion criteria are achieved (refer to **Table 11.1**).	Any entry points due to fencing breaks etc. to be repaired to a stock proof condition as soon as possible and within three months. Re-assess duration of stock rotation in areas where damage is occurring and/or grass cover is reduced below 30%. Remove stock from areas where late season grass cover is below 30%.

Number	Risk event or description	Relevant management actions to minimise risk	Residual risk			Trigger detection and monitoring events/activities	Remedial actions if risk occurs
			L	C	RL		
9	Erosion to reduce habitat value of offset site	Maintain grass cover at levels specified in (8) above at the end of the dry season. This will ensure groundcover is high due to the presence of fallen woody debris, organic matter etc. thus minimising the risk of sheet erosion. Ensure rotation of stock when grazing in offset area, so that areas are not too heavily impacted.	Unlikely	Minor	Low	Monitoring quarterly and reported annually until the offset completion criteria are achieved (refer to **Table 11.1**).	Further reduction of grazing levels and inspections at least four times per year to identify the cause of any point source erosion (such as illegal vehicle access), and rectifying accessibility as required.

Number	Risk event or description	Relevant management actions to minimise risk	Residual risk			Trigger detection and monitoring events/activities	Remedial actions if risk occurs
			L	C	RL		
10	The risk posed by drought and climate change would also increase the likelihood of fire due to the dry conditions and accumulated fuel loads.	Maintain fire control lines and manage grazing levels according to the amount of grass cover. BioCondition assessments to assess habitat quality and determine any decline owing to drought conditions.	Likely	High	High	Monitoring program (annual) and at the end of the dry season (refer to **Table 11.1)**.	Allow offset area to recover post drought/fire, particularly through the control of weeds and removal of stock. Maintaining grass cover at levels specified in (6) above at the end of the dry season. Enhanced management measures, e.g. additional plantings where habitat quality declines are detected through BioCondition assessments for two consecutive ecological surveys (the second survey to be undertaken within 12 months). These will assist to reach/maintain completion criteria.
11	The risk of changeable disturbance footprint (i.e moving wells) post OAMP provision / approval means additional disturbance impacts to MNES are different to those approved in the OAMP.	Management of Change process within Arrow that ensures that any changes are minimised. Clearance values tracked and reported internally.	Likely	Moderate	Medium	Importance of Management of Change process within Arrow has been escalated given the new contracting arrangement and limits of approvals. GIS processes are being fast-tracked to look at real-time clearance data. Securing of additional offsets for SGP Stage 2 which will mean offsets are available if required.	Engagement with DCCEEW to understand process of the Department assessing and approving the potential re-location of wells if there is additional disturbance to MNES, noting that the Department has been advised that the well locations are indicative only and are yet to be agreed with the approval holder.

Number	Risk event or description	Relevant management actions to minimise risk	Residual risk			Trigger detection and monitoring events/activities	Remedial actions if risk occurs
			L	C	RL		
12	Climate Change. The risk of changing climate means the possibility of both extended periods of lower and higher rainfall and unseasonal rainfall, particularly in the normally dry season between April and November.	Extended periods of lower rainfall – Fire Strategy: See items 6 and 10 above. Grazing may be an option for reducing fuel loads where exotic grass such as buffel have invaded. Extended periods of higher rainfall, particularly outside the normal wet season of December to March - if unseasonal rainfall should occur, then grazing may be appropriate to maintain low fuel loads (DoE, 2013).	Possible	High	Medium	Monitoring program for fuel loads (annual and at the end of the dry season, refer to **Table 11.1**).	Implement adaptive management aimed at relieving non-climate related stressors to build ecosystem resilience and maximise adaptive capability to cope with climate change (NCCARF 2019). Extended dry periods – See item 10 above. Extended wet periods – manage any observed unusual fuel loads for transition to normal seasons and risks, particularly through the monitoring and control of weeds and timing and duration of grazing. Maintaining native grass cover at levels specified in (6) above at the end of the dry season.

8 Offset Management Measures

The Offset Area Management Measures have been prepared (refer to **Table 8.1**) in accordance with the specific requirements for the OAMP in the EPBC Act approval conditions.

The offset area management measures include, but are not limited to, management actions required to be undertaken on the offset site to mitigate those risks identified to the MNES. The offset area measures to manage, report and monitor will be undertaken until the outcomes detailed in **Table 10.1** are achieved.

The offset area will be protected by securing the offset area as Category 'A' vegetation under the Queensland VMA. The offset area is secured by the approval holder declaring the area as an area of high nature conservation value under the VMA (by a change in vegetation class protection). This process also lodges the OAMP on the title of the property and the implementation of the OAMP is therefore enforceable under the VMA.

The management actions within the OAMP specify what will and will not be permitted on the offset site, and include:

- Limiting vegetation clearing to only those areas required for maintaining fencing and fire control lines or ecological thinning to maintain RE structure and floristics;
- Prohibiting alternative land use and activities during the period of offset management (e.g. timber harvesting, cropping, vegetation thinning, and any alternative land use that would result in loss of the offset, etc), i.e. for the duration of the approval;
- Restricting unauthorised access;
- Excluding domestic livestock from the offset area except for the infrequent low-density grazing associated with fuel reduction in dry periods;
- Controlling feral animals;
- Managing fire; and
- Controlling weeds.

The management schedule describes the actions to be undertaken on the offset area (refer to **Table 8.1**).

Regular Offset Area reports will be prepared by the approval holder as listed in **Table 11.2** (refer to **Section 11**). They will report against each management action in **Table 8.1**. These management actions will enable the offset area to improve the attributes identified in **Attachment 1**, thus attaining and maintaining the prescribed completion criteria (refer to **Section 10**). 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 trigger levels reached, corrective actions implemented as a result and the effectiveness of those actions and any non-compliance with the management plan and corrective actions taken to address the non-compliance.

The management actions in this table are consistent with addressing the risks identified in the listing and conservation advice in **Table 2.1** and analysed in **Table 7.1**. They will be implemented from the commencement date of the offset area until the Completion Criteria have been achieved. The habitat quality on the offset area will be maintained for the duration of the approval, i.e. to 31 December 2080.

8.1 Responsible Parties

As the approval holder, Arrow Energy, is accountable for implementing the plan. Completing the actions will be ensured through the annual reporting requirements (refer to **Section 11**). Arrow will coordinate reporting, reviewing, inspections, auditing and any adaptive management changes to the plan. Responsibilities for managing the company's offset requirements will be allocated across various roles within Arrow.

Arrow has purchased the property and 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. As the approval holder and landholder, Arrow will undertake the reporting as per **Table 11.1**.

Arrow will engage suitably qualified persons to undertake the management actions, BioCondition assessments, ecological studies and surveys, prepare reports and undertake inspections, as required.

Incidents identified on site will be assessed based on the level of severity which will dictate the necessary actions through the Company's formal incident management system. Responses to incidents adversely impacting habitat quality on the offset site, or MNES directly, will be coordinated by Arrow Energy, to ensure remediation or enhanced management measures (refer to **Table 8.1**) are implemented to address the incident as soon as reasonably possible.

Table 8.1 - Management Actions over the Offset Area

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
Degradation of habitat (Relates to loss and fragmentation of habitat, which is an identified threat in the Approved Conservation Advice for South-eastern Long-eared Bat, and Dunmall's Snake.	Achieve the completion criteria and habitat quality improvements for offset values, which include the habitat quality scores in this OAMP (**Table 10.1**).	Increase the habitat quality scores for each offset value as measured at each identified habitat quality assessment site (**Figure 11.1**) based on the results of baseline and subsequent BioCondition assessments and monitoring events to achieve the scores in the completion criteria.	Implementation of the management actions and adaptive management framework as outlined in this OAMP.	BioCondition assessments and monitoring of offset value habitat quality scores will be undertaken in accordance with **Section 11**. 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 11**).	BioCondition assessments and monitoring every five years indicate that habitat quality scores for interim performance targets will not be achieved for one or more offset values. BioCondition monitoring will be completed in: ▪ Year 5 ▪ Year 10 ▪ Year 15 ▪ 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 two 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 within eight months of detection of trigger, including, as appropriate: ▪ The approval holder reviews the OAMP with assistance from relevant senior land managers and/or senior ecologists, if required, to provide input on the effectiveness of the management actions. ▪ Increase frequency and intensity of pest animal and weed control measures and/or revise the type of measures to be implemented. ▪ Where interim habitat quality criteria are not likely to be met in

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
						the required timeframe, the approval holder will notify the Commonwealth within one week and implement additional management measures. ▪ Where final habitat quality scores are not likely to be met by year 20 (i.e. 2047), the approval holder will notify the Commonwealth within one week and will obtain advice from senior ecologists and land managers with the aim of identifying appropriate additional management interventions, such as extending the timeframes and intensifying management measures, including plantings, to enhance habitat. This may include provision of an additional offset, if required.
Habitat or vegetation loss through unauthorised land clearing. (Loss of habitat identified as a threat in the Approved Conservation Advice for	Maintain the extent of habitat within the offset area by prohibiting clearing of native vegetation.	No unapproved and/or intentional clearing of vegetation within the offset area, except for clearing that is required for fencing, access, firebreaks and public safety. Any proposed ecological thinning	Protection of the offset area via a Voluntary Declaration under Section 19E and 19F of the VMA, as described in **Section 12**, to be registered within 12 months	Quarterly inspections will monitor and document if there is evidence of recent unapproved clearing, including forestry or timber harvesting activities. Quarterly inspections will monitor and document vegetation clearing that has	Any unauthorised clearing in contravention of the Voluntary Declaration.	**Step 1**: Investigate cause of trigger (e.g. unauthorised access). ▪ As soon as unauthorised clearing is detected, review existing access restrictions, and inspect signage and offset area fencing, within two weeks of detection of the clearing, identify how unauthorised

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
South-eastern Long-eared Bat, Dunmall's Snake and the Brigalow TEC.		requires the advice of a Principal Ecologist, and prior written agreement of DCCEEW.	of the approval of this OAMP. Comply with the restrictions on clearing in **Table 7.1**. Construction and maintenance of access tracks, fencing and firebreaks will only be undertaken in accordance with the requirements of this table. If vegetation clearing is required for fencing, access, firebreaks or public safety, it must be undertaken in accordance with best practice	occurred for fire break, access road or fence line maintenance. All monitoring reports will include records of any maintenance clearing required. Annual compliance reporting to the Commonwealth Government consistent with any and all EPBC Act approval(s), as well as scheduled monitoring reports on condition of the offset.		persons[11] accessed the site and identify appropriate corrective actions. **Step 2**: Implementation of corrective action/s. ▪ All identified actions required to prevent recurrence of the prohibited clearing will be completed within three months of detection of the clearing. These may include (though are not limited to) additional fencing and/or signage and security for the offset area. ▪ BioCondition assessments to record extent of damage and progress of management measures, to assess progress toward recovery and towards meeting next interim or final completion criteria. ▪ Where unauthorised clearing has been extensive and habitat quality scores are reduced (based on results of BioCondition assessments), additional plantings will be undertaken within six months

[11] Defined in Glossary

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
			management methods and any applicable legislative requirements.			of the most recent BioCondition assessment, as needed.
Degradation of habitat by overgrazing (relates to loss and fragmentation of habitat, identified as either a known threat or suspected threat in the Approved Conservation Advice for South-eastern Long-eared Bat, Dunmall's Snake and the Brigalow TEC.	Ensure that any livestock grazing for fire management and weed control maintains and enhances the ground cover attributes for MNES (at least 30% grass cover) and does not result in the degradation of habitat and vegetation.	Increase the richness and average % cover from the baseline measured, of native perennial grasses, as measured at each habitat quality assessment site based on the results of baseline and subsequent BioCondition assessment and monitoring events.	Stock will be grazed only when required to reduce ground cover (i.e.: when groundcover exceeds 60%), and only during the dry season. The dry season is normally between April and November; however, if unseasonal rainfall should occur, then grazing may be allowed outside of this time period only if there is no evidence of moisture in the stream order one	Habitat quality (BioCondition) assessments will be undertaken in accordance with **Section 11**. These will include assessment of percentage cover of native perennial grasses Monitoring reports shall be kept recording results of BioCondition assessments and habitat quality condition of the offset area.	Detection of stock grazing outside of the dry season, or during any other exclusion period Decrease in the richness and average ground layer cover at one or more habitat quality (BioCondition) assessment sites based on the results of baseline and subsequent monitoring events	Upon being notified or becoming aware of prohibited stock grazing in the offset area, the approval holder is to remove the stock from the area (if present) and assess the adequacy of fencing within three months. The approval holder is to undertake fence maintenance and repairs to resecure the offset area within three months. Stock to be kept out of affected area for as long as is required for recovery to establish (minimum two years).

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
			gullies to ensure that "pugging" of the soil by livestock does not occur.			
Introduction, establishment and spread of non-native weeds including prohibited and restricted matter listed under the *Biosecurity Act 2014* (Qld) or as a Weed of National Significance (relates to loss and fragmentation of habitat).	Manage invasive weed species to reduce degradation of MNES habitat and the Brigalow TEC.	Weed cover must not exceed 10% cover in the offset area. No new prohibited or restricted matter species listed under the *Biosecurity Act 2014* (Qld) are identified at any BioCondition assessment or monitoring site (based on subsequent monitoring events), or opportunistically, i.e. if noted outside of BioCondition assessment or monitoring surveys.	The primary weed control method will be grazing by cattle, which will be undertaken during the dry season (that is, from April to November each year), to control Buffel Grass outbreaks. Weed control will be undertaken initially within the first year throughout the offset areas and then periodically as required to treat the weeds at the optimum time in their life cycles to control	Monitoring of this management action will be undertaken by the approval holder or suitable qualified person appointed by the approval holder at least quarterly. Weed cover is to be monitored by the same methodology and at the same time as the ground cover measurements, i.e. during BioCondition assessments. Quarterly inspections will observe and record the presence of weeds and success of previously applied weed control measures. The inspection will include	Pest plants (including Buffel Grass, Rhodes Grass and Green Panic Grass) occur in greater than 10% of the offset area. A new declared invasive 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 being present in greater than 10% of the offset area, the approval holder is to implement additional weed control measures within three months. These measures will include, and are not limited to: ▪ foliar spraying; ▪ basal bark spraying; ▪ stem injection; ▪ cut stump; ▪ cut and swab; ▪ stem scraper; and ▪ wick applicators. All new weed species and required intensification of weed management to be reported in offset monitoring reports.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
			and minimise the spread of the existing weed species.	before and after photos of the weed control area.		
Predation and impacts from dogs and other pest animals. Predation by feral animals is identified as either a potential or suspected threat in the Conservation Advice for South-eastern Long-eared Bat and Dunmall's Snake. Pigs are broad-spectrum pests that impact on the population dynamics of both plants and animals	Minimise the introduction of pest animals and control of existing populations of pest animals (wild dogs, and feral pigs, cats and foxes) within the offset areas in accordance with the *Biosecurity Act 2014* (Qld).	Detection of twelve or more feral pigs or any feral dogs during any inspection.	Implement control actions for pest animals in accordance with **Section 8**. Participate fully in, and cooperate with, any and all regional pest control programs, unless those would otherwise contravene a part of this OAMP.	Undertake monitoring for pest animals in accordance with **Section 11**.	Any observed evidence of feral animal presence, particularly dogs (that is, an indicator of feral animals required to be recorded as part of the feral animal monitoring requirements detailed in **Table 8.1**.	▪ Upon being notified or becoming aware of pest animal populations exceeding the threshold, the approval holder is to implement all necessary or appropriate control measures needed to reduce pest animal populations to below trigger thresholds, which is 12 feral pigs or any feral dogs. The approval holder is to have completed implementation of all necessary or appropriate pest control measures within three months of detecting the feral animals. ▪ Where a feral dog reduction and control program is to be undertaken, this must be continued until feral dogs are eliminated from the offset area. ▪ The approval holder 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 approval holder will make best endeavours to reach

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
affecting MNES habitat quality and health of the Brigalow TEC.						agreement with neighbouring landowners to implement such a program. ▪ If impacts from the pest animal populations have not naturally remediated within six months of completion of implementation of the control measures, the approval holder is to undertake and complete all works required to remediate those impacts.
Fire (relates to loss and fragmentation of habitat, identified as a threat in the Approved Conservation Advice for South-eastern Long-eared Bat . The impact from uncontrolled fire would be a reduction in groundcover, thinning of the canopy, loss of juvenile	No unplanned fire in the offset area. Planned fire (cool burns) is only undertaken in the surrounding areas to reduce fuel loads, where supported by advice from the Queensland Rural Fire Service (QRFS).	No unplanned fire in the offset area. Any cool burns in the surrounding area are managed appropriately to reduce fuel loads, only if required and supported by advice from the QRFS.	Implement fire management in accordance with all requirements in this OAMP. If one or more bushfires are current in the region and considered potentially threatening to the site, coordinate with all relevant fire authorities to determine the appropriate method of protecting the site (if the	Monitoring of this management action will be undertaken by the approval holder or suitable qualified person appointed by the approval holder quarterly. Quarterly inspections will monitor and document if there is evidence of wildfire or prohibited burning. Any cool burns in the surrounding area will be monitored and recorded in the annual compliance report, as well as monitoring	Destruction of, or significant damage to, part or all of the offset area. The occurrence of any unplanned or deliberately lit fires.	**Step 1**: Investigate cause of trigger ▪ Within one month of detection of the trigger, complete an investigation into the source of the fire and how habitat quality scores have been impacted. **Step 2**: Implementation of corrective action/s **Corrective action:** upon being notified or becoming aware of an unplanned fire in the offset area, the approval holder is to reassess and implement new access protocols for any lessees etc., signage and general access within two weeks. **Corrective action:** subsequent to any unplanned occurrence of fire in the offset area, within two months, the

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
canopy species, reduction of available tree hollows, and slowing of the offset area achieving the completion criteria. Fire scar mapping[12] products produced for the period 1986 to 2016 are derived from the Landsat satellite imagery and has been used to inform this risk. Due to the scale of the mapping products, site			relevant fire authorities advise against seeking to protect the site from a specific fire, the approval holder may comply with that advice without needing approval or agreement from DCCEEW). The approval holder will maintain firebreaks within the Toondoon property. Fire control lines must be inspected quarterly. Maintenance must be undertaken as required and at	reports for the offset area, with the written advice from a suitable ecological expert. Weed cover is to be monitored post-fire, utilising the same methodology and in conjunction the groundcover monitoring (e.g. BioCondition assessments). Weed control measures undertaken post a fire event to ensure weed cover is <10%. Ground cover measurements must be in accordance with Methodology 2B as stated in the *Land Manager's Monitoring Guide* (Department of Environment and		approval holder or suitable qualified person appointed by the approval holder will: ▪ inspect and repair, and widen, if necessary, all firebreaks (but cannot reduce the area of vegetation on the offset area); and ▪ reassess fuel load reduction practices; and exclude grazing until the ground cover present at the end of the dry season of that year is at a minimum of 60% Corrective action: Where there is substantial damage to the offset area, within two months, approval holder must arrange for a BioCondition assessment to determine habitat quality loss and report to the Commonwealth on how this loss will be addressed to continue to meet the required interim or final completion criteria. This may include updating this OAMP.

[12] https://www.qld.gov.au/environment/land/management/mapping/statewide-monitoring/firescar

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
specific data is not available. Anecdotal evidence indicates that unplanned fire is not common.			least once every two years. Please note: if fire damages the offset areas, it must be reported by the approval holder and in annual reports as per **Section 11**. Any damage by fire to the offset area must be reported to the Commonwealth as soon as possible following the impact.	Resource Management, 2010) (DERM)[13], or any subsequent published version of this document. The approval holder will keep themselves informed of any bushfires in the region. The Commonwealth must be notified immediately of any impact to part or all of the offset area from fire.		
Offset fails to achieve the interim performance targets and	Achieve the interim performance targets and completion	The interim performance targets are	All management actions outlined in this OAMP will be implemented to ensure that	Monitoring of the offset area will be undertaken in accordance with **Section 11**.	Interim performance targets are not	**Step 1**: Investigate cause of trigger • Within one month of detection of the trigger, complete an investigation into the reasons why the interim

[13] *Land Manager's Monitoring Guide: Ground cover indicator*, Department of Environment and Resource Management, 2010, Queensland Government, Brisbane, available at http://qldgov.softlinkhosting.com.au/liberty/opac/search.do#. Viewed 22 January 2026.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
completion criteria within the anticipated 5, 10, 15 and/or 20-year timeframes, respectively (relates to loss and fragmentation of habitat, identified as a threat in the Approved Conservation Advice for South-eastern Long-eared Bat and Dunmall's Snake.	scores at years 5, 10, 15 and 20 years, respectively (**Table 10.1**).	achieved by year 5, 10 and 15. The completion criteria are achieved by year 20. See **Table 10.1**.	the interim performance targets and completion criteria are achieved. BioCondition assessments will be undertaken every 5 years to measure progress towards interim and final completion criteria.	The results of monitoring events (BioCondition assessments) will be compared against the interim performance targets and completion criteria to determine the progress of offset habitat quality scores and recorded as part of reporting.	achieved by year 5, 10 or 15 Completion criteria are not achieved by year 20.	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. The approval holder must notify the Commonwealth that interim or final completion criteria are unlikely to be, or have not been, met. **Step 2**: Implementation of corrective action/s As soon as practicable, and in any case within eight 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 and/or revising the type of measures to be implemented. ▪ Modifying the fire management measures to better support enhancement of offset values.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
						▪ Provide additional plantings representative of the species and densities in the regional ecosystem benchmarks to enhance habitat quality improvement ▪ Secure an additional offset if there is no realistic possibility of meeting final completion criteria. If the investigation under Step 1 recommends changes to the management regime then: as soon as possible, and in any case within six months of detection of the trigger, implement a revised OAMP incorporating those recommended changes. The revised OAMP must be submitted to and approved by the Commonwealth.
Unauthorised site access	Unauthorised persons, vehicles, and/or stock are prevented from accessing the site, and authorised stock are prevented from	Public access to the offset area is prohibited. Access is restricted to those authorised persons required to undertake actions described in this management plan,	Fences will be maintained around the entirety of the offset area to prevent unauthorised access and to control stock presence.	Monitoring of this management action will be undertaken by the approval holder or appointed suitably qualified person within three months of the offset area being legally secured and during quarterly inspections.	Evidence of unauthorised persons, vehicles, and/or stock is detected at any point. Evidence of stock is detected at any point during exclusion times.	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, reassess access protocols for any lessees etc., as well as signage and general access within two weeks and

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
	incurring during exclusion times	including the approval holder, staff and contractors. 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 No evidence is found of unauthorised persons, vehicles, and/or stock is detected on site at any point. Fences and gates are erected at all necessary points and kept in good repair throughout the life of the		Quarterly inspections will monitor and document evidence of unauthorised access to the offset area.	Damage is detected to any fence.	implement repairs to fencing as required. **Step 2**: If there are areas that have been negatively impacted, the regeneration of those areas will be undertaken within two months of the impact and will be added to the monitoring sites at **Table 11.3** and monitored during the quarterly inspections. Fencing requirements will be reassessed and fencing improvements made, e.g. change in materials, if required.

Threat to offset values	Management objective	Performance criteria	Management action	Monitoring	Trigger for adaptive management and corrective action(s)	Corrective action and timing
		EPBC Act approval.				

9 Offset Area Management and Protection Additional to those that Currently Exist

Establishing an offset area on the Toondoon property would add additional protection for biodiversity values from clearing[14].

In relation to clearing, as outlined in Section 5 the offset area is currently not protected by the VMA or the EPBC Act (due to the exemption related to continuing use of the land) from activities such as timber harvesting, the inappropriate use of hot fires or under-sowing of exotic pasture species. Only the remnant vegetation areas are protected from broadscale clearing under the VMA (see maps in **Figure 4.3**). Maintaining the existing condition of regulated vegetation and land for habitat values is not addressed under the VMA.

In relation to biosecurity, the *Biosecurity Act 2014* (Qld) imposes a 'general biosecurity obligation' on all Queenslanders to manage biosecurity risks for the area under their control and that they know about or could reasonably be expected to know about[15]. 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.

Table 9.1 below outlines the Biosecurity Act obligations with respect to each category of biosecurity matter[16].

Table 9.1 - *Biosecurity Act 2014* (QLD) obligations

Category	What is Required	Examples
3	Must not distribute, be traded or released into the environment.	Most weeds, pest animals and noxious fish (e.g. gambusia, dingoes, yellow crazy ants).
4	Must not move.	Specific weeds, pest animals and noxious fish (e.g. bitou bush and feral pig).
5	Must not possess or keep.	Includes weeds, pest animals and noxious fish (e.g. rabbits and carp).
6	Must not feed (except if undertaking a control program).	Includes invasive animals such as feral deer, foxes, rabbits and wild dogs and noxious fish such as carp, gambusia and tilapia

Implementing the OAMP will increase the frequency of biosecurity management for matters such as wild dog protection and weed management, because of increased site inspections and monitoring, and additional feral animal and weed control, where required. The management actions in this OAMP set out obligations that are additional to such general "business as usual" obligations. Management actions must be undertaken on the offset area (refer to **Table 7.1**, and any trigger for adaptive management that is met

[14] *Vegetation Management Act 1999* (schedule definitions)
[15] See https://www.daf.qld.gov.au/business-priorities/biosecurity/policy-legislation-regulation/biosecurity-act-2014/general-biosecurity-obligation
[16] *Biosecurity Act 2014*, s15.

requires corrective actions, including additional management, to be undertaken. For example, there is a requirement to control feral pigs if numbers in excess of 12 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% over the offset area over the life of the approval.

The North Burnett Regional Council identifies the offset area as Rural in their planning scheme and offers no protection for native vegetation from the current ongoing land use. The council's Biosecurity Plan 2019-2024 refers only to the general biosecurity obligation of all landholders under the state *Biosecurity Act 1994*.[17]

10 Offset Completion Criteria and Performance Targets

Offset completion criteria have been determined based on an understanding of the specific habitat, connectivity, and other ecological values for the relevant MNES. These criteria were initially derived from detailed ecology survey information of both the impact and offset areas utilising an approach specified in the Guide to determining terrestrial habitat quality (DEHP, 2017 and DES 2020). The targeted habitat quality meet guidelines published by ANZMEC (2000) stating completion criteria should be:

- Specific enough to reflect a unique set of environmental, social and economic circumstances.
- Flexible enough to adapt to changing circumstances without compromising objectives.
- Include environmental indicators suitable to demonstrate that rehabilitation trends are heading in the right direction.
- Undergo periodic review, modifying if required due to changed circumstances or improved knowledge.
- Based on targeted research, resulting in more informed decisions.

During the management period, a set number of interim performance completion criteria have been proposed to track the trajectory of habitat quality towards the desired final completion criteria. The timing of the interim targets corresponds with the targeted species surveys and detailed ecological condition monitoring in **Table 11.1**.

Interim targets were derived by identifying the attributes expected to increase over the period of the approval. The values were determined by differentiating between specific, longer-term metrics (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).

Completing the management actions identified in **Table 8.1** will enable the offset area to attain the completion criteria identified in **Table 9.1**, and maintaining the stated completion criteria for the duration of the approval.

Annual reporting (that includes monitoring reports for the offset site) to DCCEEW will provide transparency regarding how the site management actions are being implemented. The reports will be prepared after the anniversary of the implementation of the offset site or will be consistent with other offset site reporting dates, as it is planned that other offset sites will be established on the property. Where relevant, the report will identify any events impacting the offset area, trigger levels reached, corrective actions implemented as a result and the efficacy and success of those actions, and any non-compliance with the management plan and subsequent corrective actions taken.

[17] North Burnett Regional Council (2019). *Biosecurity Plan 2019-2024*. Available at https://northburnett.qld.gov.au/wp-content/uploads/2021/08/NBRC-Biosecurity-Plan-2019-2024-entire.pdf

Table 10.1 - Interim Targets and Completion Criteria

Protected matter	EPBC Status	Impact area (ha)	Impact Habitat quality score	Offset area (ha)	Habitat start quality score	Habitat quality score Year 5	Habitat quality score Year 10	Habitat quality score Year 15	Habitat finish quality score*
Dunmall's Snake	Vulnerable	676.78	3.12	1428	6.44	6.5	7.0	7.3	7.5
South-eastern Long-eared Bat		650.13	4.67	2270	6.51	6.5	7.0	7.3	7.5
Brigalow TEC	Endangered	8.06	3.95	28	3.35	3.5	4.0	4.5	5.1

*The final scores out of 10 have been calculated in the OAG based on the outcomes provided in **Attachment 1** (terrestrial ecology reports for the impact and offset site (sampling sites for each of the relevant species for the offset area)) and it is the project intent to exceed the final scores shown in the OAG, as illustrated in this table. It should be noted that the interim targets included in **Table 10.1** may need to be updated as offset management progresses.*

11 Monitoring and Reporting

The monitoring methods discussed in **Table 11.1** will enable comparative changes in vegetation condition against baseline data collected on the offset area, as well as attainment and maintenance of the offset completion criteria (refer to **Section 10**). Furthermore, the monitoring and subsequent reports identified in **Table 11.2** will measure changes resulting from the management actions and variability due to climatic conditions. This will inform the nature and frequency of management intervention required.

Arrow will prepare a compliance report for each 12-month period following the date of the commencement of the action and for the period of the Approval, as per approval conditions 27 and 28.

OAMP reports will be prepared until the completion criteria of the management plan are achieved (noting that completion criteria must be maintained for the period of the approval, as per approval condition 34). The monitoring schedule is outlined in **Table 11.1**. The reporting schedule is provided in **Table 11.2**.

Data will be owned, managed, stored and the responsibility of the approval holder.

Commonwealth threatened species survey guidelines used to inform the requirements of the terrestrial flora and fauna surveys included:

- *Survey Guidelines for Australia's Threatened Reptiles (Department of Sustainability, Environment, Water, Population and Communities (DSEWPC), 2011)*.
- *Survey Guidelines for Australia's Threatened Bats; Guidelines for detecting bats listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999*.
- Species Profile and Threat databases for relevant EPBC Act listed species and communities.

Table 11.1 - Monitoring Schedule

Monitoring	Attributes monitored	Timing	Method	Location/s
Surveys undertaken by ecologists every 5 years				
Targeted habitat quality assessments	Nature and quality of habitat attributes for the species being offset, presence of threats such as dogs, pigs, cats).	2032, 2037, 2042, 2047 (March – May) [a]	Survey guidelines for Australia's threatened mammals (DSEWPC 2011); Survey guidelines for Australia's threatened bats; Guidelines for detecting bats listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*; Survey guidelines for Australia's threatened mammals Guidelines for detecting mammals listed as threatened under the *Environment Protection and Biodiversity Conservation Act 1999*; *Environment Protection and Biodiversity Conservation Act 1999.* Draft Referral guidelines for the nationally listed Brigalow Belt reptiles.	Across the offset area.
Targeted surveys for South-eastern Long-eared Bat and Dunmall's Snake	Presence of the species in the offset area, including estimated numbers and location of sitings.			
Ecological condition and relevant habitat features using BioCondition assessments.	Recruitment of woody perennial species in EDL		Field observations, vegetation assessment as per the *Guide to determining terrestrial habitat quality – a toolkit for assessing land-based offsets under the Queensland Environmental Offsets Policy* (DES, 2020) (or any subsequent published version of this document). Data for each of the ecological condition attributes monitored will be collected at each site listed in **Table 11.3** and reported on and presented in a sequential manner (including previous data collected) to quantify change from the baseline condition determined June 2020. 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.	Sites listed in **Table 11.3.**
	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			
Quarterly approval holder records and monitoring (report end of Sept, Dec, Mar, Jun).				

Monitoring	Attributes monitored	Timing	Method	Location/s
Forestry Operations, Native Timber Harvesting and general vegetation impacts.	Any incidence of native plant destruction.	Monitored quarterly and reported annually in Offset Area Report until the offset Completion Criteria are achieved.	General observations during routine inspections.	Within offset area
Unauthorised impacts to vegetation and woody debris from activities such as illegal access / camping.	Vegetation, woody debris, grass cover, weed cover, feral animal damage and presence.	Monitored quarterly and reported annually until the offset Completion Criteria are achieved.	The approval holder or person appointed by the approval holder will undertake quarterly inspections of the offset area to observe and record grass cover levels, weeds, accessibility (i.e. 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.	Within offset area
Grazing	Cattle stocking rates Grass cover Pugging	Monitored quarterly during grazing periods (dry season or as otherwise authorised) and reported annually in the Offset Area Report until the offset Completion Criteria are achieved in accordance with *Level 1 monitoring as per the Land Manager's Monitoring Guide (DERM, 2010).*	Grass and weed cover are to be assessed as per the Level 1 methodology described in the *Land Manager's Monitoring Guide* (DERM, 2010) as provided in Attachment 4 of this OAMP.	Within offset area

Monitoring	Attributes monitored	Timing	Method	Location/s
Unplanned fire	Occurrence, control measures implemented, timing and result of the control measures as per **Table 7.2**.	Monitored quarterly and reported annually until the offset Completion Criteria are achieved.	General observations during routine inspections.	
Weeds	Occurrence, control measures implemented, timing and the result of the control measures as per **Table 8.1**.	Monitored quarterly and reported annually until the offset Completion Criteria are achieved.	Weed cover is to be monitored by the same methodology and at the same time as the grass cover measurements.	
Pest animals	Occurrence, control measures implemented, timing, number and type of animal/s and the result of the control measures as per **Table 8.1**.	Monitored quarterly and reported annually until the offset completion criteria are achieved.	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 in the offset area. If detected, locations will be captured via a GPS and photographed, to be rechecked at the next quarterly inspection. Any evidence of predation on fauna must be reported immediately to the approval holder and corrective actions implemented (refer to **Table 8.1**.).	

[a] Based on a starting date for the OAMP management measures of 2027. The years 2032, 2037, 2042, and 2047 are representative of "years 5, 10, 15, and **Table 10.**

Table 11.2 - Reporting Schedule

Report to DCCEEW	Report Details	Reporting Period	Submission due date
Annual Offset Area Report	Annual Area Offsets Report which contributes to the Annual Compliance Report as per approval condition 28. This report details: ▪ photo point (including coordinates); ▪ monitoring results; ▪ 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, the Brigalow TEC condition, condition of Dunmalls Snake and South-eastern Long-eared Bat habitat and results of surveys, achieved for preceding reporting period. Note: the reports and results from detailed ecology survey (BioCondition assessments) and monitoring events, conducted in accordance with **Table 11.1**, will be provided as an Appendix to the subsequent Annual Offset Area Report.	Annual Offset Area Report - for each 12-month period. Reported annually until the Offset Completion Criteria are achieved and then every five years for the period of the approval.	The same period provided for the publication of the Annual Compliance Report under the Approval on Arrow Energy's website - Reports and plans.
	Photo-point monitoring (including coordinates) for the previous monitoring period to be included in the Annual Area Offsets Report.	Subject to weather and safe access, 1 May – 15 June annually until the offset Completion Criteria are achieved and then every 5 years for the period of effect of the approval.	

Report to DCCEEW	Report Details	Reporting Period	Submission due date
	See **Table 11.3** for the current monitoring points for SGP Stages 2 and 3, these may be rationalised for future monitoring as per requirements in the *Guide to determining habitat quality* (DES, 2020).		
Annual Compliance Report	Compliance report detailing compliance with approval conditions under the EPBC Act, including compliance with the offset conditions, as detailed in this OAMP.	12-month period reported annually.	The period for the publication of the Annual Compliance Report under the Approval on Arrow Energy's website - Reports and plans.

Table 11.3 - Monitoring Sites

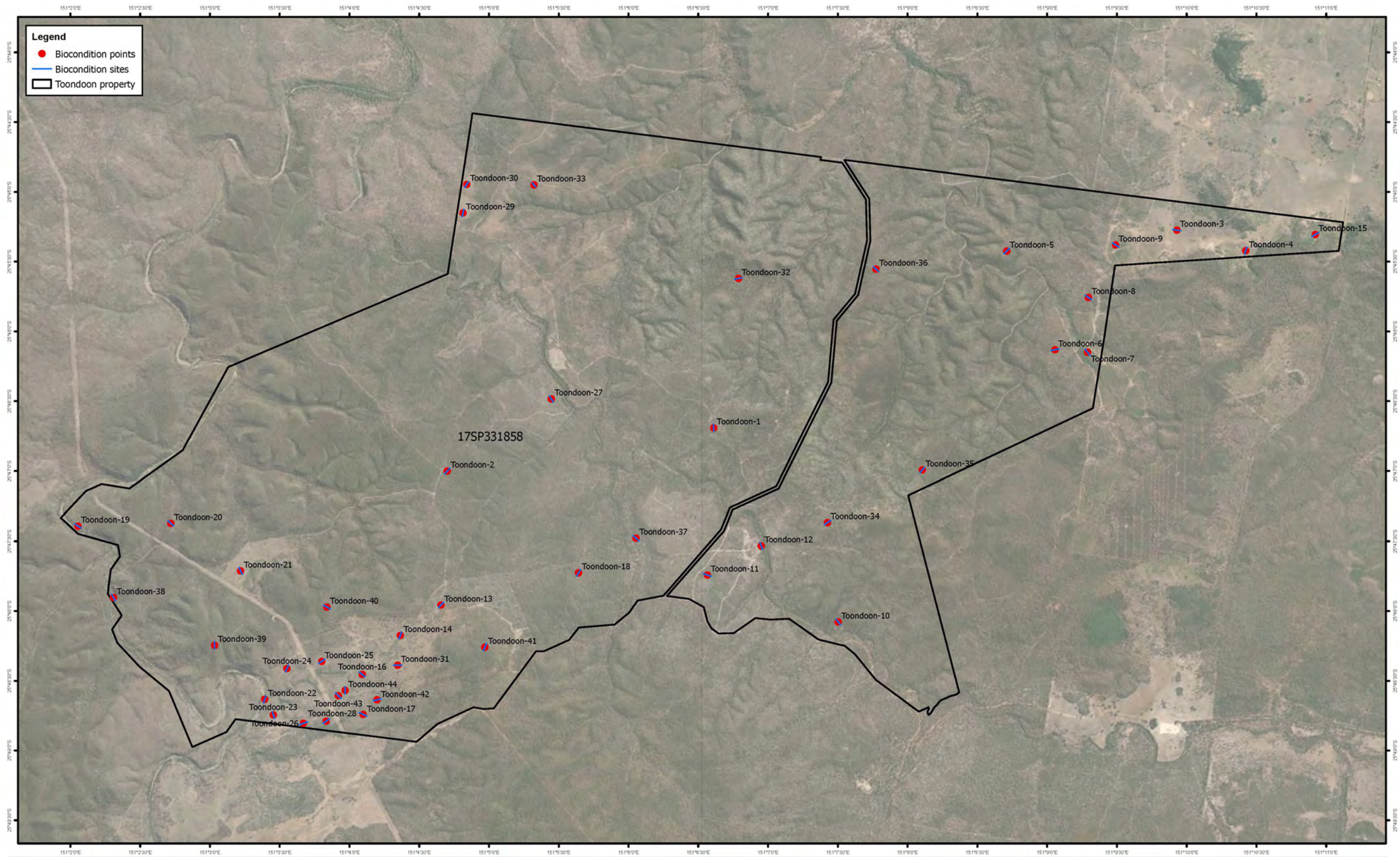
Assessment Unit	Monitoring site number	Regional ecosystem	GDA 2020	
			Latitude	Longitude
AU01	T-23	11.11.15	-25.81241615	151.057578
	T-24		-25.8068526	151.0592139
AU02	T-16		-25.80756851	151.0681821
	T-25		-25.80601336	151.0633628
AU03	T-17	11.5.20	-25.81235302	151.068295
	T-42	11.11.3c	-25.81061663	151.0699824
AU04	T-43	11.11.3	-25.81012615	151.0653872
	T-44		-25.80948118	151.0661546
AU05	T-26		-25.8133838	151.0611785
	T-28		-25.81314049	151.0639161
AU06	T-29	11.12.1	-25.75253134	151.0801979
	T-30		-25.74913938	151.0806653
AU07	T-19	11.3.25	-25.78984044	151.0342298
	T-22		-25.8105484	151.0565564

Assessment Unit	Monitoring site number	Regional ecosystem	GDA 2020	
			Latitude	Longitude
	T-38		-25.79837652	151.0384886
AU08	T-12	11.3.4	-25.79224307	151.1158547
AU09	T-13	11.5.20	-25.79928898	151.0775959
	T-14		-25.8029043	151.0727446
	T-31		-25.8064698	151.0724485
AU10	T-10	11.7.4	-25.80128981	151.1250088
	T-20		-25.78951414	151.0453334
	T-32		-25.76033042	151.1131591
	T-34		-25.78941967	151.1237957
	T-37		-25.7913164	151.1009058
	T-41		-25.80429965	151.0828376
	T-05		-25.75709347	151.1451906
	T-06		-25.76887026	151.1509196
AU11	T-11	11.7.6	-25.79567739	151.1094189
	T-21		-25.79523228	151.0536569
	T-27		-25.77472439	151.0907716
	T-33		-25.74915872	151.088909
	T-07		-25.76913767	151.1548191
	T-09		-25.75630729	151.1581849
AU12	T-01		-25.77817301	151.1101884
	T-18		-25.79543757	151.0940516
	T-02		-25.78332453	151.0783314
	T-35		-25.78321706	151.1351009
	T-36		-25.75922084	151.1295375
	T-39		-25.80408554	151.0505426
	T-40		-25.79950055	151.0639789
	T-08		-25.76258965	151.1549548

Assessment Unit	Monitoring site number	Regional ecosystem	GDA 2020	
			Latitude	Longitude
AU13	T-15	11.9.5a	-25.75507064	151.1820468
	T-03		-25.75457121	151.1654911
	T-04		-25.75699376	151.1737272

Note that the grey-shaded rows represent AUs that are to be used for offsets for Stage 3 of the Project.

Figure 11.1 - Monitoring Sites for the Offset Area



Based on or contains data provided by the State of Queensland. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws.

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Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it.

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12 Legally Binding Mechanism

This offset will be secured through the use of a declared area as an area of high conservation value under the VMA. Once the declaration has been registered on the title, the offset area will be a Category 'A' area on the property map of assessable vegetation (PMAV). Pursuant to the VMA, an area mapped as Category 'A' on a PMAV is described as an '*area subject to compliance notices, offsets and voluntary declarations*.

Once approved under the EPBC Act, the OAMP will be attached to the declared area, further ensuring compliance of the plan. Arrow will seek to secure the offset area within 6 months of approval of the OAMP (actual timing will be dependent on regulatory processes).

Management and monitoring of the offset area will be undertaken in accordance with commitments in the approved OAMP. DCCEEW will be notified within five business days of the declared area execution.

The declared area will remain in place as the legally securing mechanism for the offset area until the outcomes detailed in **Table 10.1** are achieved. 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 (i.e. until 31 December 2080). Statutory protection of the offset area is maintained under the VMA.

Title searches for the subject lots of the offset property are provided in **Schedule 1**, as requirement 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.

13 Adaptive Management and Plan Review

This plan has been prepared to be implemented until the offset completion criteria have been achieved. when the approval for the action ceases. Management measures will be reported in the Offset Area reports, and adapted, where required, if triggers are reached and corrective actions are implemented (refer to **Table 11.3**). If management measures need substantial adjustment, Arrow may review this plan and submit as per Condition 31[18].

[18] Revision of the OAMP: See variations to conditions of approval dated 9 Juen 2025 - condition 31: If the approval holder wishes to carry out any activity other than in accordance with the management plans specified in the conditions, the approval holder must submit to the Department for the Minister's written approval a revised version of that management plan. The approval holder must not commence the varied activity until the Minister has approved the varied management plan. The Minister will not approve a varied management plan unless the revised management plan would result in an equivalent or improved environmental outcome over time. If the Minister approves the revised management plan, that management plan must be implemented in place of the management plan originally approved.

14 Contribution authors and CVs

Name	CV attached	Contribution
Mark Sanders	**Attachment 6**	Technical specialist – Fauna ecologist undertook field assessments
David Stanton	**Attachment 7**	Technical specialist – Flora ecologist undertook field assessments
Daniel Kelly	**Attachment 8**	Technical specialist – Arrow ecologist undertook field assessments
Nazim Uddin	**Attachment 9**	Technical specialist – Arrow ecologist undertook field assessments
Alan Key	**Attachment 10**	Offsets Specialist and Broker - Plan preparation
Paul Finn	**Attachment 11**	Principal Ecologist - Plan preparation

15 Glossary

Term	Definition
Approval holder	Means the person to whom the approval is granted.
Brigalow Development Scheme	In 1962 The *Brigalow and Other Lands Development Act* (Qld) was passed. Under the Brigalow Development Scheme, approximately 2 million ha was allocated in Areas I, IA and II in the Bauhinia, Taroom and Duaringa districts, with a further 2.4 million ha in the Brigalow Belt North. Properties were to be large enough to stock 1,000 cattle. State and Commonwealth governments provided loans of up to $60,000 for settlers to cover development costs, plus paying for the construction of 1,200 km of development roads. The Scheme was the first closer settlement policy that provided a combination of infrastructure, adequate financial assistance, and large enough blocks to provide a decent living. By the 1970s, most of the brigalow scrub had disappeared. Vast areas of sucker regrowth were controlled by aerial spraying with 245T and 24D, burning and mechanical means, in preparation for improved pastures and cropping. Sheep numbers declined markedly matched by a rise in cattle numbers and the area under crops. The rise in cropping was linked to a severe decline in cattle prices in the 1970s and to the more effective control of brigalow regrowth using blade ploughing, whereby the roots were cut off under the soil.
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 OR ▪ 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*, 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 property map of assessable vegetation (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), s 20A.
Conservation advice	Means an approved conservation advice under the EPBC Act for an EPBC Act listed species or community.
Core habitat	Means core habitat known and core habitat possible as defined in the rules for habitat mapping for each individual species in the *Supplementary Report to*

Term	Definition
	the Surat Gas Project EIS (March 2012), Attachment 1 – Matters of National Environmental Significance.
Core habitat known	Means habitat where a spatially accurate confirmed record of a particular species exists (e.g. Herbrecs or survey record). Core habitat known is attributed to the particular habitat polygon in which it occurs, based on either Queensland RE mapping or high-resolution habitat mapping developed for a specific purpose. Core habitat known also means a 1 km buffer around all spatially accurate (<400 metres accuracy) species records.
Core habitat possible	Means an area where previous records of a particular species are not known to occur within a given area or habitat, although specific habitat features are present which are known to be favoured by the species and the habitat occurs within the species' known geographic range.
EPBC community	Means a threatened ecological community listed under the EPBC Act.
EPBC listed threatened species	Means a threatened flora or fauna species listed under the EPBC Act.
EPBC Act Offsets Policy (EOP)	Means the *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy (October 2012) including the Offsets Assessment Guide.
Exempted development	See *the Planning Regulation 2017*, Schedule 24
General habitat	Means where a species has not been recorded in a given location and habitat accounts for some of the features favoured by a particular species. The habitat occurs on the margins of a species' known geographic range. Otherwise, the habitat is suitable for the species.
Habitat quality scores	A score out of ten, based on BioCondition assessment plus an assessment of habitat quality.
Matters of national environmental significance (MNES)	Means matters protected by a provision of Part 3 for which the approval has effect.
Minister	Means the Minister administering the *Environment Protection and Biodiversity Conservation Act 1999* and includes a delegate of the Minister
Offset calculator	The Offset Assessment Guide spreadsheet tool as provided by DCCEEW
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.
Recovery plan/s	Means an approved recovery plan under the EPBC Act for an EPBC listed species or EPBC community
Regrowth vegetation	Vegetation that is not remnant vegetation however meets certain criteria, native and consistent with or on track to meet RE status if managed.
Remnant vegetation	Vegetation that: ▪ is an endangered regional ecosystem, an of concern regional ecosystem, or at least concern regional ecosystem, and

Term	Definition
	▪ forms the predominant canopy of the vegetation covering more than 50% of the undisturbed predominant canopy; averaging more than 70% of the vegetation's undisturbed height; and composed of species characteristic of the vegetation's undisturbed predominant canopy.
Stage 2	Means year 1 to 3 (inclusive) of the action, starting at the date of commencement. However, for purposes of the approved Offset Strategy, the Stage 1 activities will continue after year 3.
Suitably qualified ecologist	Means a person who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using relevant protocols, standards, methods and literature.
The Project	Surat Gas Project: Stage 2
Threat abatement plans	Means an approves threat abatement plan under the EPBC Act.

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Schedule 1 – Title Search – Lot 17 on Plan SP331858

Titles QUEENSLAND

Current Title Search

Queensland Titles Registry Pty Ltd
ABN 23 648 568 101

Title Reference:	**51288587**	**Search Date:**	13/05/2026 14:42
Date Title Created:	12/07/2022	**Request No:**	56118712
Previous Title:	51264454		

ESTATE AND LAND

Estate in Fee Simple

LOT 17 SURVEY PLAN 331858
Local Government: NORTH BURNETT

REGISTERED OWNER **INTEREST**

Dealing No: 722487092 19/05/2023

DUNCAN WILLIAM BROWN	1/3
GLENYS PAULINE BROWN	1/3
PHILLIP RICHMOND BROWN	1/3

AS TENANTS IN COMMON

EASEMENTS, ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
   Deed of Grant No. 40079073 (Lot 17 on CP NT369)
2. EASEMENT IN GROSS No 702611336 09/04/1998 at 09:10
   burdening the land
   QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
   A.C.N. 078 849 233
   over
   EASEMENT B ON SP106096
3. MORTGAGE No 723461578 14/08/2024 at 09:10
   QUEENSLAND COUNTRY BANK LIMITED A.C.N. 087 651 027

ADMINISTRATIVE ADVICES

Dealing	Type	Lodgement Date	Status
709099887	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	01/11/2005 14:44	CURRENT
709899094	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	31/08/2006 14:23	CURRENT
712987570	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	12/01/2010 12:54	CURRENT

UNREGISTERED DEALINGS

NIL

Caution - Charges do not necessarily appear in order of priority

** End of Current Title Search **

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Appendix 1 - EPBC 2010/5344 Disturbance limits and Actual disturbance

SGP Stage 2 – Offset Area Management Plan
EPBC Approval 2010/5344

Common name *Scientific name*	Whole of SGP project maximum disturbance limits (ha)	Total Stage 1 impact area (ha)	Stage 1 approval limit (ha)	Stage 1 OAMP impact area Approved (ha)	Impact area remaining - in excess of Stage 1 (ha)	Proposed impact area Stage 2 (ha)
Terrestrial Species						
Curly-bark Wattle *Acacia curranii*	1,210	-	-	-	-	-
Hando's Wattle *Acacia handonis*	1,210	-	-	-	-	-
Belson's Panic *Homopholis belsonii*	140	-	-	-	-	-
Lobed Blue Grass *Bothriochloa biloba*	305	-	-	-	-	-
Kogan Waxflower *Philotheca sporadica*	480	-	-	-	-	-
Prostanthera sp Dunmore	380	-	-	-	-	-
Small-leaved Denhamia *Denhamia parvifolia*	50	-	-	-	-	-
Calytris gurumundensis	1,210	-	-	-	-	-
Ooline *Cadellia pentastylis*	-	-	-	-	-	-
Finger Panic Grass *Digitaria porrecta*	174	-	-	-	-	-
Austral Toadflax *Thesium australe*	160	-	-	-	-	-
Acacia lauta	990	-	-	-	-	-
Cobar Greenhood Orchid *Pterostylis cobarensis*	2,170	-	-	-	-	-
Xerothamnella herbacea	110	-	-	-	-	-
Hawkweed	120	-	-	-	-	-

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SGP Stage 2 – Offset Area Management Plan
EPBC Approval 2010/5344

Common name *Scientific name*	Whole of SGP project maximum disturbance limits (ha)	Total Stage 1 impact area (ha)	Stage 1 approval limit (ha)	Stage 1 OAMP impact area Approved (ha)	Impact area remaining - in excess of Stage 1 (ha)	Proposed impact area Stage 2 (ha)
Picris evae						
Autral Cornflower *Rhamponticum australe*	160	-	-	-	-	-
Eculyptys virens	170	-	-	-	-	-
King Blue-grass *Dichanthium queenslandicum*	160	-	-	-	-	-
Queensland white-gum *Eucalyptus argophloia*	10	-	-	-	-	-
Macrozamia machinii	-	-	-	-	-	-
South-eastern long-eared bat *Nyctophilus corbeni*	4,080	467.84	485.52	485.52	17.68	650.13
Dunmall's snake, *Furina dunmalli*	4,400	166.69	300	150	16.69*	676.78
Five-clawed worm-skink *Anomalopus mackayi*	560	0	2	0	0	0
Squatter pigeon (southern) *Geophaps scripta scripta*	3,261	0	203	0	0	0
Regent honeyeater *Anthochaera phrygia*	20	0	1	0	0	0
Collared delma, *Delma torquata*	90	0	11	0	0	0
Yakka skink, *Egernia rugosa*	310	0	19	0	0	0

**It is noted that, for the Dunmall's Snake, the stated impacts area of 150 ha in the approved OAMP will be exceeded by 16.69 ha (Table 2.1). This discrepancy is due to the application of updated, more conservative mapping rules since the original Stage 1 OAMP was drafted and approved. Arrow commits to making up this shortfall in the subsequent round of offsets for Stage 2.*

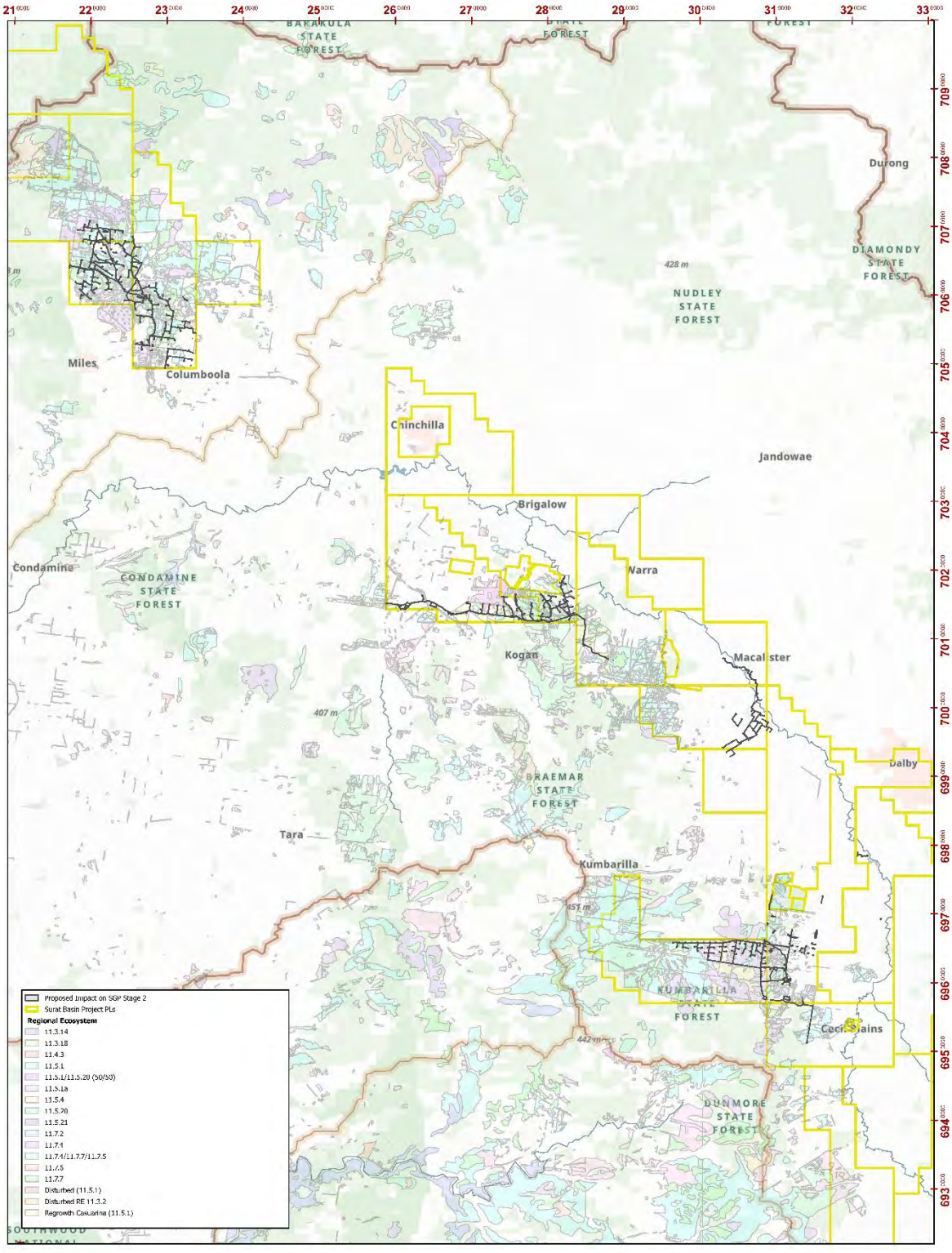
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Common name *Scientific name*	Whole of SGP project maximum disturbance limits (ha)	Total Stage 1 impact area (ha)	Stage 1 approval limit (ha)	Stage 1 OAMP impact area Approved (ha)	Impact area remaining - in excess of Stage 1 (ha)	Proposed impact area Stage 2 (ha)
EPBC Communities						
Brigalow (*Acacia harpophylla* dominant and co-dominant)	106	0.28	39	4.63	4.35	8.06
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	8	0	8	8	0	0
Weeping Myall Woodlands	1	0	0	0	0	0
Natural Grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	0	0	0	0	0	0
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	0	0	0	0	0	0
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	0	0	0	0	0	0

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Appendix 2 - Mapping of MNES impact areas



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0 6.25 12.5 25 Kilometers

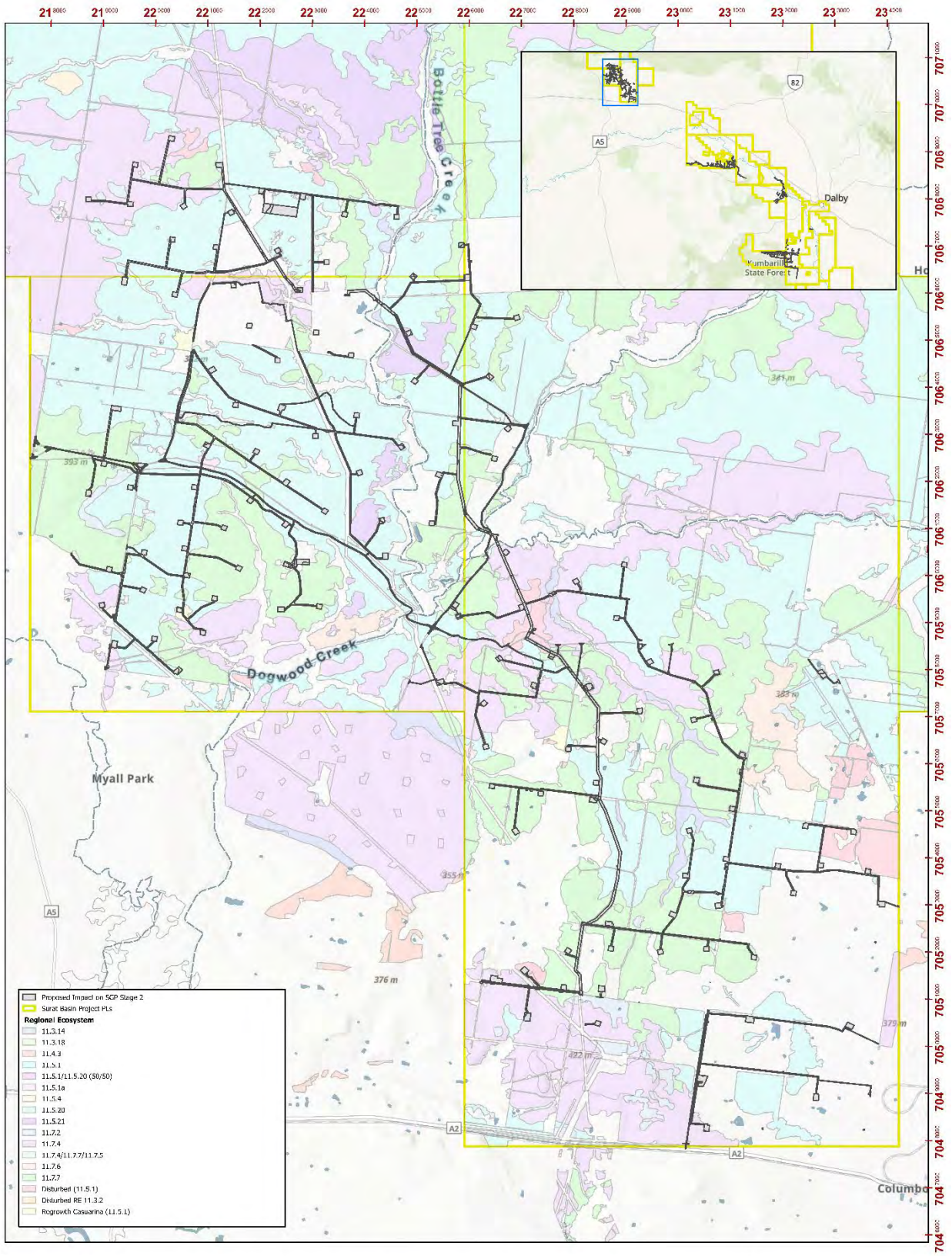
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Appendix 2 Page 1 of 5

Mapping of MNES impact areas

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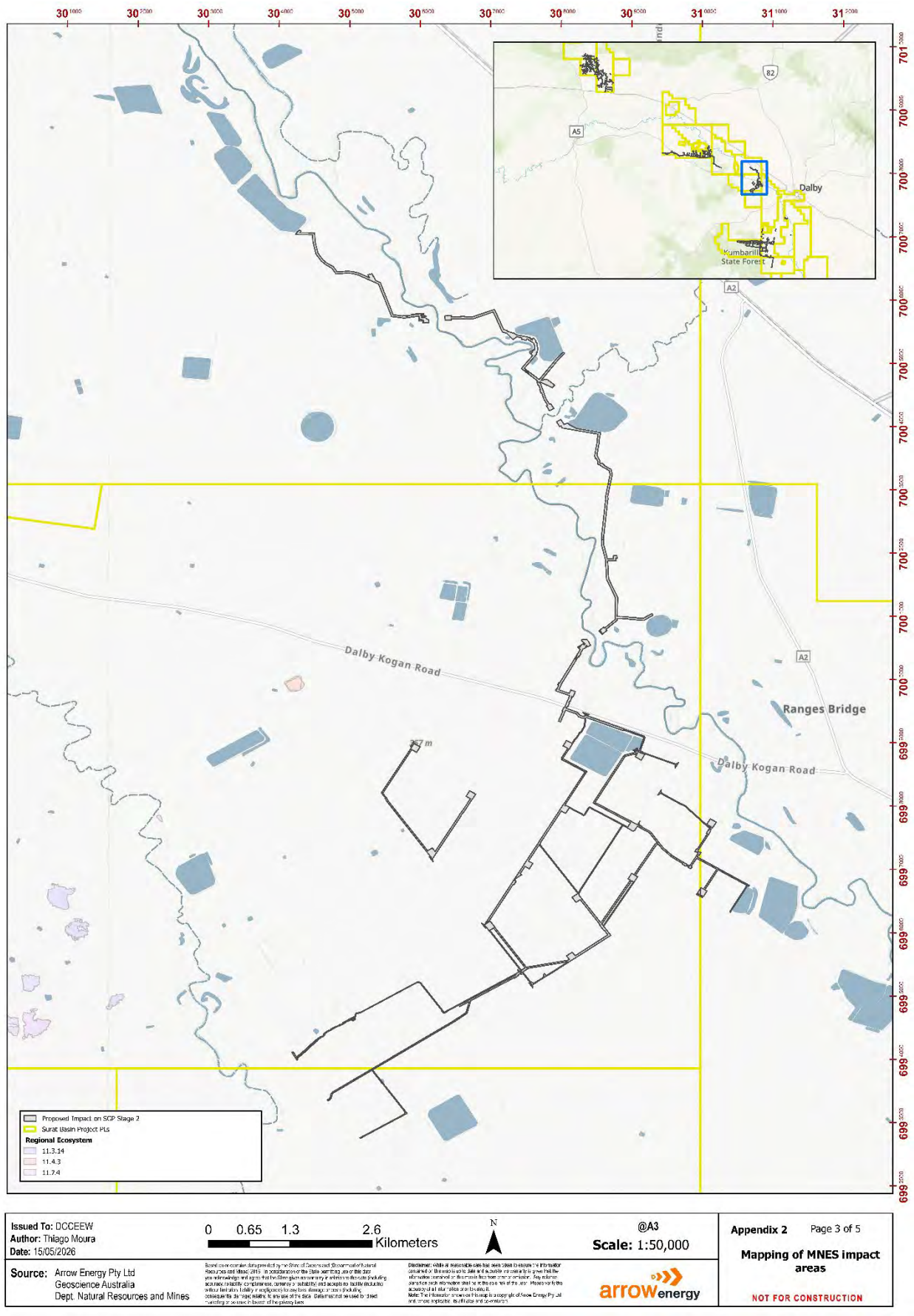
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Mapping of MNES impact areas

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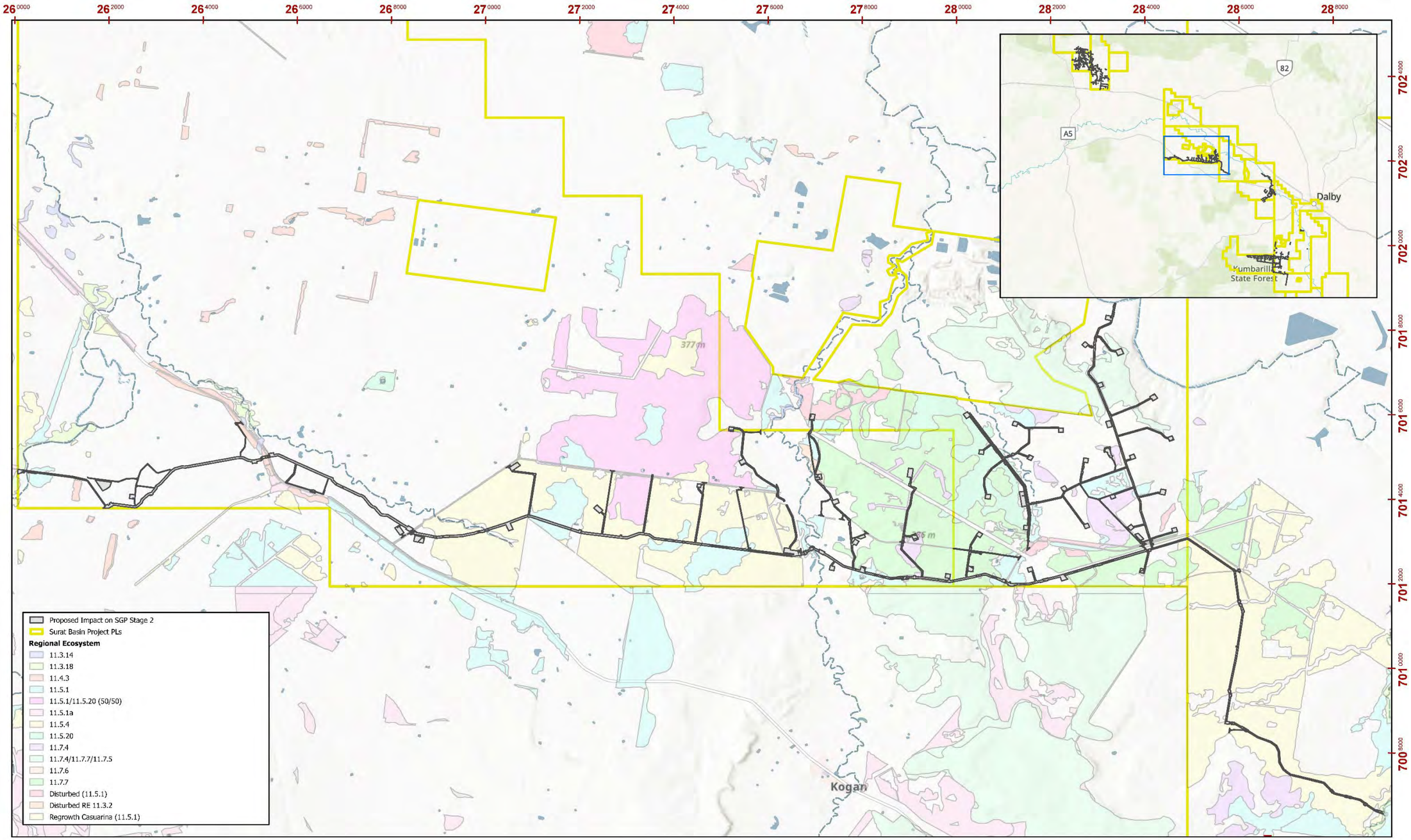
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Appendix 2 Page 3 of 5

Mapping of MNES impact areas

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0 1 2 4 Kilometers

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@A3
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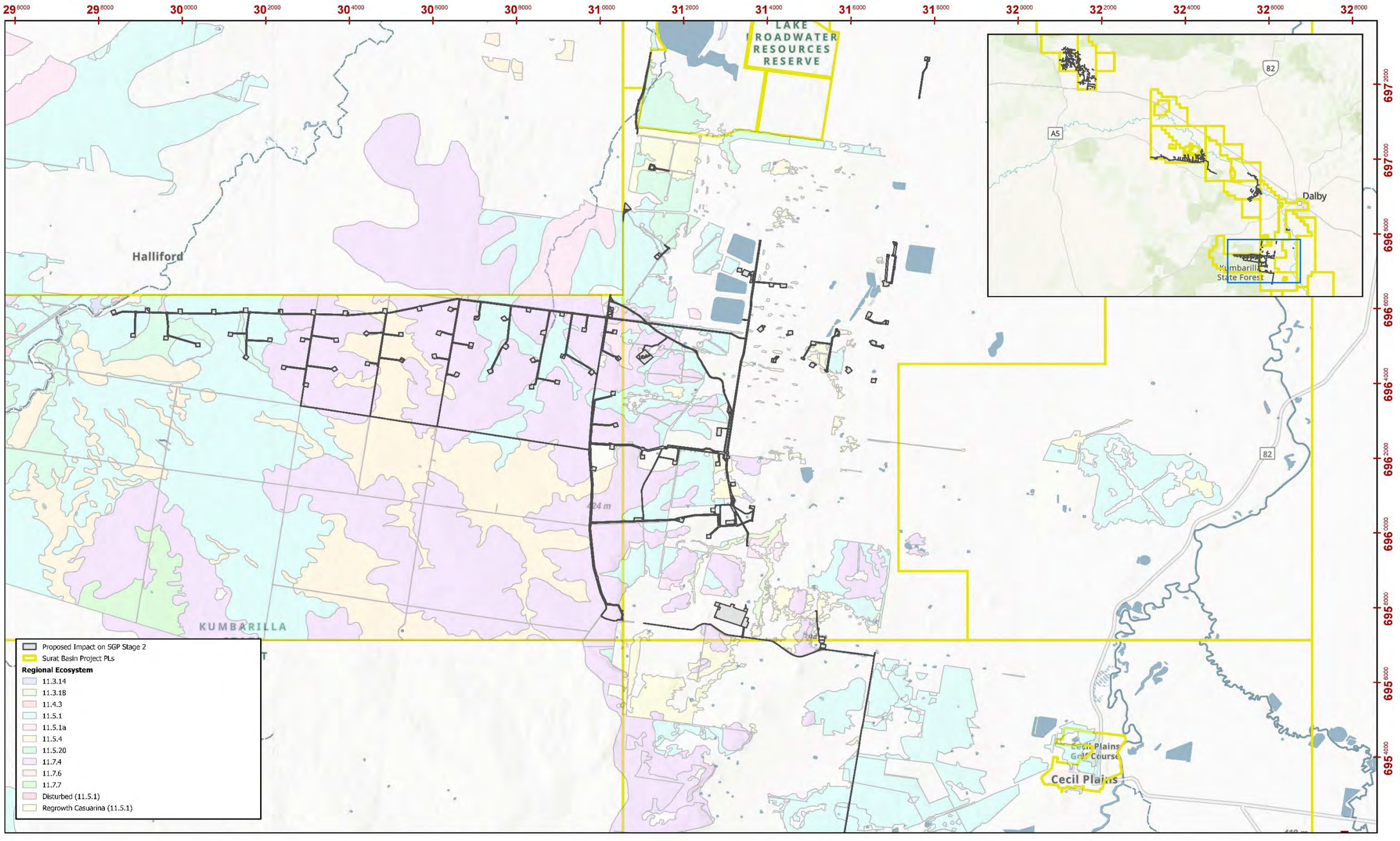
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Appendix 2 Page 4 of 5

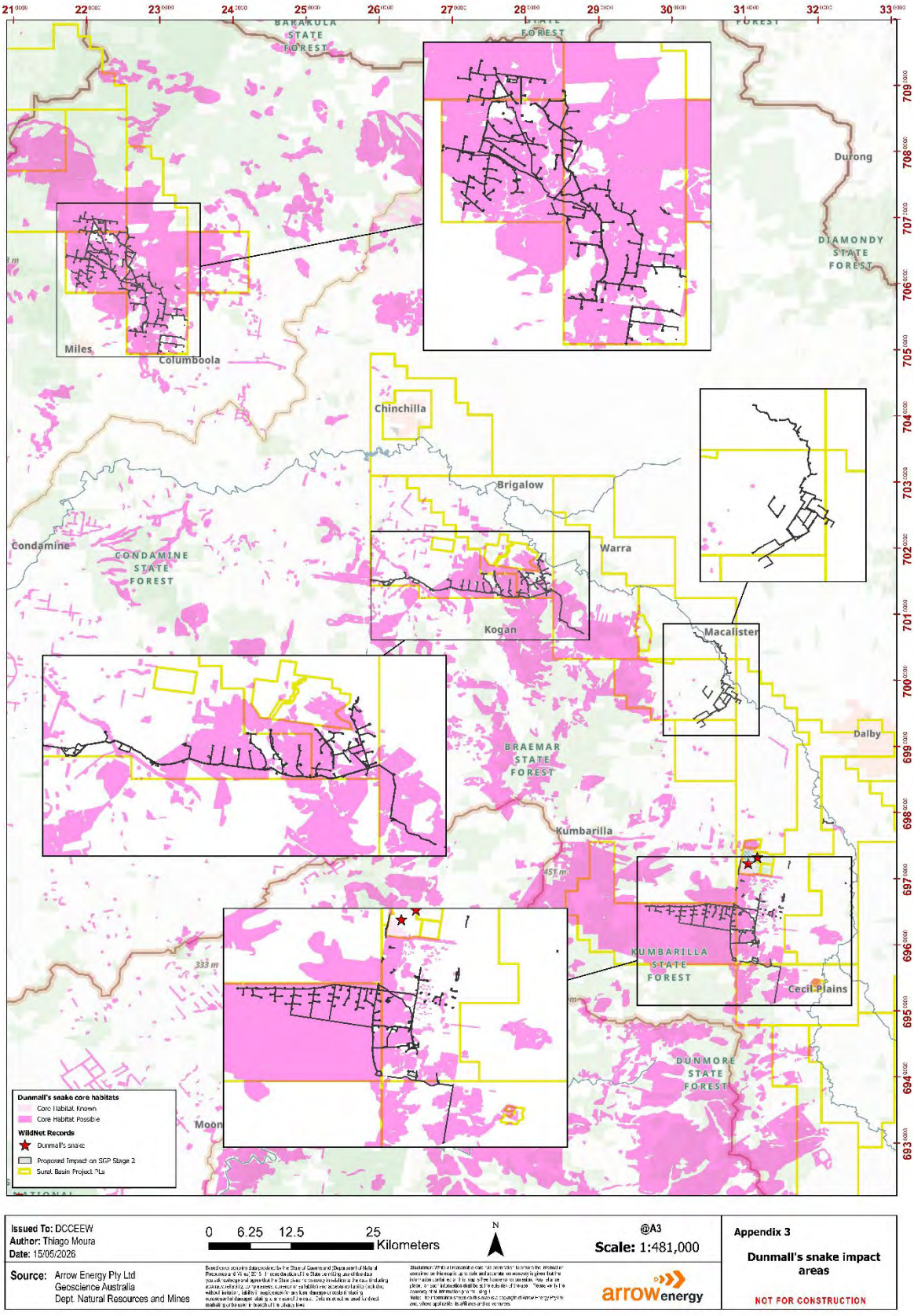
Mapping of MNES impact areas

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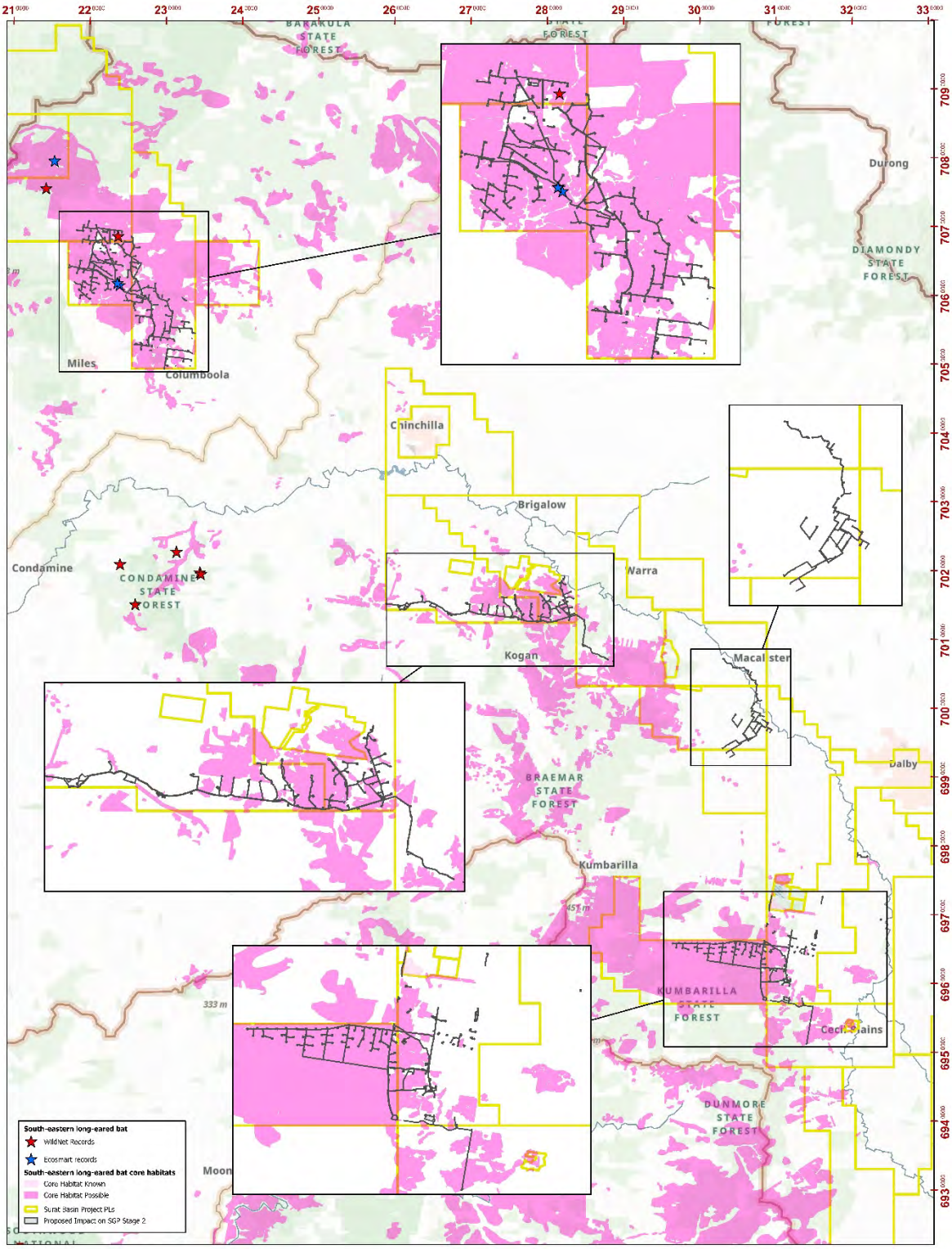


Issued To: DCCEEW **Author:** Thiago Moura **Date:** 15/05/2026	0 1.25 2.5 5 Kilometers N	@A3 **Scale:** 1:90,000	**Appendix 2** Page 4 of 5 **Mapping of MNES impact areas**
Source: Arrow Energy Pty Ltd Geoscience Australia Dept. Natural Resources and Mines	Based on or contains data provided by the State of Queensland (Department of Natural Resources and Mines) 2016. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for direct marketing or be used in breach of the privacy laws **Disclaimer:** While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it. **Note:** The information shown on this map is a copyright of Arrow Energy Pty Ltd and, where applicable, its affiliates and co-venturers.		**NOT FOR CONSTRUCTION**

Appendix 3 - Dunmall's Snake impact areas



Appendix 4 - South-eastern Long-eared Bat impact areas



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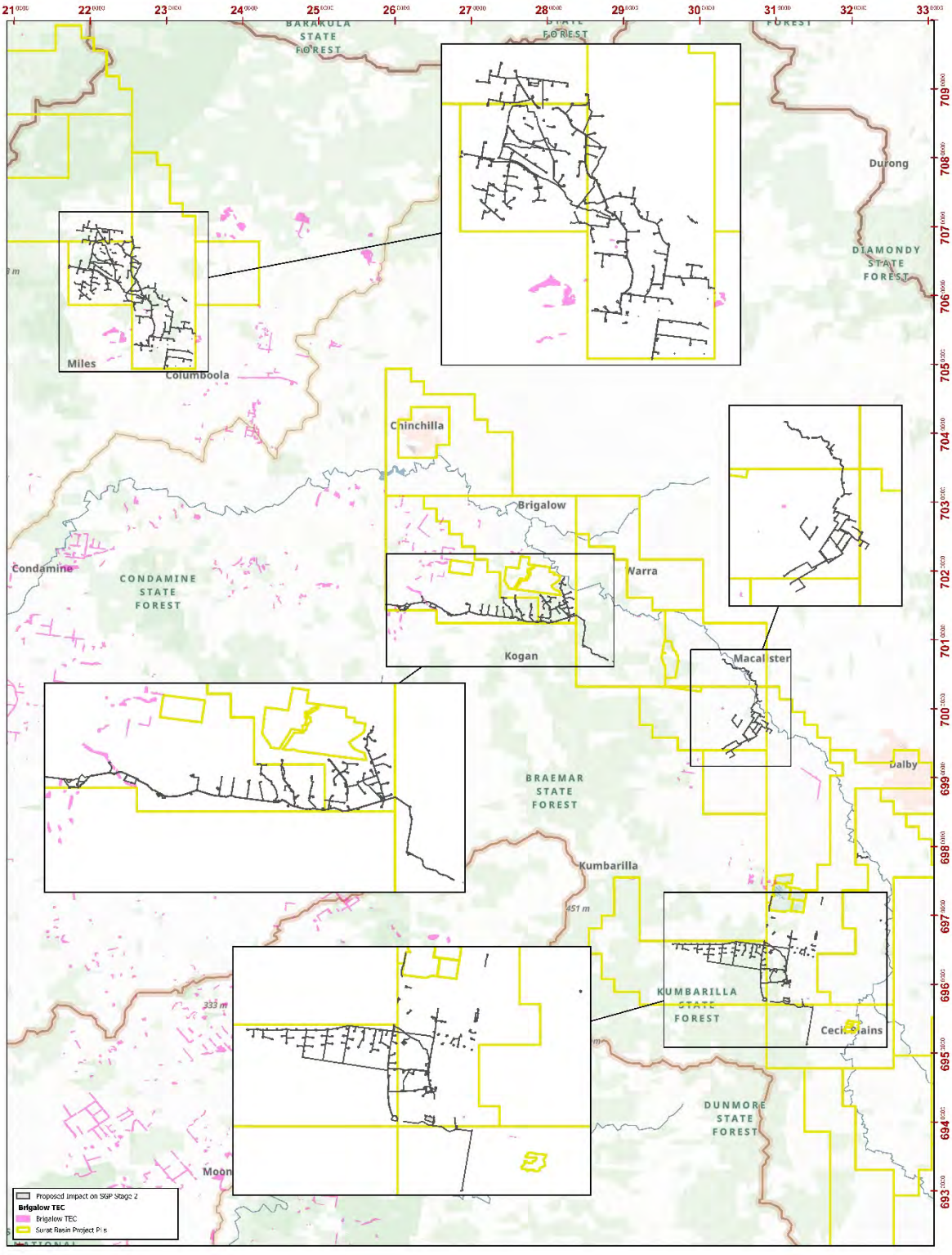
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Scale: 1:481,000

Source: Arrow Energy Pty Ltd
Geoscience Australia
Dept. Natural Resources and Mines

Appendix 4
South-eastern long-eared bat impact areas
NOT FOR CONSTRUCTION

Appendix 5 - Brigalow TEC impact areas



Appendix 6 - Impact habitat quality score - Dunmall's Snake

Impact Area	0

Assessment Unit Site Reference	11.3.14

ENTER RE INTO GREEN BOX	11.3.14	CS4			CS9			AE17			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	1.0	5.0
Native plant species richness - trees	5.0	3.0	0.6	2.5	3.0	0.6	2.5	1.0	0.2	0.0	0.5	1.7
Native plant species richness - shrubs	7.0	1.0	0.1	0.0	2.0	0.3	2.5	0.0	0.0	0.0	0.1	0.8
Native plant species richness - grasses	7.0	2.0	0.3	2.5	1.0	0.1	0.0	2.0	0.3	2.5	0.2	1.7
Native plant species richness - forbs	19.0	7.0	0.4	2.5	3.0	0.2	0.0	4.0	0.2	0.0	0.2	0.8
Tree canopy height (average of emergent, canopy and sub-canopy layers)	16.0	18.0	1.1	5.0	16.0	1.0	5.0	22.0	1.4	5.0	1.2	
Tree sub-canopy height	8.0	9.0	1.1	5.0	7.0	0.9	5.0	10.0	1.3	5.0	1.1	
Average score	12.0	0.0	1.1	5.0	0.0	0.9	5.0	0.0	1.3	5.0	1.1	5.0
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	53.0	62.0	1.2	5.0	34.4	0.6	5.0	18.0	0.3	2.0	0.7	
Tree sub-canopy cover	40.0	8.0	0.2	2.0	0.0	0.0	0.0	78.0	2.0	5.0	0.7	
Average score	46.5	0.0	0.7	3.5	0.0	0.3	2.5	0.0	1.1	3.5	0.7	3.2
Shrub canopy cover	18.0	1.0	0.1	0.0	0.8	0.0	0.0	2.0	0.1	3.0	0.1	1.0
Native grass cover	18.0	0.0	0.0	0.0	0.0	0.0	0.0	6.0	0.3	1.0	0.1	0.3
Organic litter	48.0	39.6	0.8	5.0	16.0	0.3	3.0	54.5	1.1	5.0	0.8	4.3
Large trees (euc and non-euc)	47.0	24.0	0.5	10.0	15.0	0.3	5.0	30.0	0.6	10.0	0.5	8.3
Coarse woody debris	544.0	690.0	1.3	5.0	320.0	0.6	5.0	23.0	0.0	0.0	0.6	3.3
Non-native plant cover	0.0	0.3	0.3	3.0	0.4	0.4	3.0	0.2	0.2	5.0	0.3	3.7
Quality and availability of food and foraging habitat - max score of 25		0.0		0.0	0.0		0.0	25.0		25.0		8.3
Quality and availability of shelter - max score of 25		0.0		0.0	0.0		0.0	5.0		5.0		1.7
Total Site Condition Score				44.0			33.5			70.0		49.2
Max Site condidion score - 130												130.0
Site Conditions Score - out of 3	3.0											1.1
Site Context												
Size of patch - max score of 10		5.0		5.0	0.0		0.0	10.0		10.0		5.0
Connectedness - max score of 5		5.0		5.0	0.0		0.0	2.0		2.0		2.3
Context - max score of 5		2.0		2.0	0.0		0.0	0.0		0.0		0.7

Threats to the species - max score of 25		5		5	5	5	5	5	5
Species mobility capacity - max score of 25		10		10	0	0	5	5	5
Site Context Score				27		5		22	18
MAX Site Context Score - 70									70
Site Context Score - out of 3	**3**								**0.771428571**

Impact Area	0.01

Assessment Unit Site Reference	11.3.18

ENTER RE INTO GREEN BOX	11.3.18	CN6			AE26			AE32			AE42			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	100.0	0.0	0.0	0.0	50.0	0.5	3.0	100.0	1.0	5.0	0.5	0.0	0.0	0.4	2.0	
Native plant species richness - trees	4.0	4.0	1.0	5.0	3.0	0.8	2.5	2.0	0.5	2.5	4.0	1.0	5.0	0.8	3.8	
Native plant species richness - shrubs	7.0	1.0	0.1	0.0	1.0	0.1	0.0	1.0	0.1	0.0	2.0	0.3	2.5	0.2	0.6	
Native plant species richness - grasses	11.0	11.0	1.0	5.0	3.0	0.3	2.5	2.0	0.2	0.0	1.0	0.1	0.0	0.4	1.9	
Native plant species richness - forbs	21.0	21.0	1.0	5.0	13.0	0.6	2.5	2.0	0.1	0.0	3.0	0.1	0.0	0.5	1.9	
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.0	13.0	0.7	5.0	16.0	0.9	5.0	10.3	0.6	3.0	16.0	0.9	5.0	0.8		
Tree sub-canopy height	9.0	6.0	0.7	3.0	10.0	1.1	5.0	8.0	0.9	5.0	9.5	1.1	5.0	0.9		
Average score	13.5	0.0	0.7	4.0	0.0	1.0	5.0	0.0	0.7	4.0	0.0	1.0	5.0	0.8	4.5	
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	43.0	78.3	1.8	5.0	24.0	0.6	5.0	58.0	1.3	5.0	3.0	0.1	0.0	0.9		
Tree sub-canopy cover	46.0	6.1	0.1	2.0	25.0	0.5	5.0	10.0	0.2	2.0	29.0	0.6	5.0	0.4		
Average score	44.5	0.0	1.0	3.5	0.0	0.6	5.0	0.0	0.8	3.5	0.0	0.4	2.5	0.7	3.6	
Shrub canopy cover	26.0	0.0	0.0	0.0	12.0	0.5	3.0	0.0	0.0	0.0	42.0	1.6	5.0	0.5	2.0	
Native grass cover	16.0	29.0	1.8	5.0	13.9	0.9	3.0	26.0	1.6	5.0	11.5	0.7	3.0	1.3	4.0	
Organic litter	35.0	31.0	0.9	5.0	43.0	1.2	5.0	24.0	0.7	5.0	51.2	1.5	5.0	1.1	5.0	
Large trees (euc and non-euc)	17.0	20.0	1.2	15.0	6.0	0.4	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	5.0	
Coarse woody debris	273.0	415.0	1.5	5.0	80.0	0.3	2.0	80.0	0.3	2.0	80.0	0.3	2.0	0.6	2.8	
Non-native plant cover	0.0	0.2	0.2	5.0	0.0	0.0	10.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	6.3	
Quality and availability of food and foraging habitat - max score of 25		0.0		0.0	5.0		5.0	0.0		0.0	25.0		25.0		7.5	
Quality and availability of shelter - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0	
Total Site Condition Score				57.5			53.5			32.0			60.0		50.8	
Max Site condidion score - 130															130.0	
Site Conditions Score - out of 3															1.2	
Site Context																
Size of patch - max score of 10		2.0		2.0	5.0		5.0	2.0		2.0	10.0		10.0		4.8	
Connectedness - max score of 5		0.0		0.0	4.0		4.0	0.0		0.0	5.0		5.0		2.3	
Context - max score of 5		0.0		0.0	4.0		4.0	4.0		4.0	4.0		4.0		3.0	

Threats to the species - max score of 25	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Species mobility capacity - max score of 25	0.0	0.0	5.0	5.0	0.0	0.0	15.0	15.0	5.0
Site Context Score		7.0		23.0		11.0		39.0	20.0
MAX Site Context Score - 70									70.0
Site Context Score - out of 3									**0.9**

Impact Area	0

Assessment Unit Site Reference	11.4.3

ENTER RE INTO GREEN BOX	11.4.3	ae01			s6			ae45			ae74			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	100.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	1.0	5.0
Native plant species richness - trees	2.0	3.0	1.5	5.0	2.0	1.0	5.0	3.0	1.5	5.0	2.0	1.0	5.0	1.3	5.0
Native plant species richness - shrubs	10.0	8.0	0.8	2.5	2.0	0.2	0.0	5.0	0.5	2.5	1.0	0.1	0.0	0.4	1.3
Native plant species richness - grasses	4.0	3.0	0.8	2.5	8.0	2.0	5.0	3.0	0.8	2.5	3.0	0.8	2.5	1.1	3.1
Native plant species richness - forbs	13.0	8.0	0.6	2.5	21.0	1.6	5.0	8.0	0.6	2.5	5.0	0.4	2.5	0.8	3.1
Tree canopy height (average of emergent, canopy and sub-canopy layers)	24.0	17.6	0.7	5.0	12.0	0.5	3.0	13.3	0.6	3.0	9.0	0.4	3.0	0.5	
Tree sub-canopy height	na	11.0		0.0	5.0		0.0	8.8		0.0	0.0		0.0		
Average score	24.0	0.0	0.7	2.5	0.0	0.5	1.5	0.0	0.6	1.5	0.0	0.4	1.5	0.5	1.8
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	70.0	66.0	0.9	5.0	46.2	0.7	5.0	40.0	0.6	5.0	61.0	0.9	5.0	0.8	
Tree sub-canopy cover	na	8.0		0.0	9.5		0.0	22.0		0.0	0.0		0.0		
Average score	70.0	0.0	0.9	2.5	0.0	0.7	2.5	0.0	0.6	2.5	0.0	0.9	2.5	0.8	2.5
Shrub canopy cover	na	37.0		0.0	3.2		0.0	20.0		0.0	0.0		0.0		0.0
Native grass cover	6.0	22.0	3.7	5.0	6.8	1.1	5.0	6.0	1.0	5.0	12.0	2.0	5.0	2.0	5.0
Organic litter	75.0	41.5	0.6	5.0	38.0	0.5	5.0	21.0	0.3	3.0	29.0	0.4	3.0	0.4	4.0
Large trees (euc and non-euc)	128.0	68.0	0.5	10.0	14.0	0.1	5.0	48.0	0.4	5.0	0.0	0.0	0.0	0.3	5.0
Coarse woody debris	1752.0	450.0	0.3	2.0	310.0	0.2	2.0	670.0	0.4	2.0	0.0	0.0	0.0	0.2	1.5
Non-native plant cover	0.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	10.0
Quality and availability of food and foraging habitat - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Quality and availability of shelter - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Site Condition Score				54.5			51.0			46.5			37.0		47.3
Max Site condidion score - 130															80.0
Site Conditions Score - out of 3															1.8
Site Context															
Size of patch - max score of 10		10.0		10.0	2.0		2.0	2.0		2.0	0.0		0.0		3.5
Connectedness - max score of 5		2.0		2.0	0.0		0.0	0.0		0.0	0.0		0.0		0.5
Context - max score of 5		2.0		2.0	2.0		2.0	4.0		4.0	2.0		2.0		2.5

Threats to the species - max score of 25	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Species mobility capacity - max score of 25	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Site Context Score			14.0			4.0			6.0			2.0	6.5
MAX Site Context Score - 70													20.0
Site Context Score - out of 3													**1.0**

Impact Area	1.46

Assessment Unit Site Reference	11.5.1

ENTER RE INTO GREEN BOX	11.5.1	CN13			AE20			AE24			AE46			AE73			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	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	100.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	1.0	5.0
Native plant species richness - trees	3.0	11.0	3.7	5.0	2.0	0.7	2.5	1.0	0.3	2.5	3.0	1.0	5.0	1.0	0.3	2.5	1.2	3.5
Native plant species richness - shrubs	6.0	7.0	1.2	5.0	3.0	0.5	2.5	2.0	0.3	2.5	5.0	0.8	2.5	1.0	0.2	0.0	0.6	2.5
Native plant species richness - grasses	9.0	11.0	1.2	5.0	1.0	0.1	0.0	3.0	0.3	2.5	1.0	0.1	0.0	6.0	0.7	2.5	0.5	2.0
Native plant species richness - forbs	11.0	12.0	1.1	5.0	8.0	0.7	2.5	5.0	0.5	2.5	4.0	0.4	2.5	3.0	0.3	2.5	0.6	3.0
Tree canopy height (average of emergent, canopy and sub-canopy layers)	17.0	17.0	1.0	5.0	19.3	1.1	5.0	13.5	0.8	5.0	13.0	0.8	5.0	19.0	1.1	5.0	1.0	
Tree sub-canopy height	8.0	7.0	0.9	5.0	9.0	1.1	5.0	9.3	1.2	5.0	9.0	1.1	5.0	9.0	1.1	5.0	1.1	
Average score	0.0	0.0	0.9	5.0	0.0	1.1	5.0	0.0	1.0	5.0	0.0	0.9	5.0	0.0	1.1	5.0	1.0	5.0
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	25.0	5.4	0.2	2.0	17.0	0.7	5.0	10.0	0.4	2.0	13.0	0.5	5.0	32.0	1.3	5.0	0.6	
Tree sub-canopy cover	5.0	45.7	9.1	3.0	14.0	2.8	3.0	8.0	1.6	5.0	12.0	2.4	3.0	8.0	1.6	5.0	3.5	
Average score	0.0	0.0	4.7	2.5	0.0	1.7	4.0	0.0	1.0	3.5	0.0	1.5	4.0	0.0	1.4	5.0	2.1	3.8
Shrub canopy cover	10.0	12.0	1.2	5.0	38.0	3.8	3.0	51.0	5.1	3.0	41.0	4.1	3.0	23.0	2.3	3.0	3.3	3.4
Native grass cover	26.0	50.0	1.9	5.0	0.0	0.0	0.0	3.9	0.2	1.0	1.5	0.1	0.0	17.5	0.7	3.0	0.6	1.8
Organic litter	30.0	8.6	0.3	3.0	19.5	0.7	5.0	77.5	2.6	3.0	55.5	1.9	5.0	37.5	1.3	5.0	1.3	4.2
Large trees (euc and non-euc)	22.0	6.0	0.3	5.0	18.0	0.8	10.0	6.0	0.3	5.0	8.0	0.4	5.0	4.0	0.2	5.0	0.4	6.0
Coarse woody debris	342.0	285.0	0.8	5.0	31.5	0.1	0.0	24.0	0.1	0.0	760.0	2.2	2.0	520.0	1.5	5.0	0.9	2.4
Non-native plant cover	0.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	10.0
Quality and availability of food and foraging habitat - max score of 25		15.0		15.0	15.0		15.0	15.0		15.0	15.0		15.0	0.0		0.0		12.0
Quality and availability of shelter - max score of 25		10.0		10.0	5.0		5.0	5.0		5.0	15.0		15.0	0.0		0.0		7.0
Total Site Condition Score				90.5			69.5			65.5			79.0			53.5		71.6
Max Site condition score - 130																		130.0
Site Conditions Score - out of 3																		1.7
Site Context																		
Size of patch - max score of 10		5.0		5.0	10.0		10.0	5.0		5.0	10.0		10.0	10.0		10.0		8.0
Connectedness - max score of 5		2.0		2.0	5.0		5.0	4.0		4.0	5.0		5.0	2.0		2.0		3.6
Context - max score of 5		2.0		2.0	4.0		4.0	4.0		4.0	4.0		4.0	2.0		2.0		3.2

				0.0			0.0			0.0			0.0			0.0		0.0
Threats to the species - max score of 25		5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0		5.0
Species mobility capacity - max score of 25		5.0		5.0	15.0		15.0	10.0		10.0	15.0		15.0	0.0		0.0		9.0
Site Context Score				19.0			39.0			28.0			39.0			19.0		28.8
MAX Site Context Score - 70																		70.0
Site Context Score - out of 3																		**1.2**

Impact Area	0.08

Assessment Unit Site Reference	11.5.20

ENTER RE INTO GREEN BOX	11.5.20	CS5			CS6			CS7			CN7			AE58			AE59			AE60			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	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	100.0	66.0	0.7	3.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	1.0	4.7
Native plant species richness - trees	3.0	3.0	1.0	5.0	2.0	0.7	2.5	2.0	0.7	2.5	3.0	1.0	5.0	3.0	1.0	5.0	2.0	0.7	2.5	2.0	0.7	2.5	0.8	3.6
Native plant species richness - shrubs	4.0	1.0	0.3	2.5	2.0	0.5	2.5	0.0	0.0	0.0	0.0	0.0	0.0	4.0	1.0	5.0	6.0	1.5	5.0	1.0	0.3	2.5	0.5	2.5
Native plant species richness - grasses	7.0	14.0	2.0	5.0	15.0	2.1	5.0	13.0	1.9	5.0	12.0	1.7	5.0	4.0	0.6	2.5	4.0	0.6	2.5	6.0	0.9	2.5	1.4	3.9
Native plant species richness - forbs	13.0	9.0	0.7	2.5	13.0	1.0	5.0	7.0	0.5	2.5	11.0	0.8	2.5	4.0	0.3	2.5	5.0	0.4	2.5	4.0	0.3	2.5	0.6	2.9
Tree canopy height (average of emergent, canopy and sub-canopy layers)	23.0	15.0	0.7	3.0	20.5	0.9	5.0	21.5	0.9	5.0	20.0	0.9	5.0	16.4	0.7	5.0	23.0	1.0	5.0	21.0	0.9	5.0	0.9	
Tree sub-canopy height	10.0	8.0	0.8	5.0	7.0	0.7	5.0	3.0	0.3	3.0	7.0	0.7	5.0	11.6	1.2	5.0	12.0	1.2	5.0	12.0	1.2	5.0	0.9	
Average score	16.5	0.0	0.7	4.0	0.0	0.8	5.0	0.0	0.6	4.0	13.5	0.8	5.0	0.0	0.9	5.0	0.0	1.1	5.0	0.0	1.1	5.0	0.9	4.7
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	43.0	22.6	0.5	5.0	45.7	1.1	5.0	35.8	0.8	5.0	49.1	1.1	5.0	31.0	0.7	5.0	30.0	0.7	5.0	48.0	1.1	5.0	0.9	
Tree sub-canopy cover	46.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.1	0.0	28.0	0.6	5.0	13.0	0.3	2.0	17.0	0.4	2.0	0.2	
Average score	44.5	0.0	0.3	2.5	0.0	0.5	2.5	0.0	0.4	2.5	0.0	0.6	2.5	0.0	0.7	5.0	0.0	0.5	3.5	0.0	0.7	3.5	0.5	3.1
Shrub canopy cover	38.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	38.0	1.0	5.0	43.0	1.1	5.0	3.0	0.1	0.0	0.3	1.4
Native grass cover	8.0	46.0	5.8	5.0	49.0	6.1	5.0	23.0	2.9	5.0	42.0	5.3	5.0	10.6	1.3	5.0	5.5	0.7	3.0	15.1	1.9	5.0	3.4	4.7
Organic litter	57.0	11.0	0.2	3.0	27.0	0.5	3.0	40.0	0.7	5.0	41.0	0.7	5.0	54.5	1.0	5.0	62.0	1.1	5.0	63.2	1.1	5.0	0.7	4.4
Large trees (euc and non-euc)	15.0	0.0	0.0	0.0	6.0	0.4	5.0	9.0	0.6	10.0	4.0	0.3	5.0	4.0	0.3	5.0	0.0	0.0	0.0	14.0	0.9	10.0	0.4	5.0
Coarse woody debris	178.0	15.0	0.1	0.0	410.0	2.3	2.0	0.0	0.0	0.0	650.0	3.7	2.0	127.0	0.7	5.0	410.0	2.3	2.0	830.0	4.7	2.0	2.0	1.9
Non-native plant cover	0.0	0.1	0.1	5.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	9.3
Quality and availability of food and foraging habitat - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	20.0		20.0	15.0		15.0	0.0		0.0		5.0
Quality and availability of shelter - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Site Condition Score				37.5			52.5			51.5			52.0			85.0			66.0			55.5		57.1
Max Site condidion score - 130																								130.0
Site Conditions Score - out of 3																								1.3
Site Context																								
Size of patch - max score of 10		0.0		0.0	10.0		10.0	0.0		0.0	2.0		2.0	10.0		10.0	10.0		10.0	10.0		10.0		6.0
Connectedniess - max score of 5		0.0		0.0	5.0		5.0	0.0		0.0	0.0		0.0	5.0		5.0	5.0		5.0	5.0		5.0		2.9
Context - max score of 5		4.0		4.0	4.0		4.0	4.0		4.0	0.0		0.0	4.0		4.0	4.0		4.0	4.0		4.0		3.4
				0.0			0.0			0.0			0.0			0.0			0.0			0.0		0.0
Threats to the species - max score of 25		5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0		5.0
Species mobility capacity - max score of 25		0.0		0.0	10.0		10.0	0.0		0.0	0.0		0.0	15.0		15.0	15.0		15.0	10.0		10.0		7.1
Site Context Score				9.0			34.0			9.0			7.0			39.0			39.0			34.0		24.4
MAX Site Context Score - 70																								70.0
Site Context Score - out of 3																								**1.0**

Impact Area	0.05

Assessment Unit Site Reference	11.5.21

ENTER RE INTO GREEN BOX	11.5.21	GBS15			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.0	0.0	0.0	0.0	0.0	0.0
Native plant species richness - trees	6.0	2.5	0.4	2.5	0.4	2.5
Native plant species richness - shrubs	10.0	2.5	0.3	2.5	0.3	2.5
Native plant species richness - grasses	7.0	2.5	0.4	2.5	0.4	2.5
Native plant species richness - forbs	16.0	0.0	0.0	0.0	0.0	0.0
Tree canopy height (average of emergent, canopy and sub-canopy layers)	19.0	5.0	0.3	3.0	0.3	
Tree sub-canopy height	9.0	0.0	0.0	0.0	0.0	
Average score	14.0	2.5	0.1	1.5	0.1	1.5
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	41.0	5.0	0.1	2.0	0.1	
Tree sub-canopy cover	43.0	0.0	0.0	0.0	0.0	
Average score	42.0	2.5	0.1	1.0	0.1	1.0
Shrub canopy cover	32.0	5.0	0.2	3.0	0.2	3.0
Native grass cover	9.0	5.0	0.6	3.0	0.6	3.0
Organic litter	46.0	5.0	0.1	3.0	0.1	3.0
Large trees (euc and non-euc)	77.0	10.0	0.1	5.0	0.1	5.0
Coarse woody debris	738.0	0.0	0.0	0.0	0.0	0.0
Non-native plant cover	0.0	0.1	0.1	5.0	0.1	5.0
Quality and availability of food and foraging habitat - max score of 25		10.0		10.0		10.0
Quality and availability of shelter - max score of 25		15.0		15.0		15.0
Total Site Condition Score				54.0		54.0
Max Site condidion score - 130						130.0
Site Conditions Score - out of 3						1.2
Site Context						
Size of patch - max score of 10		10.0		10.0		10.0
Connectedness - max score of 5		4.0		4.0		4.0
Context - max score of 5		4.0		4.0		4.0

		0.0	0.0
Threats to the species - max score of 25	5.0	5.0	5.0
Species mobility capacity - max score of 25	10.0	10.0	10.0
Site Context Score		33.0	33.0
MAX Site Context Score - 70			70.0
Site Context Score - out of 3			**1.4**

Impact Area	0.05

Assessment Unit Site Reference	11.5.4

ENTER RE INTO GREEN BOX	11.5.4	AE02			AE03			AE10			AE11			AE12			AE55			SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	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	100.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	0.9	5.0
Native plant species richness - trees	4.0	2.0	0.5	2.5	2.0	0.5	2.5	3.0	0.8	2.5	3.0	0.8	2.5	3.0	0.8	2.5	3.0	0.8	2.5	0.6	2.5
Native plant species richness - shrubs	3.0	5.0	1.7	5.0	4.0	1.3	5.0	4.0	1.3	5.0	2.0	0.7	2.5	1.0	0.3	2.5	4.0	1.3	5.0	1.0	4.2
Native plant species richness - grasses	13.0	4.0	0.3	2.5	4.0	0.3	2.5	3.0	0.2	0.0	4.0	0.3	2.5	5.0	0.4	2.5	3.0	0.2	0.0	0.3	1.7
Native plant species richness - forbs	18.0	8.0	0.4	2.5	8.0	0.4	2.5	7.0	0.4	2.5	7.0	0.4	2.5	7.0	0.4	2.5	4.0	0.2	0.0	0.3	2.1
Tree canopy height (average of emergent, canopy and sub-canopy layers)	21.0	14.0	0.7	3.0	13.0	0.6	3.0	23.0	1.1	5.0	17.0	0.8	5.0	21.0	1.0	5.0	14.0	0.7	3.0	0.7	
Tree sub-canopy height	10.0	0.0	0.0	0.0	8.7	0.9	5.0	11.5	1.2	5.0	10.0	1.0	5.0	10.0	1.0	5.0	12.0	1.2	5.0	0.7	
Average score	15.5	0.0	0.3	1.5	0.0	0.7	4.0	0.0	1.1	5.0	0.0	0.9	5.0	0.0	1.0	5.0	0.0	0.9	4.0	0.7	4.1
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	30.0	14.0	0.5	2.0	27.0	0.9	5.0	37.0	1.2	5.0	25.0	0.8	5.0	15.0	0.5	5.0	22.0	0.7	5.0	0.7	
Tree sub-canopy cover	49.0	0.0	0.0	0.0	12.0	0.2	2.0	27.0	0.6	5.0	21.0	0.4	2.0	20.0	0.4	2.0	19.0	0.4	2.0	0.3	
Average score	39.5	0.0	0.2	1.0	0.0	0.6	3.5	0.0	0.9	5.0	0.0	0.6	3.5	0.0	0.5	3.5	0.0	0.6	3.5	0.5	3.3
Shrub canopy cover	24.0	37.0	1.5	5.0	12.0	0.5	5.0	4.0	0.2	3.0	2.0	0.1	0.0	6.0	0.3	3.0	30.0	1.3	5.0	0.5	3.5
Native grass cover	30.0	10.6	0.4	1.0	6.4	0.2	1.0	0.0	0.0	0.0	5.0	0.2	1.0	1.7	0.1	0.0	16.8	0.6	3.0	0.2	1.0
Organic litter	58.0	74.4	1.3	5.0	57.0	1.0	5.0	24.0	0.4	3.0	59.0	1.0	5.0	92.3	1.6	5.0	20.0	0.3	3.0	0.8	4.3
Large trees (euc and non-euc)	17.0	10.0	0.6	10.0	12.0	0.7	10.0	36.0	2.1	15.0	30.0	1.8	15.0	20.0	1.2	15.0	2.0	0.1	5.0	0.9	11.7
Coarse woody debris	204.0	24.0	0.1	2.0	24.0	0.1	2.0	17.0	0.1	0.0	67.0	0.3	2.0	48.0	0.2	2.0	275.5	1.4	5.0	0.3	2.2
Non-native plant cover	0.0	0.0	0.0	10.0	0.0	0.0	10.0	0.4	0.4	3.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.1	8.8
Quality and availability of food and foraging habitat - max score of 25		5.0		5.0	0.0		0.0	5.0		5.0	0.0		0.0	0.0		0.0	10.0		10.0		3.3
Quality and availability of shelter - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Total Site Condition Score				58.0			58.0			54.0			56.5			58.5			61.0		57.7
Max Site condidion score - 130																					100.0
Site Conditions Score - out of 3																					1.7
Site Context																					
Size of patch - max score of 10		2.0		2.0	10.0		10.0	5.0		5.0	5.0		5.0	10.0		10.0	2.0		2.0		5.7
Connectedness - max score of 5		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	2.0		2.0	0.0		0.0		0.3
Context - max score of 5		4.0		4.0	4.0		4.0	2.0		2.0	2.0		2.0	2.0		2.0	4.0		4.0		3.0
Threats to the species - max score of 25		5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0		5.0
Species mobility capacity - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Site Context Score				11.0			19.0			12.0			12.0			19.0			11.0		14.0
MAX Site Context Score - 70																					56.0
Site Context Score - out of 3																					**0.8**

Impact Area	0

Assessment Unit Site Reference	11.7.2

ENTER RE INTO GREEN BOX	11.7.2	AG253			AG293			AE68			EPB48			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	100.0	5.0	0.1	0.0	5.0	0.1	0.0	3.0	0.0	0.0	5.0	0.1	0.0	0.0	0.0	
Native plant species richness - trees	3.0	2.5	0.8	2.5	2.5	0.8	2.5	5.0	1.7	5.0	2.5	0.8	2.5	1.0	3.1	
Native plant species richness - shrubs	4.0	2.5	0.6	2.5	2.5	0.6	2.5	2.5	0.6	2.5	2.5	0.6	2.5	0.6	2.5	
Native plant species richness - grasses	5.0	2.5	0.5	2.5	2.5	0.5	2.5	2.5	0.5	2.5	2.5	0.5	2.5	0.5	2.5	
Native plant species richness - forbs	5.0	2.5	0.5	2.5	2.5	0.5	2.5	2.5	0.5	2.5	2.5	0.5	2.5	0.5	2.5	
Tree canopy height (average of emergent, canopy and sub-canopy layers)	15.0	5.0	0.3	3.0	5.0	0.3	3.0	5.0	0.3	3.0	5.0	0.3	3.0	0.3		
Tree sub-canopy height	5.0	5.0	1.0	5.0	5.0	1.0	5.0	5.0	1.0	5.0	5.0	1.0	5.0	1.0		
Average score	10.0	5.0	0.7	4.0	5.0	0.7	4.0	5.0	0.7	4.0	5.0	0.7	4.0	0.7	4.0	
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40.0	5.0	0.1	2.0	5.0	0.1	2.0	5.0	0.1	2.0	5.0	0.1	2.0	0.1		
Tree sub-canopy cover	41.0	3.0	0.1	0.0	3.0	0.1	0.0	3.0	0.1	0.0	3.0	0.1	0.0	0.1		
Average score	40.5	4.0	0.1	1.0	4.0	0.1	1.0	4.0	0.1	1.0	4.0	0.1	1.0	0.1	1.0	
Shrub canopy cover	4.0	2.0	0.5	5.0	0.0	0.0	0.0	3.0	0.8	5.0	5.0	1.3	5.0	0.6	3.8	
Native grass cover	15.0	5.0	0.3	1.0	5.0	0.3	1.0	5.0	0.3	1.0	5.0	0.3	1.0	0.3	1.0	
Organic litter	20.0	5.0	0.3	3.0	5.0	0.3	3.0	5.0	0.3	3.0	5.0	0.3	3.0	0.3	3.0	
Large trees (euc and non-euc)	30.0	0.0	0.0	0.0	10.0	0.3	5.0	15.0	0.5	10.0	10.0	0.3	5.0	0.3	5.0	
Coarse woody debris	1214.0	5.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	
Non-native plant cover	0.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	5.0	
Quality and availability of food and foraging habitat - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0	
Quality and availability of shelter - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0	
Total Site Condition Score				29.0			29.0			41.5			34.0		33.4	
Max Site condidion score - 130															130.0	
Site Conditions Score - out of 3															0.8	
Site Context																
Size of patch - max score of 10		10.0		10.0	10.0		10.0	10.0		10.0	10.0		10.0		10.0	
Connectedness - max score of 5		5.0		5.0	5.0		5.0	2.0		2.0	5.0		5.0		4.3	
Context - max score of 5		2.0		2.0	2.0		2.0	4.0		4.0	2.0		2.0		2.5	

Threats to the species - max score of 25	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Species mobility capacity - max score of 25	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0
Site Context Score			17.0			17.0			16.0			17.0	16.8
MAX Site Context Score - 70													70.0
Site Context Score - out of 3													**0.7**

Impact Area	0.86

Assessment Unit Site Reference	11.7.4

ENTER RE INTO GREEN BOX	11.7.4	CS8		AE22			AE41			AE47			AE 50			AE66			AE70			GBS1			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchmark %	Average Score
Recruitment of woody perennial species in EDL	100.0	0.0	0.0	0.0	5.0	0.1	0.0	5.0	0.1	0.0	3.0	0.0	0.0	5.0	0.1	0.0	3.0	0.0	0.0	3.0	0.0	0.0	5.0	0.1	0.0	0.0	0.0
Native plant species richness - trees	4.0	5.0	1.3	5.0	5.0	1.3	5.0	2.5	0.6	2.5	2.5	0.6	2.5	2.5	0.6	2.5	2.5	0.6	2.5	2.5	0.6	2.5	5.0	1.3	5.0	0.9	3.4
Native plant species richness - shrubs	6.0	2.5	0.4	2.5	2.5	0.4	2.5	2.5	0.4	2.5	2.5	0.4	2.5	2.5	0.4	2.5	2.5	0.4	2.5	5.0	0.8	2.5	5.0	0.8	2.5	0.5	2.5
Native plant species richness - grasses	7.0	5.0	0.7	2.5	2.5	0.4	2.5	2.5	0.4	2.5	2.5	0.4	2.5	2.5	0.4	2.5	2.5	0.4	2.5	2.5	0.4	2.5	5.0	0.7	2.5	0.4	2.5
Native plant species richness - forbs	9.0	5.0	0.6	2.5	2.5	0.3	2.5	2.5	0.3	2.5	2.5	0.3	2.5	0.0	0.0	0.0	2.5	0.3	2.5	2.5	0.3	2.5	2.5	0.3	2.5	0.3	2.2
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18.0	5.0	0.3	3.0	3.0	0.2	0.0	3.0	0.2	0.0	3.0	0.2	0.0	5.0	0.3	3.0	5.0	0.3	3.0	5.0	0.3	3.0	5.0	0.3	3.0	0.2	
Tree sub-canopy height	9.0	3.0	0.3	3.0	5.0	0.6	3.0	0.0	0.0	0.0	5.0	0.6	3.0	5.0	0.6	3.0	5.0	0.6	3.0	5.0	0.6	3.0	5.0	0.6	3.0	0.5	
Average score	13.5	4.0	0.3	3.0	4.0	0.4	1.5	1.5	0.1	0.0	4.0	0.4	1.5	5.0	0.4	3.0	5.0	0.4	3.0	5.0	0.4	3.0	5.0	0.4	3.0	0.3	2.3
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	29.0	5.0	0.2	2.0	5.0	0.2	2.0	5.0	0.2	2.0	5.0	0.2	2.0	5.0	0.2	2.0	5.0	0.2	2.0	2.0	0.1	0.0	5.0	0.2	2.0	0.2	
Tree sub-canopy cover	46.0	3.0	0.1	0.0	3.0	0.1	0.0	0.0	0.0	0.0	5.0	0.1	2.0	5.0	0.1	2.0	3.0	0.1	0.0	3.0	0.1	0.0	3.0	0.1	0.0	0.1	
Average score	37.5	4.0	0.1	1.0	4.0	0.1	1.0	2.5	0.1	1.0	5.0	0.1	2.0	5.0	0.1	2.0	4.0	0.1	1.0	2.5	0.1	0.0	4.0	0.1	1.0	0.1	1.1
Shrub canopy cover	8.0	0.0	0.0	0.0	5.0	0.6	5.0	3.0	0.4	3.0	3.0	0.4	3.0	3.0	0.4	3.0	3.0	0.4	3.0	3.0	0.4	3.0	5.0	0.6	5.0	0.4	3.1
Native grass cover	12.0	5.0	0.4	1.0	5.0	0.4	1.0	5.0	0.4	1.0	3.0	0.3	1.0	3.0	0.3	1.0	5.0	0.4	1.0	5.0	0.4	1.0	5.0	0.4	1.0	0.4	1.0
Organic litter	50.0	3.0	0.1	0.0	5.0	0.1	3.0	5.0	0.1	3.0	5.0	0.1	3.0	5.0	0.1	3.0	5.0	0.1	3.0	5.0	0.1	3.0	5.0	0.1	3.0	0.1	2.8
Large trees (euc and non-euc)	14.0	5.0	0.4	5.0	10.0	0.7	10.0	5.0	0.4	5.0	5.0	0.4	5.0	5.0	0.4	5.0	5.0	0.4	5.0	5.0	0.4	5.0	15.0	1.1	15.0	0.5	6.9
Coarse woody debris	320.0	5.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.0	2.0	0.0	0.0	5.0	0.0	0.0	5.0	0.0	0.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0
Non-native plant cover	0.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	5.0
Quality and availability of food and foraging habitat - max score of 25		15.0		15.0	5.0		5.0	10.0		10.0	10.0		10.0	0.0		0.0	10.0		10.0	20.0		20.0	10.0		10.0		10.0
Quality and availability of shelter - max score of 25		15.0		15.0	0.0		0.0	5.0		5.0	5.0		5.0	10.0		10.0	0.0		0.0	10.0		10.0	15.0		15.0		7.5
Total Site Condition Score				57.5			44.0			43.0			45.5			39.5			41.0			60.0			70.5		50.1
Max Site condition score - 130																											100.0
Site Conditions Score - out of 3																											1.5
Site Context																											
Size of patch - max score of 10		0.0		0.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0		10.0	10.0		10.0		8.8
Connectedness - max score of 5		0.0		0.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	4.0		4.0	0.0		0.0	5.0		5.0		3.6
Context - max score of 5		0.0		0.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		4.0		3.5
				0.0			0.0			0.0			0.0			0.0			0.0			0.0			0.0		0.0
Threats to the species - max score of 25		5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0		5.0
Species mobility capacity - max score of 25		5.0		5.0	10.0		10.0	15.0		15.0	15.0		15.0	15.0		15.0	10.0		10.0	5.0		5.0	15.0		15.0		11.3
Site Context Score				10.0			34.0			39.0			39.0			39.0			33.0			24.0			39.0		32.1
MAX Site Context Score - 70																											58.0
Site Context Score - out of 3																											1.7

Impact Area	0

Assessment Unit Site Reference	11.7.6

ENTER RE INTO GREEN BOX	11.7.6	AE28			AE36			EPB47			EPB51			EPB58			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	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	100.0	3.0	0.0	0.0	5.0	0.1	0.0	5.0	0.1	0.0	5.0	0.1	0.0	5.0	0.1	0.0	0.0	0.0
Native plant species richness - trees	4.0	2.5	0.6	2.5	2.5	0.6	2.5	2.5	0.6	2.5	2.5	0.6	2.5	2.5	0.6	2.5	0.6	2.5
Native plant species richness - shrubs	5.0	2.5	0.5	2.5	0.0	0.0	0.0	2.5	0.5	2.5	2.5	0.5	2.5	2.5	0.5	2.5	0.4	2.0
Native plant species richness - grasses	10.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	0.3	2.5	2.5	0.3	2.5	2.5	0.3	2.5	0.2	1.5
Native plant species richness - forbs	16.0	2.5	0.2	0.0	0.0	0.0	0.0	2.5	0.2	0.0	2.5	0.2	0.0	2.5	0.2	0.0	0.1	0.0
Tree canopy height (average of emergent, canopy and sub-canopy layers)	25.0	3.0	0.1	0.0	3.0	0.1	0.0	3.0	0.1	0.0	5.0	0.2	0.0	5.0	0.2	0.0	0.2	
Tree sub-canopy height	13.0	5.0	0.4	3.0	5.0	0.4	3.0	3.0	0.2	0.0	5.0	0.4	3.0	5.0	0.4	3.0	0.4	
Average score	19.0	4.0	0.3	1.5	4.0	0.3	1.5	3.0	0.2	0.0	5.0	0.3	1.5	5.0	0.3	1.5	0.3	1.2
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40.0	5.0	0.1	2.0	2.0	0.1	0.0	5.0	0.1	2.0	5.0	0.1	2.0	5.0	0.1	2.0	0.1	
Tree sub-canopy cover	46.0	5.0	0.1	2.0	3.0	0.1	0.0	3.0	0.1	0.0	3.0	0.1	0.0	3.0	0.1	0.0	0.1	
Average score	43.0	5.0	0.1	2.0	2.5	0.1	0.0	4.0	0.1	1.0	4.0	0.1	1.0	4.0	0.1	1.0	0.1	1.0
Shrub canopy cover	7.0	5.0	0.7	5.0	5.0	0.7	5.0	2.0	0.3	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.6
Native grass cover	23.0	5.0	0.2	1.0	3.0	0.1	1.0	5.0	0.2	1.0	5.0	0.2	1.0	5.0	0.2	1.0	0.2	1.0
Organic litter	52.0	5.0	0.1	0.0	5.0	0.1	0.0	5.0	0.1	0.0	5.0	0.1	0.0	5.0	0.1	0.0	0.1	0.0
Large trees (euc and non-euc)	22.0	5.0	0.2	5.0	5.0	0.2	5.0	0.0	0.0	0.0	5.0	0.2	5.0	0.0	0.0	0.0	0.1	3.0
Coarse woody debris	217.0	5.0	0.0	0.0	2.0	0.0	0.0	5.0	0.0	0.0	2.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Non-native plant cover	0.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	5.0
Quality and availability of food and foraging habitat - max score of 25		0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Quality and availability of shelter - max score of 25		20.0		20.0	0.0		0.0	5.0		5.0	10.0		10.0	5.0		5.0		8.0
Total Site Condition Score				44.5			20.0			22.5			31.0			21.0		27.8
Max Site condition score - 130																		130.0
Site Conditions Score - out of 3																		0.6
Site Context																		
Size of patch - max score of 10		10.0		10.0	2.0		2.0	10.0		10.0	10.0		10.0	10.0		10.0		8.4
Connectedness - max score of 5		2.0		2.0	2.0		2.0	5.0		5.0	5.0		5.0	5.0		5.0		3.8
Context - max score of 5		4.0		4.0	4.0		4.0	5.0		5.0	2.0		2.0	5.0		5.0		4.0

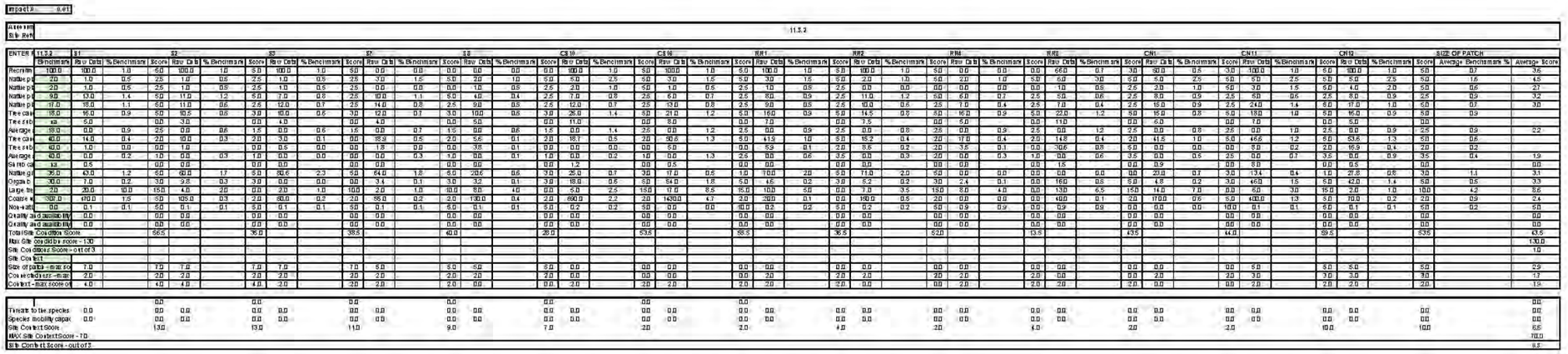
			0.0			0.0			0.0			0.0			0.0			0.0
Threats to the species - max score of 25		5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0		5.0
Species mobility capacity - max score of 25		5.0		5.0	0.0		0.0	10.0		10.0	15.0		15.0	10.0		10.0		8.0
Site Context Score				26.0			13.0			35.0			37.0			35.0		29.2
MAX Site Context Score - 70																		70.0
Site Context Score - out of 3																		**1.3**

Impact Area	0.61

Assessment Unit Site Reference	11.7.7

ENTER RE INTO GREEN BOX		N3			AE21			AE38			AE62			AE69			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	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	100.0	3.0	0.0	0.0	5.0	0.1	0.0	5.0	0.1	0.0	5.0	0.1	0.0	5.0	0.1	0.0	0.0	0.0
Native plant species richness - trees	5.0	2.5	0.5	2.5	2.5	0.5	2.5	2.5	0.5	2.5	5.0	1.0	5.0	2.5	0.5	2.5	0.6	3.0
Native plant species richness - shrubs	9.0	2.5	0.3	2.5	2.5	0.3	2.5	2.5	0.3	2.5	2.5	0.3	2.5	2.5	0.3	2.5	0.3	2.5
Native plant species richness - grasses	4.0	5.0	1.3	5.0	2.5	0.6	2.5	2.5	0.6	2.5	5.0	1.3	5.0	2.5	0.6	2.5	0.9	3.5
Native plant species richness - forbs	9.0	5.0	0.6	2.5	2.5	0.3	2.5	2.5	0.3	2.5	2.5	0.3	2.5	2.5	0.3	2.5	0.3	2.5
Tree canopy height (average of emergent, canopy and sub-canopy layers)	19.0	3.0	0.2	0.0	5.0	0.3	3.0	5.0	0.3	3.0	5.0	0.3	3.0	5.0	0.3	3.0	0.2	
Tree sub-canopy height	9.0	5.0	0.6	3.0	5.0	0.6	3.0	5.0	0.6	3.0	5.0	0.6	3.0	5.0	0.6	3.0	0.6	
Average score	14.0	4.0	0.4	1.5	5.0	0.4	3.0	5.0	0.4	3.0	5.0	0.4	3.0	5.0	0.4	3.0	0.4	2.7
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40.0	2.0	0.1	0.0	5.0	0.1	2.0	2.0	0.1	0.0	2.0	0.1	0.0	5.0	0.1	2.0	0.1	
Tree sub-canopy cover	49.0	5.0	0.1	2.0	0.0	0.0	0.0	5.0	0.1	2.0	3.0	0.1	0.0	5.0	0.1	2.0	0.1	
Average score	44.5	3.5	0.1	1.0	2.5	0.1	1.0	3.5	0.1	1.0	2.5	0.1	0.0	5.0	0.1	2.0	0.1	1.0
Shrub canopy cover	20.0	5.0	0.3	3.0	3.0	0.2	3.0	5.0	0.3	3.0	2.0	0.1	3.0	5.0	0.3	3.0	0.2	3.0
Native grass cover	4.0	5.0	1.3	5.0	5.0	1.3	5.0	5.0	1.3	5.0	5.0	1.3	5.0	5.0	1.3	5.0	1.3	5.0
Organic litter	68.0	3.0	0.0	0.0	5.0	0.1	0.0	5.0	0.1	0.0	5.0	0.1	0.0	3.0	0.0	0.0	0.1	0.0
Large trees (euc and non-euc)	30.0	15.0	0.5	10.0	5.0	0.2	5.0	10.0	0.3	5.0	5.0	0.2	5.0	10.0	0.3	5.0	0.3	6.0
Coarse woody debris	288.0	2.0	0.0	0.0	2.0	0.0	0.0	5.0	0.0	0.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0
Non-native plant cover	0.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	5.0
Quality and availability of food and foraging habitat - max score of 25		5.0		5.0	10.0		10.0	15.0		15.0	10.0		10.0	10.0		10.0		10.0
Quality and availability of shelter - max score of 25		15.0		15.0	20.0		20.0	20.0		20.0	5.0		5.0	5.0		5.0		13.0
Total Site Condition Score				58.0			62.0			67.0			51.0			48.0		57.2
Max Site condition score - 130																		130.0
Site Conditions Score - out of 3																		1.3
Site Context																		
Size of patch - max score of 10		10.0		10.0	7.0		7.0	10.0		10.0	10.0		10.0	10.0		10.0		9.4
Connectedness - max score of 5		0.0		0.0	2.0		2.0	4.0		4.0	2.0		2.0	4.0		4.0		2.4
Context - max score of 5		4.0		4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0		4.0		4.0

			0.0			0.0			0.0			0.0			0.0			0.0
Threats to the species - max score of 25	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0	5.0		5.0			5.0
Species mobility capacity - max score of 25	0.0		0.0	5.0		5.0	15.0		15.0	5.0		5.0	10.0		10.0			7.0
Site Context Score			19.0			23.0			38.0			26.0			33.0			27.8
MAX Site Context Score - 70																		70.0
Site Context Score - out of 3																		**1.2**



Impact n... 6.61

Assessment Site Ref

11.3.2

ENTER # 11.3.2	S1		S2		S3		S7		S8		CS 10		CS 16		RR1		RR2		RR4		RR5		CN1		CN11		CN12		SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchmark %	Average Score
Recruitm	100.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	0.0	0.0	0.0	66.0	0.7	3.0	90.0	0.9	5.0	100.0	1.0	5.0	100.0	1.0	5.0	0.7	3.5
Native pl	2.0	1.0	0.5	2.5	1.0	0.6	2.5	1.0	0.5	2.5	3.0	1.5	5.0	2.0	1.0	5.0	3.0	1.5	5.0	3.0	1.5	5.0	2.0	1.0	5.0	2.0	1.0	5.0	3.0	5.0	5.0	2.5	5.0	5.0	2.5	5.0	5.0	2.5	5.0	5.0	2.5	5.0	5.0	1.6	4.5
Native pl	2.0	1.0	0.5	2.5	1.0	0.5	2.5	1.0	0.5	2.5	0.0	0.0	0.0	0.0	1.0	0.5	2.5	2.0	1.0	5.0	1.0	0.5	2.5	1.0	0.5	2.5	2.0	1.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	2.5	4.0	2.0	5.0	0.6	2.7
Native pl	9.0	13.0	1.4	5.0	11.0	1.2	5.0	7.0	0.8	2.5	10.0	1.1	5.0	4.0	0.4	2.5	7.0	0.8	2.5	6.0	0.7	2.5	8.0	0.9	2.5	11.0	1.2	5.0	6.0	0.7	2.5	5.0	0.6	2.5	8.0	0.9	2.5	8.0	0.9	2.5	8.0	0.9	2.5	0.9	3.2
Native pl	17.0	18.0	1.1	5.0	11.0	0.6	2.5	12.0	0.7	2.5	14.0	0.8	2.5	9.0	0.5	2.5	12.0	0.7	2.5	13.0	0.8	2.5	9.0	0.5	2.5	10.0	0.6	2.5	7.0	0.4	2.5	7.0	0.4	2.5	15.0	0.9	2.5	24.0	1.4	5.0	17.0	1.0	5.0	0.7	3.0
Tree cano	16.0	16.0	0.9	5.0	10.5	0.6	3.0	10.0	0.6	3.0	12.0	0.7	3.0	10.0	0.6	3.0	26.0	1.4	5.0	21.0	1.2	5.0	16.0	0.9	5.0	14.5	0.8	5.0	16.0	0.9	5.0	22.0	1.2	5.0	15.0	0.8	5.0	18.0	1.0	5.0	16.0	0.9	5.0	0.9	
Tree sub	n/a	5.0		0.0	3.0		0.0	4.0		0.0	4.0		0.0	5.0		0.0	11.0		0.0	8.0		0.0	7.0		0.0	7.5		0.0	5.0		0.0	11.0		0.0	6.0		0.0	7.0		0.0	5.0		0.0	0.0	
Average	18.0	0.0	0.9	2.5	0.0	0.6	1.5	0.0	0.6	1.5	0.0	0.7	1.5	0.0	0.6	1.5	0.0	1.4	2.5	0.0	1.2	2.5	0.0	0.9	2.5	0.0	0.8	2.5	0.0	0.9	2.5	0.0	1.2	2.5	0.0	0.8	2.5	0.0	1.0	2.5	0.0	0.9	2.5	0.9	2.2
Tree cano	40.0	14.0	0.4	2.5	10.0	0.3	2.5	3.0	0.1	0.0	18.0	0.5	2.5	5.6	0.1	2.5	18.7	0.5	2.5	50.6	1.3	5.0	41.9	1.0	5.0	17.0	0.4	2.5	14.8	0.4	2.5	41.5	1.0	5.0	46.6	1.2	5.0	53.5	1.3	5.0	0.6				
Tree sub	40.0	1.0	0.0	0.0	1.0		0.0	0.5	0.0	0.0	1.8	0.0	0.0	3.6	0.1	0.0	0.0	0.0	0.0	5.0		0.0	5.9	0.1	2.0	5.6	0.1	2.0	3.5	0.1	0.0	30.6	0.8	5.0	0.0	0.0	0.0	8.0	0.2	2.0	16.9	0.4	2.0	0.2	
Average	40.0	0.0	0.2	1.0	0.0	0.3	1.0	0.0	0.0	0.0	0.0	0.3	1.0	0.0	0.1	1.0	0.0	0.2	1.0	0.0	1.3	2.5	0.0	0.6	3.5	0.0	0.3	2.0	0.0	0.3	1.0	0.0	0.6	3.5	0.0	0.5	2.5	0.0	0.7	3.5	0.0	0.3	3.5	0.4	1.9
Sa rho ca	n/a	0.5		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	1.2		0.0	0.5		0.0	0.0		0.0	0.0		0.0	0.0		0.0	1.5		0.0	0.9		0.0	0.8		0.0	0.5		0.0	0.0	
Native gr	35.0	43.0	1.2	5.0	62.0	1.7	5.0	82.6	2.3	5.0	64.0	1.8	5.0	28.6	0.8	3.0	25.0	0.7	3.0	17.0	0.5	1.0	19.0	0.5	2.0	71.0	2.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	23.0	0.7	3.0	134.0	3.8	5.0	27.5	0.8	3.0	1.1	3.1
Organic b	30.0	1.0	0.2	3.0	9.8	0.3	3.0	0.0	0.0	0.0	3.4	0.1	3.0	3.2	0.1	3.0	18.6	0.5	5.0	54.0	1.8	5.0	4.5	0.2	3.0	2.4	0.1	0.0	16.0	0.5	5.0	4.8	0.2	3.0	46.0	1.5	5.0	42.0	1.4	5.0	0.5	0.2	5.0	0.5	3.3
Large tre	2.0	20.0	10.0	15.0	4.0	2.0	0.0	2.0	1.0	10.0	2.0	1.0	10.0	8.0	4.0	0.0	5.0	2.5	15.0	17.0	8.5	15.0	10.0	5.0	0.0	7.0	3.5	15.0	8.0	4.0	0.0	13.0	6.5	15.0	14.0	7.0	0.0	6.0	3.0	15.0	2.0	1.0	10.0	4.2	8.6
Coarse w	500.0	470.0	1.5	5.0	105.0	0.3	2.0	60.0	0.2	2.0	66.0	0.2	2.0	130.0	0.4	2.0	690.0	2.2	2.0	1400.0	4.7	2.0	20.0	0.1	0.0	160.0	0.5	2.0	0.0	0.0	0.0	40.0	0.1	2.0	170.0	0.6	5.0	400.0	1.3	5.0	70.0	0.2	2.0	0.9	2.4
Non-nativ	0.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	0.1	5.0	0.2	0.2	5.0	0.0	0.0	10.0	0.3	0.2	5.0	0.2	0.2	5.0	0.9	0.9	0.0	0.9	0.9	0.0	0.0	0.0	10.0	0.1	0.1	5.0	0.1	0.1	5.0	0.2	5.0
Quality and condition (HV	0.0			0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Quality and condition (HV	0.0			0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Site Condition Score				56.5			36.0			38.5			40.0			26.0			53.5			58.5			36.5			52.0			13.5			43.5			44.0			59.5			53.5		43.5
Max Site Condition score - 1.30																																													1.30.0
Site Conditions Score - out of 3																																													1.0
Site Context																																													
Size of patch - max sco	7.0			7.0	7.0		7.0	7.0		7.0	5.0		5.0	5.0		5.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	5.0		5.0	5.0		5.0		2.9
Connectivity - max	2.0			2.0	2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0	0.0		0.0	0.0		0.0	2.0		2.0	2.0		2.0	0.0		0.0	2.0		2.0	0.0		0.0	2.0		2.0	3.0		3.0		1.7
Context - max score of	4.0			4.0	4.0		4.0	2.0		2.0	2.0		2.0	0.0		0.0	2.0		2.0	2.0		2.0	2.0		2.0	0.0		0.0	2.0		2.0	2.0		2.0	0.0		0.0	2.0		2.0	2.0		2.0		1.9
				0.0			0.0			0.0			0.0			0.0			0.0			0.0																										0.0
Threats to tle species	0.0			0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Species mobility capac	0.0			0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0		0.0		0.0
Site Context Score				13.0			13.0			11.0			9.0			7.0			2.0			2.0			4.0			2.0			4.0			2.0			2.0			10.0			10.0		6.6
Max Site Context Score - 7.0																																													7.0.0
Site Context Score - out of 3																																													0.9

Impact Area	0

Assessment Unit Site Reference	Casuarina Regrowth (11.5.1)

ENTER RE INTO GREEN BOX	11.5.1	CN14			CN14			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.0	5.0	0.1	0.0	5.0	0.1	0.0	0.1	0.0
Native plant species richness - trees	3.0	2.5	0.8	2.5	2.5	0.8	2.5	0.8	2.5
Native plant species richness - shrubs	6.0	2.5	0.4	2.5	2.5	0.4	2.5	0.4	2.5
Native plant species richness - grasses	9.0	5.0	0.6	2.5	5.0	0.6	2.5	0.6	2.5
Native plant species richness - forbs	11.0	5.0	0.5	2.5	5.0	0.5	2.5	0.5	2.5
Tree canopy height (average of emergent, canopy and sub-canopy layers	17.0	5.0	0.3	3.0	5.0	0.3	3.0	0.3	
Tree sub-canopy height	8.0	3.0	0.4	3.0	3.0	0.4	3.0	0.4	
Average score	0.0	4.0	0.3	3.0	4.0	0.3	3.0	0.3	3.0
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	25.0	2.0	0.1	0.0	2.0	0.1	0.0	0.1	
Tree sub-canopy cover	5.0	2.0	0.4	2.0	2.0	0.4	2.0	0.4	
Average score	0.0	2.0	0.2	1.0	2.0	0.2	1.0	0.2	1.0
Shrub canopy cover	10.0	3.0	0.3	3.0	3.0	0.3	3.0	0.3	3.0
Native grass cover	26.0	5.0	0.2	1.0	5.0	0.2	1.0	0.2	1.0
Organic litter	30.0	3.0	0.1	3.0	3.0	0.1	3.0	0.1	3.0
Large trees (euc and non-euc)	22.0	5.0	0.2	5.0	5.0	0.2	5.0	0.2	5.0
Coarse woody debris	342.0	5.0	0.0	0.0	5.0	0.0	0.0	0.0	0.0
Non-native plant cover	0.0	0.1	0.1	5.0	0.1	0.1	5.0	0.1	5.0
Quality and availability of food and foraging habitat - max score of 25		0.0			0.0				
Quality and availability of shelter - max score of 25		0.0			0.0				
Total Site Condition Score				31.0			31.0		31.0
Max Site condidion score - 130									130.0
Site Conditions Score - out of 3									0.7
Site Context									
Size of patch - max score of 10		0.0		0.0	0.0		0.0		0.0
Connectedness - max score of 5		0.0		0.0	0.0		0.0		0.0
Context - max score of 5		0.0		0.0	0.0		0.0		0.0

			0.0		0.0	
Threats to the species - max score of 25	0.0		0.0	0.0	0.0	0.0
Species mobility capacity - max score of 25	0.0		0.0	0.0	0.0	0.0
Site Context Score			0.0		0.0	0.0
MAX Site Context Score - 70						70.0
Site Context Score - out of 3						**0.0**

Final habitat quality score (weighted)	11.3.14	11.3.18	11.4.3	11.5.1	11.5.20	11.5.21	11.5.4	11.7.2	11.7.4	11.7.6	11.7.7	11.3.2	Casuarina Regrowth (11.5.1)	Total	
Site Condition score (out of 3)	1.13	1.17	1.77	1.65	1.32	1.25	1.73	0.77	1.50	0.64	1.32	1.00	0.72		
Site Context Score (out of 3)	0.77	0.86	0.98	1.23	1.05	1.41	0.75	0.72	1.72	1.25	1.19	0.28	0.00		
Species Stocking Rate Score (out of 4)	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29		
Habitat Quality score (out of 10)	2.19	2.31	3.03	3.17	2.65	2.95	2.77	1.77	3.51	2.18	2.80	1.57	1.00		
Assessment Unit area (ha) in Impact area	0.60	2.29	0.92	310.56	21.12	10.55	11.23	1.25	166.64	0.14	147.66	2.28	1.53	676.76	
Total Impact area (ha) for this MNES	676.76	676.76	676.76	676.76	676.76	676.76	676.76	676.76	676.76	676.76	676.76	676.76	676.76		
Size Weighting	0.00	0.00	0.00	0.46	0.03	0.02	0.02	0.00	0.25	0.00	0.22	0.00	0.00	1.00	
Weighted Habitat Quality Score	0.00	0.01	0.00	1.46	0.08	0.05	0.05	0.00	0.86	0.00	0.61	0.01	0.00	3.12	Rounded 3.00

Course woody debris (length (m) per hectare)	0	100	200	300	400	500
Score*	0	5	10	15	20	25

Appendix 7 - Impact habitat quality score - South-eastern Long-eared Bat

Impact Area	0.00

Assessment Unit / Site Reference	11.3.14											
ENTER RE INTO GREEN BOX	11.3.14	CS4			CS9			AE17			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100%	5	100	100%	5	100%	5.00
Native plant species richness - trees	5	3	60%	2.5	3	60%	2.5	1	20%	0	47%	1.67
Native plant species richness - shrubs	7	1	14%	0	2	29%	2.5	0	0%	0	14%	0.83
Native plant species richness - grasses	7	2	29%	2.5	1	14%	0	2	29%	2.5	24%	1.67
Native plant species richness - forbs	19	7	37%	2.5	3	16%	0	4	21%	0	25%	0.83
Tree canopy height (average of emergent, canopy and sub-canopy layers)	16	18	113%	5	16	100%	5	22	138%	5	117%	
Tree sub-canopy height	8	9	113%	5	7	88%	5	10	125%	5	108%	
Average score	12	0	113%	5	0	94%	5	0	131%	5	113%	5.00
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	53	62	117%	5	34.4	65%	5	18	34%	2	72%	
Tree sub-canopy cover	40	8	20%	2	0	0%	0	78	195%	5	72%	
Average score	46.5	0	68%	3.5	0	32%	2.5	0	114%	3.5	72%	3.17
Shrub canopy cover	18	1	6%	0	0.8	4%	0	2	11%	3	7%	1.00
Native grass cover	18	0	0%	0	0	0%	0	6	33%	1	11%	0.33
Organic litter	48	39.6	83%	5	16	33%	3	54.5	114%	5	76%	4.33
Large trees (euc and non-euc)	47	24	51%	10	15	32%	5	30	64%	10	49%	8.33
Coarse woody debris	544	690	127%	5	320	59%	5	23	4%	0	63%	3.33
Non-native plant cover	0	0.25	25%	3	0.42	42%	3	0.24	24%	5	30%	3.67
Quality and availability of food and foraging habitat - max score of 25		0		0	0		0	25		25		8.33
Quality and availability of shelter - max score of 25		0		0	0		0	5		5		1.67
Total Site Condition Score				44			33.5			70		49.17
Max Site condition score - 130												130.00
Site Conditions Score - out of 3	3											1.13
Site Context												
Size of patch - max score of 10		5		5	0		0	10		10		5.00
Connectedness - max score of 5		5		5	0		0	2		2		2.33
Context - max score of 5		2		2	0		0	0		0		0.67
				0			0			0		0.00
Threats to the species - max score of 25		5		5	5		5	5		5		5.00
Species mobility capacity - max score of 25		10		10	0		0	5		5		5.00
Site Context Score				27			5			22		18.00
MAX Site Context Score - 70.												70.00
Site Context Score - out of 3	3											0.77

Impact Area	0.01

Assessment Unit Site Reference	11.3.18															
ENTER RE INTO GREEN BOX	11.3.18	CN6			AE26			AE32			AE42			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	0	0	0	50	1	3	100	1	5	1	0	0	0	2	
Native plant species richness - trees	4	4	1	5	3	1	3	2	1	3	4	1	5	1	4	
Native plant species richness - shrubs	7	1	0	0	1	0	0	1	0	0	2	0	3	0	1	
Native plant species richness - grasses	11	11	1	5	3	0	3	2	0	0	1	0	0	0	2	
Native plant species richness - forbs	21	21	1	5	13	1	3	2	0	0	3	0	0	0	2	
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18	13	1	5	16	1	5	10	1	3	16	1	5	1		
Tree sub-canopy height	9	6	1	3	10	1	5	8	1	5	10	1	5	1		
Average score	14	0	1	4	0	1	5	0	1	4	0	1	5	1	5	
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	43	78	2	5	24	1	5	58	1	5	3	0	0	1		
Tree sub-canopy cover	46	6	0	2	25	1	5	10	0	2	29	1	5	0		
Average score	45	0	1	4	0	1	5	0	1	4	0	0	3	1	4	
Shrub canopy cover	26	0	0	0	12	0	3	0	0	0	42	2	5	1	2	
Native grass cover	16	29	2	5	14	1	3	26	2	5	12	1	3	1	4	
Organic litter	35	31	1	5	43	1	5	24	1	5	51	1	5	1	5	
Large trees (euc and non-euc)	17	20	1	15	6	0	5	0	0	0	0	0	0	0	5	
Coarse woody debris	273	415	2	5	80	0	2	80	0	2	80	0	2	1	3	
Non-native plant cover	0	0	0	5	0	0	10	0	0	5	0	0	5	0	6	
Quality and availability of food and foraging habitat - max score of 25		0		0	5		5	0		0	25		25		8	
Quality and availability of shelter - max score of 25		0		0	0		0	0		0	0		0		0	
Total Site Condition Score				58			54			32			60		51	
Max Site condidion score - 130															130	
Site Conditions Score - out of 3															1	
Site Context																
Size of patch - max score of 10		2		2	5		5	2		2	10		10		5	
Connectedness - max score of 5		0		0	4		4	0		0	5		5		2	
Context - max score of 5		0		0	4		4	4		4	4		4		3	
				0			0			0			0		0	
Threats to the species - max score of 25		5		5	5		5	5		5	5		5		5	
Species mobility capacity - max score of 25		0		0	5		5	0		0	15		15		5	
Site Context Score				7			23			11			39		20	
MAX Site Context Score - 70.															70	
Site Context Score - out of 3															0	

Impact Area	2.17

Assessment Unit																			
Site Reference																			
	11.5.1																		
ENTER RE INTO GREEN BOX	11.5.1	CN13			AE20			AE24			AE46			AE73			SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	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	100	1	5	100	1	5	100	1	5	100	1	5	100	1	5	1	5	
Native plant species richness - trees	3	11	4	5	2	1	3	1	0	3	3	1	5	1	0	3	1	4	
Native plant species richness - shrubs	6	7	1	5	3	1	3	2	0	3	5	1	3	1	0	0	1	3	
Native plant species richness - grasses	9	11	1	5	1	0	0	3	0	3	1	0	0	6	1	3	0	2	
Native plant species richness - forbs	11	12	1	5	8	1	3	5	0	3	4	0	3	3	0	3	1	3	
Tree canopy height (average of emergent, canopy and sub-canopy layers)	17	17	1	5	19	1	5	14	1	5	13	1	5	19	1	5	1		
Tree sub-canopy height	8	7	1	5	9	1	5	9	1	5	9	1	5	9	1	5	1		
Average score	0	0	1	5	0	1	5	0	1	5	0	1	5	0	1	5	1	5	
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	25	5	0	2	17	1	5	10	0	2	13	1	5	32	1	5	1		
Tree sub-canopy cover	5	46	9	3	14	3	3	8	2	5	12	2	3	8	2	5	4		
Average score	0	0	5	3	0	2	4	0	1	4	0	1	4	0	1	5	2	4	
Shrub canopy cover	10	12	1	5	38	4	3	51	5	3	41	4	3	23	2	3	3	3	
Native grass cover	25	50	2	5	0	0	0	4	0	1	2	0	0	18	1	3	1	2	
Organic litter	30	9	0	3	20	1	5	78	3	3	56	2	5	38	1	5	1	4	
Large trees (euc and non-euc)	22	5	0	5	18	1	10	5	0	5	8	0	5	4	0	5	0	5	
Coarse woody debris	342	285	1	5	32	0	0	24	0	0	760	2	2	520	2	5	1	2	
Non-native plant cover	0	0	0	10	0	0	10	0	0	10	0	0	10	0	0	10	0	10	
Quality and availability of food and foraging habitat - max score of 25		15		15	15		15	15		15	15		15	0		0		12	
Quality and availability of shelter - max score of 25		10		10	5		5	5		5	15		15	0		0		7	
Total Site Condition Score				91			70			66			79			54		72	
Max Site condition score - 130																		130	
Site Conditions Score - out of 3																		2	
Site Context																			
Size of patch - max score of 10		5		5	10		10	5		5	10		10	10		10		8	
Connectedness - max score of 5		2		2	5		5	4		4	5		5	2		2		4	
Context - max score of 5		2		2	4		4	4		4	4		4	2		2		3	
				0			0			0			0			0		0	
Threats to the species - max score of 25		5		5	5		5	5		5	5		5	5		5		5	
Species mobility capacity - max score of 25		5		5	15		15	10		10	15		15	0		0		9	
Site Context Score				19			39			28			39			19		29	
MAX Site Context Score - 70.																		70	
Site Context Score - out of 3																		1	

Impact Area	0.14

Assessment Unit																									
Site Reference																									
ENTER RE INTO GREEN BOX	11.5.20	CS5			CS6			CS7			CN7			AE58			AE59			AE60			SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	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	66	1	3	100	1	5	100	1	5	100	1	5	100	1	5	100	1	5	100	1	5	1	5
Native plant species richness - trees	3	3	1	5	2	1	3	2	1	3	3	1	5	3	1	5	2	1	3	2	1	3	1	4
Native plant species richness - shrubs	4	1	0	3	2	1	3	0	0	0	0	0	0	4	1	5	6	2	5	1	0	3	1	3
Native plant species richness - grasses	7	14	2	5	15	2	5	13	2	5	12	2	5	4	1	3	4	1	3	6	1	3	1	4
Native plant species richness - forbs	13	9	1	3	13	1	5	7	1	3	11	1	3	4	0	3	5	0	3	4	0	3	1	3
Tree canopy height (average of emergent, canopy and sub-canopy layers)	23	15	1	3	21	1	5	22	1	5	20	1	5	16	1	5	23	1	5	21	1	5	1	
Tree sub-canopy height	10	8	1	5	7	1	5	3	0	3	7	1	5	12	1	5	12	1	5	12	1	5	1	
Average score	17	0	1	4	0	1	5	0	1	4	14	1	5	0	1	5	0	1	5	0	1	5	1	5
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	43	23	1	5	46	1	5	36	1	5	49	1	5	31	1	5	30	1	5	48	1	5	1	
Tree sub-canopy cover	46	0	0	0	0	0	0	0	0	0	2	0	0	28	1	5	13	0	2	17	0	2	0	
Average score	45	0	0	3	0		3	0	0	3	0	1	3	0	1	5	0	0	4	0	1	4	1	3
Shrub canopy cover	38	1	0	0	0	0	0	0	0	0	0	0	0	38	1	5	43	1	5	3	0	0	0	1
Native grass cover	8	46	6	5	49	6	5	23	3	5	42	5	5	11	1	5	6	1	3	15	2	5	3	5
Organic litter	57	11	0	3	27	0	3	40	1	5	41	1	5	55	1	5	62	1	5	63	1	5	1	4
Large trees (euc and non-euc)	15	0	0	0	6	0	5	9	1	10	4	0	5	4	0	5	0	0	0	14	1	10	0	5
Coarse woody debris	178	15	0	0	410	2	2	0	0	0	650	4	2	127	1	5	410	2	2	830	5	2	2	2
Non-native plant cover	0	0	0	5	0	0	10	0	0	10	0	0	10	0	0	10	0	0	10	0	0	10	0	9
Quality and availability of food and foraging habitat - max score of 25		0		0	0		0	0		0	0		0	20		20	15		15	0		0		5
Quality and availability of shelter - max score of 25		0		0	0		0	0		0	0		0	0		0	0		0	0		0		0
Total Site Condition Score				38			53			52			52			85			66			56		57
Max Site condition score - 130																								130
Site Conditions Score - out of 3																								1
Site Context																								
Size of patch - max score of 10		0		0	10		10	0		0	2		2	10		10	10		10	10		10		6
Connectedness - max score of 5		0		0	5		5	0		0	0		0	5		5	5		5	5		5		3
Context - max score of 5		4		4	4		4	4		4	0		0	4		4	4		4	4		4		3
				0			0			0			0			0			0			0		0
Threats to the species - max score of 25		5		5	5		5	5		5	5		5	5		5	5		5	5		5		5
Species mobility capacity - max score of 25		0		0	10		10	0		0	0		0	15		15	15		15	10		10		7
Site Context Score				9			34			9			7			39			39			34		24
MAX Site Context Score - 70.																								70
Site Context Score - out of 3																								1

Impact Area	0.08

Assessment Unit Site Reference	11.5.21					
ENTER RE INTO GREEN BOX	11.5.21	GBS15		SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100	0	0	0	0	0
Native plant species richness - trees	6	3	0	3	0	3
Native plant species richness - shrubs	10	3	0	3	0	3
Native plant species richness - grasses	7	3	0	3	0	3
Native plant species richness - forbs	16	0	0	0	0	0
Tree canopy height (average of emergent, canopy and sub-canopy layers)	19	5	0	3	0	
Tree sub-canopy height	9	0	0	0	0	
Average score	14	3	0	2	0	2
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	41	5	0	2	0	
Tree sub-canopy cover	43	0	0	0	0	
Average score	42	3	0	1	0	1
Shrub canopy cover	32	5	0	3	0	3
Native grass cover	9	5	1	3	1	3
Organic litter	46	5	0	3	0	3
Large trees (euc and non-euc)	77	10	0	5	0	5
Coarse woody debris	738	0	0	0	0	0
Non-native plant cover	0	0	0	5	0	5
Quality and availability of food and foraging habitat - max score of 25		10		10		10
Quality and availability of shelter - max score of 25		15		15		15
Total Site Condition Score				54		54
Max Site condidion score - 130						130
Site Conditions Score - out of 3						1
Site Context						
Size of patch - max score of 10		10		10		10
Connectedness - max score of 5		4		4		4
Context - max score of 5		4		4		4
				0		0
Threats to the species - max score of 25		5		5		5
Species mobility capacity - max score of 25		10		10		10
Site Context Score				33		33
MAX Site Context Score - 70.						70
Site Context Score - out of 3						1

Impact Area	0.07

Assessment Unit	11.5.4																					
Site Reference																						
ENTER RE INTO GREEN BOX	11.5.4	AE02			AE03			AE10			AE11			AE12			AE55			SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	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	100	1	5	100	1	5	100	1	5	100	1	5	100	1	5	100	1	5	1	5	
Native plant species richness - trees	4	2	1	3	2	1	3	3	1	3	3	1	3	3	1	3	3	1	3	1	3	
Native plant species richness - shrubs	3	5	2	5	4	1	5	4	1	5	2	1	3	1	0	3	4	1	5	1	4	
Native plant species richness - grasses	13	4	0	3	4	0	3	3	0	0	4	0	3	5	0	3	3	0	0	0	2	
Native plant species richness - forbs	18	8	0	3	8	0	3	7	0	3	7	0	3	7	0	3	4	0	0	0	2	
Tree canopy height (average of emergent, canopy and sub-canopy layers)	21	14	1	3	13	1	3	23	1	5	17	1	5	21	1	5	14	1	3	1		
Tree sub-canopy height	10	0	0	0	9	1	5	12	1	5	10	1	5	10	1	5	12	1	5	1		
Average score	16	0	0	2	0	1	4	0	1	5	0	1	5	0	1	5	0	1	4	1	4	
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	30	14	0	2	27	1	5	37	1	5	25	1	5	15	1	5	22	1	5	1		
Tree sub-canopy cover	49	0	0	0	12	0	2	27	1	5	21	0	2	20	0	2	19	0	2	0		
Average score	40	0	0	1	0	1	4	0	1	5	0	1	4	0	0	4	0	1	4	0	3	
Shrub canopy cover	24	37	2	5	12	1	5	4	0	3	2	0	0	6	0	3	30	1	5	1	4	
Native grass cover	30	11	0	1	6	0	1	0	0	0	5	0	1	2	0	0	17	1	3	0	1	
Organic litter	58	74	1	5	57	1	5	24	0	3	59	1	5	92	2	5	20	0	3	1	4	
Large trees (euc and non-euc)	17	10	1	10	12	1	10	36	2	15	30	2	15	20	1	15	2	0	5	1	12	
Coarse woody debris	204	24	0	2	24	0	2	17	0	0	67	0	2	48	0	2	276	1	5	0	2	
Non-native plant cover	0	0	0	10	0	0	10	0	0	3	0	0	10	0	0	10	0	0	10	0	9	
Quality and availability of food and foraging habitat - max score of 25		5		5	0		0	5		5	0		0	0			0	10		10		3
Quality and availability of shelter - max score of 25		0		0	0		0	0		0	0		0	0			0	0		0		0
Total Site Condition Score				58			58			54			57				59			61		58
Max Site condition score - 130																						130
Site Conditions Score - out of 3																						1
Site Context																						
Size of patch - max score of 10		2		2	10		10	5		5	5		5	10			10	2		2		6
Connectedness - max score of 5		0		0	0		0	0		0	0		0	2			2	0		0		0
Context - max score of 5		4		4	4		4	2		2	2		2	2			2	4		4		3
				0			0			0			0				0			0		0
Threats to the species - max score of 25		5		5	5		5	5		5	5		5	5			5	5		5		5
Species mobility capacity - max score of 25		0		0	0		0	0		0	0		0	0			0	0		0		0
Site Context Score				11			19			12			12				19			11		14
MAX Site Context Score - 70.																						70
Site Context Score - out of 3																						1

Impact Area	1.16

Assessment Unit																																
Site Reference																	11.7.4															
ENTER RE INTO GREEN BOX	11.7.4		CS8		AE22			AE41			AE47			AE50			AE66			AE70			GBS1			SIZE OF PATCH						
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchmark %	Average Score		
Recruitment of woody perennial species in EDL	100	0	0	0	5	0	0	5	0	0	3	0	0	5	0	0	3	0	0	3	0	0	5	0	0				0	0		
Native plant species richness - trees	4	5	1	5	5	1	5	3	1	3	3	1	3	3	1	3	3	1	3	3	1	3	5	1	5				1	3		
Native plant species richness - shrubs	6	3	0	3	3	0	3	3	0	3	3	0	3	3	0	3	3	0	3	5	1	3	5	1	3				1	3		
Native plant species richness - grasses	7	5	1	3	3	0	3	3	0	3	3	0	3	3	0	3	3	0	3	3	0	3	5	1	3				0	3		
Native plant species richness - forbs	9	5	1	3	3	0	3	3	0	3	3	0	3	0	0	0	3	0	3	3	0	3	3	0	3				0	2		
Tree canopy height (average of emergent, canopy and sub-canopy layers)	18	5	0	3	3	0	0	3	0	0	3	0	0	5	0	3	5	0	3	5	0	3	5	0	3				0			
Tree sub-canopy height	9	3	0	3	5	1	3	0	0	0	5	1	3	5	1	3	5	1	3	5	1	3	5	1	3				0			
Average score	14	4	0	3	4	0	2	2	0	0	4	0	2	5	0	3	5	0	3	5	0	3	5	0	3				0	2		
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	29	5	0	2	5	0	2	5	0	2	5	0	2	5	0	2	5	0	2	2	0	0	5	0	2				0			
Tree sub-canopy cover	46	3	0	0	3	0	0	0	0	0	5	0	2	5	0	2	3	0	0	3	0	0	3	0	0				0			
Average score	38	4	0	1	4	0	1	3	0	1	5	0	2	5	0	2	4	0	1	3	0	0	4	0	1				0	1		
Shrub canopy cover	8	0	0	0	5	1	5	3	0	3	3	0	3	3	0	3	3	0	3	3	0	3	5	1	5				0	3		
Native grass cover	12	5	0	1	5	0	1	5	0	1	3	0	1	3	0	1	5	0	1	5	0	1	5	0	1				0	1		
Organic litter	50	3	0	0	5	0	3	5	0	3	5	0	3	5	0	3	5	0	3	5	0	3	5	0	3				0	3		
Large trees (euc and non-euc)	14	5	0	5	10	1	10	5	0	5	5	0	5	5	0	5	5	0	5	5	0	5	15	1	15				0	7		
Coarse woody debris	320	5	0	0	0	0	0	5	0	0	2	0	0	5	0	0	5	0	0	5	0	0	5	0	0				0	0		
Non-native plant cover	0	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5				0	5		
Quality and availability of food and foraging habitat - max score of 25		15		15	5		5	10		10	10		10	0		0	10		10	20		20	10		10					10		
Quality and availability of shelter - max score of 25		15		15	0		0	5		5	5		5	10		10	0		0	10		10	15		15					8		
Total Site Condition Score				58			44			43			46			40			41			60			71					50		
Max Site condition score - 130																														130		
Site Conditions Score - out of 3																														1		
Site Context																																
Size of patch - max score of 10		0		0	10		10	10		10	10		10	10		10	10		10	10		10	10		10					9		
Connectedness - max score of 5		0		0	5		5	5		5	5		5	5		5	4		4	0		0	5		5					4		
Context - max score of 5		0		0	4		4	4		4	4		4	4		4	4		4	4		4	4		4					4		
				0			0			0			0			0			0			0			0					0		
Threats to the species - max score of 25		5		5	5		5	5		5	5		5	5		5	5		5	5		5	5		5					5		
Species mobility capacity - max score of 25		5		5	10		10	15		15	15		15	15		15	10		10	5		5	15		15					11		
Site Context Score				10			34			39			39			39			33			24			39					32		
MAX Site Context Score - 70																														70		
Site Context Score - out of 3																														1		

Impact Area	1.02

Assessment Unit Site Reference	11.7.6																		
ENTER RE INTO GREEN BOX	11.7.6	AE28			AE36			EPB47			EPB51			EPB58			SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	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	3	0	0	5	0	0	5	0	0	5	0	0	5	0	0	0	0	
Native plant species richness - trees	4	3	1	3	3	1	3	3	1	3	3	1	3	3	1	3	1	3	
Native plant species richness - shrubs	5	3	1	3	0	0	0	3	1	3	3	1	3	3	1	3	0	2	
Native plant species richness - grasses	10	0	0	0	0	0	0	3	0	3	3	0	3	3	0	3	0	2	
Native plant species richness - forbs	16	3	0	0	0	0	0	3	0	0	3	0	0	3	0	0	0	0	
Tree canopy height (average of emergent, canopy and sub-canopy layers)	25	3	0	0	3	0	0	3	0	0	5	0	0	5	0	0	0		
Tree sub-canopy height	13	5	0	3	5	0	3	3	0	0	5	0	3	5	0	3	0		
Average score	19	4	0	2	4	0	2	3	0	0	5	0	2	5	0	2	0	1	
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40	5	0	2	2	0	0	5	0	2	5	0	2	5	0	2	0		
Tree sub-canopy cover	46	5	0	2	3	0	0	3	0	0	3	0	0	3	0	0	0		
Average score	43	5	0	2	3	0	0	4	0	1	4	0	1	4	0	1	0	1	
Shrub canopy cover	7	5	1	5	5	1	5	2	0	3	0	0	0	0	0	0	0	3	
Native grass cover	23	5	0	1	3	0	1	5	0	1	5	0	1	5	0	1	0	1	
Organic litter	52	5	0	0	5	0	0	5	0	0	5	0	0	5	0	0	0	0	
Large trees (euc and non-euc)	22	5	0	5	5	0	5	0	0	0	5	0	5	0	0	0	0	3	
Coarse woody debris	217	5	0	0	2	0	0	5	0	0	2	0	0	2	0	0	0	0	
Non-native plant cover	0	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	5	
Quality and availability of food and foraging habitat - max score of 25		0		0	0		0	0		0	0		0	0		0		0	
Quality and availability of shelter - max score of 25		20		20	0		0	5		5	10		10	5		5		8	
Total Site Condition Score				45			20			23			31			21		28	
Max Site condition score - 130																		130	
Site Conditions Score - out of 3																		1	
Site Context																			
Size of patch - max score of 10		10		10	2		2	10		10	10		10	10		10		8	
Connectedness - max score of 5		2		2	2		2	5		5	5		5	5		5		4	
Context - max score of 5		4		4	4		4	5		5	2		2	5		5		4	
				0			0			0			0			0		0	
Threats to the species - max score of 25		5		5	5		5	5		5	5		5	5		5		5	
Species mobility capacity - max score of 25		5		5	0		0	10		10	15		15	10		10		8	
Site Context Score				26			13			35			37			35		29	
MAX Site Context Score - 70.																		70	
Site Context Score - out of 3																		1	

Impact Area	1.02

Assessment Unit																				
Site Reference																				
ENTER RE INTO GREEN BOX	11.7.7	N3			AE21			AE38			AE62			AE69			SIZE OF PATCH		
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchmark %	Average Score	
Recruitment of woody perennial species in EDL	100	3	0	0	5	0	0	5	0	0	5	0	0	5	0	0	0	0		
Native plant species richness - trees	5	3	1	3	3	1	3	3	1	3	5	1	5	3	1	3	1	3		
Native plant species richness - shrubs	9	3	0	3	3	0	3	3	0	3	3	0	3	3	0	3	0	3		
Native plant species richness - grasses	4	5	1	5	3	1	3	3	1	3	5	1	5	3	1	3	1	4		
Native plant species richness - forbs	9	5	1	3	3	0	3	3	0	3	3	0	3	3	0	3	0	3		
Tree canopy height (average of emergent, canopy and sub-canopy layers)	19	3	0	0	5	0	3	5	0	3	5	0	3	5	0	3	0			
Tree sub-canopy height	9	5	1	3	5	1	3	5	1	3	5	1	3	5	1	3	1			
Average score	14	4	0	2	5	0	3	5	0	3	5	0	3	5	0	3	0	3		
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	40	2	0	0	5	0	2	2	0	0	2	0	0	5	0	2	0			
Tree sub-canopy cover	48	5	0	2	0	0	0	5	0	2	3	0	0	5	0	2	0			
Average score	45	4	0	1	3	0	1	4	0	1	3	0	0	5	0	2	0	1		
Shrub canopy cover	20	5	0	3	3	0	3	5	0	3	2	0	3	5	0	3	0	3		
Native grass cover	4	5	1	5	5	1	5	5	1	5	5	1	5	5	1	5	1	5		
Organic litter	68	3	0	0	5	0	0	5	0	0	5	0	0	3	0	0	0	0		
Large trees (euc and non-euc)	30	15	1	10	5	0	5	10	0	5	5	0	5	10	0	5	0	6		
Coarse woody debris	288	2	0	0	2	0	0	5	0	0	5	0	0	5	0	0	0	0		
Non-native plant cover	0	0	0	5	0	0	5	0	0	5	0	0	5	0	0	5	0	5		
Quality and availability of food and foraging habitat - max score of 25		5		5	10		10	15		15	10		10	10		10		10		
Quality and availability of shelter - max score of 25		15		15	20		20	20		20	5		5	5		5		13		
Total Site Condition Score				58			62			67			51			48		57		
Max Site condition score - 130																		130		
Site Conditions Score - out of 3																		1		
Site Context																				
Size of patch - max score of 10		10		10	7		7	10		10	10		10	10		10		9		
Connectedness - max score of 5		0		0	2		2	4		4	2		2	4		4		2		
Context - max score of 5		4		4	4		4	4		4	4		4	4		4		4		
				0			0			0			0			0		0		
Threats to the species - max score of 25		5		5	5		5	5		5	5		5	5		5		5		
Species mobility capacity - max score of 25		0		0	5		5	15		15	5		5	10		10		7		
Site Context Score				19			23			38			26			33		28		
MAX Site Context Score - 70.																		70		
Site Context Score - out of 3																		1		

Final habitat quality score (weighted)	11.3.14	11.3.18	11.3.25	11.5.1	11.5.20	11.5.21	11.5.4	11.7.4	11.7.6	11.7.7	Total	
Site Condition score (out of 3)	1.13	1.17	0.00	1.65	1.32	1.25	1.33	1.16	0.64	1.32		
Site Context Score (out of 3)	0.77	0.86	0.00	1.23	1.05	1.41	0.60	1.38	1.25	1.19		
Species Stocking Rate Score (out of 4)	2.00	2.00	0.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00		
Habitat Quality score (out of 10)	3.91	4.03	0.00	4.89	4.37	4.66	3.93	4.53	3.89	4.51		
Assessment Unit area (ha) in Impact area	0.60	2.29	0.68	289.36	21.12	10.55	11.10	166.64	0.14	147.66	650.13	
Total Impact area (ha) for this MNES	650.13	650.13	650.13	650.13	650.13	650.13	650.13	650.13	650.13	650.13		
Size Weighting	0.00	0.00	0.00	0.45	0.03	0.02	0.02	0.26	0.00	0.23	1.00	
Weighted Habitat Quality Score	0.00	0.01	0.00	2.17	0.14	0.08	0.07	1.16	0.00	1.02	4.66	**5.00**

rounded

% sub-Canopy Cover (T2+S1 intercept)	0	30	40	50	60	70
Score	0	5	10	15	20	25

		Connectivity Score*			
		0	2	4	5
'Forage' and 'shelter/breeding' amenity (average)	0	0	0	5	10
	5	0	5	10	15
	10	5	5	10	15
	15	5	10	15	20
	20	10	15	20	25

Appendix 8 - Impact habitat quality score - Brigalow TEC

Impact Area	0.55

Assessment Unit Site Reference		11.4.3														
ENTER RE INTO GREEN BOX	11.4.3	ae01			s6			ae45			ae74			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	100.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	1.0	5.0	
Native plant species richness - trees	2.0	3.0	1.5	5.0	2.0	1.0	5.0	3.0	1.5	5.0	2.0	1.0	5.0	1.3	5.0	
Native plant species richness - shrubs	10.0	8.0	0.8	2.5	2.0	0.2	0.0	5.0	0.5	2.5	1.0	0.1	0.0	0.4	1.3	
Native plant species richness - grasses	4.0	3.0	0.8	2.5	8.0	2.0	5.0	3.0	0.8	2.5	3.0	0.8	2.5	1.1	3.1	
Native plant species richness - forbs	13.0	8.0	0.6	2.5	21.0	1.6	5.0	8.0	0.6	2.5	5.0	0.4	2.5	0.8	3.1	
Tree canopy height (average of emergent, canopy and sub-canopy layers)	24.0	17.6	0.7	5.0	12.0	0.5	3.0	13.3	0.6	3.0	9.0	0.4	3.0			
Tree sub-canopy height	na	11.0		0.0	5.0		0.0	8.8		0.0	0.0		0.0			
Average score	24.0	0.0	0.7	2.5	0.0	0.5	1.5	0.0	0.6	1.5	0.0	0.4	1.5	0.5	1.8	
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	70.0	68.0	0.9	5.0	46.2	0.7	5.0	40.0	0.6	5.0	61.0	0.9	5.0			
Tree sub-canopy cover	na	8.0		0.0	9.5		0.0	22.0		0.0	0.0		0.0			
Average score	70.0	0.0	0.9	2.5	0.0	0.7	2.5	0.0	0.6	2.5	0.0	0.9	2.5	0.8	2.5	
Shrub canopy cover	na	37.0		0.0	3.2		0.0	20.0		0.0	0.0		0.0		0.0	
Native grass cover	6.0	22.0	3.7	5.0	6.8	1.1	5.0	6.0	1.0	5.0	12.0	2.0	5.0	2.0	5.0	
Organic litter	75.0	41.5	0.6	5.0	38.0	0.5	5.0	21.0	0.3	3.0	29.0	0.4	3.0	0.4	4.0	
Large trees (euc and non-euc)	128.0	68.0	0.5	10.0	14.0	0.1	5.0	48.0	0.4	5.0	0.0	0.0	0.0	0.3	5.0	
Coarse woody debris	1752.0	450.0	0.3	2.0	310.0	0.2	2.0	670.0	0.4	2.0	0.0	0.0	0.0	0.2	1.5	
Non-native plant cover	0.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	10.0	
Total Site Condition Score				54.5			51.0			46.5			37.0		47.3	
Max Site condition score - 80															80.0	
Site Condition Score - out of 7	7.0														4.1	
Site Context																
Size of patch - max score of 10		10.0		10.0	2.0		2.0	2.0		2.0	0.0		0.0		3.5	
Connectedness - max score of 5		2.0		2.0	0.0		0.0	0.0		0.0	0.0		0.0		0.5	
Context - max score of 5		2.0		2.0	2.0		2.0	4.0		4.0	2.0		2.0		2.5	
Site Context Score				14.0			4.0			6.0			2.0		6.5	
MAX Site Context Score - 20															20.0	
Site Context Score - out of 3	**3.0**														**1.0**	

Impact Area	3.19

Assessment Unit Site Reference	11.5.1																	
ENTER RE INTO GREEN BOX	11.5.1	CN13			AE20			AE24			AE46			AE73			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	% Benchmark	Score	Average Benchmark %	Average Score
Recruitment of woody perennial species in EDL	100.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	100.0	1.0	5.0	1.0	5.0
Native plant species richness - trees	3.0	11.0	3.7	5.0	2.0	0.7	2.5	1.0	0.3	2.5	3.0	1.0	5.0	1.0	0.3	2.5	1.2	3.5
Native plant species richness - shrubs	6.0	7.0	1.2	5.0	3.0	0.5	2.5	2.0	0.3	2.5	5.0	0.8	2.5	1.0	0.2	0.0	0.6	2.5
Native plant species richness - grasses	9.0	11.0	1.2	5.0	1.0	0.1	0.0	3.0	0.3	2.5	1.0	0.1	0.0	6.0	0.7	2.5	0.5	2.0
Native plant species richness - forbs	11.0	12.0	1.1	5.0	8.0	0.7	2.5	5.0	0.5	2.5	4.0	0.4	2.5	3.0	0.3	2.5	0.6	3.0
Tree canopy height (average of emergent, canopy and sub-canopy layers)	17.0	17.0	1.0	5.0	19.3	1.1	5.0	13.5	0.8	5.0	13.0	0.8	5.0	19.0	1.1	5.0	1.0	5.0
Tree sub-canopy height	8.0	7.0	0.9	5.0	9.0	1.1	5.0	9.3	1.2	5.0	9.0	1.1	5.0	9.0	1.1	5.0		5.0
Average score	0.0	0.0	0.9	5.0	0.0	1.1	5.0	0.0	1.0	5.0	0.0	0.9	5.0	0.0	1.1	5.0	1.0	5.0
Tree canopy cover (average of emergent, canopy and sub-canopy layers)	25.0	5.4	0.2	2.0	17.0	0.7	5.0	10.0	0.4	2.0	13.0	0.5	5.0	32.0	1.3	5.0	0.6	3.8
Tree sub-canopy cover	5.0	45.7	9.1	3.0	14.0	2.8	3.0	8.0	1.6	5.0	12.0	2.4	3.0	8.0	1.6	5.0		3.8
Average score	0.0	0.0	4.7	2.5	0.0	1.7	4.0	0.0	1.0	3.5	0.0	1.5	4.0	0.0	1.4	5.0	2.1	3.8
Shrub canopy cover	10.0	12.0	1.2	5.0	38.0	3.8	3.0	51.0	5.1	3.0	41.0	4.1	3.0	23.0	2.3	3.0		3.4
Native grass cover	26.0	50.0	1.9	5.0	0.0	0.0	0.0	3.9	0.2	1.0	1.5	0.1	0.0	17.5	0.7	3.0	0.6	1.8
Organic litter	30.0	8.6	0.3	3.0	19.5	0.7	5.0	77.5	2.6	3.0	55.5	1.9	5.0	37.5	1.3	5.0	1.3	4.2
Large trees (euc and non-euc)	22.0	6.0	0.3	5.0	18.0	0.8	10.0	6.0	0.3	5.0	8.0	0.4	5.0	4.0	0.2	5.0	0.4	6.0
Coarse woody debris	342.0	285.0	0.8	5.0	31.5	0.1	0.0	24.0	0.1	0.0	760.0	2.2	2.0	520.0	1.5	5.0	0.9	2.4
Non-native plant cover	0.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	0.0	10.0	0.0	10.0
Total Site Condition Score				65.5			49.5			45.5			49.0			53.5		70.2
Max Site condition score - 80																		80.0
Site Condition Score - out of 7																		6.1
Site Context																		
Size of patch - max score of 10		5.0		5.0	10.0		10.0	5.0		5.0	10.0		10.0	10.0		10.0		8.0
Connectedness - max score of 5		2.0		2.0	5.0		5.0	4.0		4.0	5.0		5.0	2.0		2.0		3.6
Context - max score of 5		2.0		2.0	4.0		4.0	4.0		4.0	4.0		4.0	2.0		2.0		3.2
Site Context Score				9.0			19.0			13.0			19.0			14.0		14.8
MAX Site Context Score - 20																		20.0
Site Context Score - out of 3																		**2.2**

Impact Area:	0.00

Management Unit:	11.7.4																													
Site Reference:																														
ENTER RE INTO GREEN BOX:	11.7.4	CB2			AE02			AE41			AE47			AE39			AE50			AE70			GES1			SEE OF PATCH				
	Benchmark	Raw Data	%Benchmark	Score	Raw Data	% Benchmark	Score	Raw Data	%Benchmark	Score	Raw Data	%Benchmark	Score	Raw Data	%Benchmark	Score	Raw Data	%Benchmark	Score	Raw Data	%Benchmark	Score	Raw Data	%Benchmark	Score	Raw Data	%Benchmark	Score	Average Benchmark %	Average Score
Recruitment of woody perennial species in EDL:	100.00	0.00	0.00	0.00	5.00	0.05	0.00	5.00	0.05	0.00	5.00	0.05	0.00	5.00	0.05	0.00	5.00	0.05	0.00	3.00	0.03	0.00	3.00	0.03	0.00	5.00	0.05	0.00	0.04	0.00
Native plant species richness – trees:	4.00	5.00	1.25	5.00	5.00	1.25	5.00	2.50	0.63	2.50	2.50	0.63	2.50	2.50	0.63	2.50	2.50	0.63	2.50	2.50	0.63	2.50	5.00	1.25	5.00	5.00	1.25	5.00	0.86	3.44
Native plant species richness – shrubs:	6.00	2.50	0.42	2.50	2.50	0.42	2.50	2.50	0.42	2.50	2.50	0.42	2.50	2.50	0.42	2.50	2.50	0.42	2.50	5.00	0.83	2.50	5.00	0.83	2.50	5.00	0.83	2.50	0.62	2.50
Native plant species richness – grasses:	7.00	5.00	0.71	2.50	2.50	0.36	2.50	2.50	0.36	2.50	2.50	0.36	2.50	2.50	0.36	2.50	2.50	0.36	2.50	2.50	0.36	2.50	5.00	0.71	2.50	5.00	0.71	2.50	0.45	2.50
Native plant species richness – forbs:	9.00	5.00	0.56	2.50	2.50	0.28	2.50	2.50	0.28	2.50	2.50	0.28	2.50	0.00	0.00	0.00	2.50	0.28	2.50	2.50	0.28	2.50	2.50	0.28	2.50	2.50	0.28	2.50	0.28	2.19
Tree canopy height (average of remargest canopy and sub-canopy t	15.00	5.00	0.33	3.00	3.00	0.17	0.00	3.00	0.17	0.00	3.00	0.17	0.00	5.00	0.29	3.00	5.00	0.29	3.00	5.00	0.28	3.00	5.00	0.28	3.00	5.00	0.28	3.00	0.24	1.98
Tree sub-canopy height	9.00	3.00	0.33	3.00	5.00	0.56	3.00	0.00	0.00	0.00	5.00	0.56	3.00	5.00	0.56	3.00	5.00	0.56	3.00	5.00	0.56	3.00	5.00	0.56	3.00	5.00	0.56	3.00	0.46	2.63
Average score:	13.50	4.00	0.31	3.00	4.00	0.36	1.50	1.50	0.08	0.00	4.00	0.36	1.50	5.00	0.42	3.00	5.00	0.42	3.00	5.00	0.42	3.00	5.00	0.42	3.00	5.00	0.42	3.00	0.35	2.25
Tree canopy cover (average of remargest canopy and sub-canopy t	29.00	5.00	0.17	2.00	5.00	0.17	2.00	5.00	0.17	2.00	5.00	0.17	2.00	5.00	0.17	2.00	5.00	0.17	2.00	2.00	0.07	0.00	5.00	0.17	2.00	5.00	0.17	2.00	0.16	1.75
Tree sub-canopy cover:	45.00	3.00	0.07	0.00	3.00	0.07	0.00	0.00	0.00	0.00	5.00	0.11	2.00	5.00	0.11	2.00	3.00	0.07	0.00	3.00	0.07	0.00	3.00	0.07	0.00	3.00	0.07	0.00	0.07	0.50
Average score:	37.50	4.00	0.12	1.00	4.00	0.12	1.00	2.50	0.09	1.00	5.00	0.14	2.00	5.00	0.14	2.00	4.00	0.12	1.00	2.50	0.07	0.00	4.00	0.12	1.00	2.50	0.11	1.13		
Shrub canopy cover:	8.00	0.00	0.00	0.00	5.00	0.63	5.00	3.00	0.38	3.00	3.00	0.38	3.00	3.00	0.38	3.00	3.00	0.38	3.00	3.00	0.38	3.00	5.00	0.63	5.00	5.00	0.39	3.13		
Native grass cover:	12.00	5.00	0.42	1.00	5.00	0.42	1.00	5.00	0.42	1.00	3.00	0.25	1.00	3.00	0.25	1.00	5.00	0.42	1.00	5.00	0.42	1.00	5.00	0.42	1.00	5.00	0.38	1.00		
Organic litter:	60.00	3.00	0.05	0.00	5.00	0.10	3.00	5.00	0.10	3.00	5.00	0.10	3.00	5.00	0.10	3.00	5.00	0.10	3.00	5.00	0.10	3.00	5.00	0.10	3.00	5.00	0.10	3.00	0.10	2.63
Large trees (≥ 80 cm DBH):	14.00	5.00	0.36	5.00	10.00	0.71	10.00	5.00	0.36	5.00	5.00	0.36	5.00	5.00	0.36	5.00	5.00	0.36	5.00	5.00	0.36	5.00	15.00	1.07	15.00	5.00	0.49	6.88		
Coarse woody debris:	320.00	5.00	0.02	0.00	0.00	0.00	0.00	5.00	0.02	0.00	2.00	0.01	0.00	5.00	0.02	0.00	5.00	0.02	0.00	5.00	0.02	0.00	5.00	0.02	0.00	5.00	0.01	0.00		
Non-native plant cover:	0.00	0.10	0.10	5.00	0.10	0.10	5.00	0.10	0.10	5.00	0.10	0.10	5.00	0.10	0.10	5.00	0.10	0.10	5.00	0.10	0.10	5.00	0.10	0.10	5.00	0.10	0.10	5.00		

Total Site Condition Score				20.50			39.00			28.00			30.50			29.50			31.00			30.00			45.50			39.38
Max Site condition score = 80																												80.00
Site Condition Score – out of 7																												3.45
Site Context																												
Size of patch - max score of 10:		0.00		0.00	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		10.00			8.00
Connectedness - max score of 5:		0.00		0.00	5.00		5.00	5.00		5.00	5.00		5.00	4.00		5.00	4.00		4.00	0.00		0.00	5.00		5.00			4.00
Context - max score of 5:		0.00		0.00	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		4.00			3.20

Site Context Score				0.00			19.00			19.00			19.00			19.00			16.00			11.00			19.00			15.20
MAX Site Context Score = 20																												20.00
Site Context Score – out of 3																												2.28

Impact Area	0.22

Assessment Unit Site Reference	Brigalow Regrowth (11.4.3)					
ENTER RE INTO GREEN BOX	11.4.3	CN14			SIZE OF PATCH	
	Benchmark	Raw Data	% Benchmark	Score	Average Benchamark %	Average Score
Recruitment of woody perennial species in EDL	100.00	5.00	0.05	0.00	0.05	0.00
Native plant species richness - trees	2.00	2.50	1.25	5.00	1.25	5.00
Native plant species richness - shrubs	10.00	2.50	0.25	2.50	0.25	2.50
Native plant species richness - grasses	4.00	5.00	1.25	5.00	1.25	5.00
Native plant species richness - forbs	13.00	5.00	0.38	2.50	0.38	2.50
Tree canopy height (average of emergent, canopy and su	24.00	5.00	0.21	0.00		
Tree sub-canopy height	na	3.00		0.00		
Average score	24.00	4.00	0.21	0.00	0.21	0.00
Tree canopy cover (average of emergent, canopy and su	70.00	2.00	0.03	0.00		
Tree sub-canopy cover	na	2.00		0.00		
Average score	70.00	2.00	0.03	0.00	0.03	0.00
Shrub canopy cover	na	3.00		0.00		0.00
Native grass cover	6.00	5.00	0.83	3.00	0.83	3.00
Organic litter	75.00	3.00	0.04	0.00	0.04	0.00
Large trees (euc and non-euc)	128.00	5.00	0.04	5.00	0.04	5.00
Coarse woody debris	1752.00	5.00	0.00	0.00	0.00	0.00
Non-native plant cover	0.00	0.10	0.10	5.00	0.10	5.00

Total Site Condition Score				28.00		28.00
Max Site condidion score - 80						80.00
Site Condition Score - out of 7						2.45
Site Context						
Size of patch - max score of 10		0.00		0.00		0.00
Connectedness - max score of 5		0.00		0.00		0.00
Context - max score of 5		0.00		0.00		0.00

Site Context Score				0.00		0.00
MAX Site Context Score - 20						20.00
Site Context Score - out of 3						**0.00**

Final habitat quality score (weighted)	11.4.3	11.5.1	11.7.4	Brigalow Regrowth (11.4	Total	
Site Condition score	4.13	6.14	0.00	2.45		
Site Context Score	0.98	2.22	0.00	0.00		
Habitat Quality score (out of 10)	5.11	8.36	0.00	2.45		
Assessment Unit area (ha) in Impact area	0.86	3.07	3.41	0.72	8.06	
Total Impact area (ha) for this MNES	8.06	8.06	8.06	8.06		
Size Weighting	0.11	0.38	0.42	0.09	1.00	
Weighted Habitat Quality Score	0.55	3.19	0.00	0.22	3.95	rounded 4.00

Appendix 9 - Habitat quality scores - Dunmall's Snake - offset start quality

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

DunSnk (Hab)

Assessment Unit - Regional Ecosystem		AU01 - RE 11.11.15 Adv Regrowth								AU01 (11.11.15 regrowth)		AU05 - RE 11.11.3 Remnant								AU05 (11.11.3 remnant)	
Site Reference		Benchmark	T-23			Benchmark	T-24					Benchmark	T-26			Benchmark	T-28				
		11.11.15	Raw Data	% Benchmark	Score	11.11.15	Raw Data	% Benchmark	Score	Average % Benchmark	Average score	11.11.3	Raw Data	% Benchmark	Score	11.11.3	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL		100	100	100%	5	100	100	100%	5	100%	5.0	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees		4	4	100%	5	4	5	125%	5	113%	5.0	3	5	167%	5	3	8	267%	5	217%	5.0
Native plant species richness - shrubs		3	6	200%	5	3	3	100%	5	150%	5.0	6	7	117%	5	6	10	167%	5	142%	5.0
Native plant species richness - grasses		7	7	100%	5	7	7	100%	5	100%	5.0	6	11	183%	5	6	14	233%	5	208%	5.0
Native plant species richness - forbes		12	12	100%	5	12	11	92%	5	96%	5.0	14	9	64%	3	14	17	121%	5	93%	4.0
Tree canopy height (average of emergent, canopy, sub-canopy)		14	3.333333333	28%	1.5	14		28%	1.5	28%	1.5	21.5		83%	5	21.5		77%	5	80%	5.0
Emergent height		na	0			na	0					na	0			na	0				
Canopy height		18	10	56%	3	18	10	56%	3			28	21	75%	5	28	20.5	73%	5		
Subcanopy height		10	0	0%	0	10	0	0%	0			15	13.5	90%	5	15	12	80%	5		
Tree canopy cover (average of emergent, canopy, sub-canopy)		36		30%	2.5	36		38%	2.5	34%	2.5	41.5		80%	5	41.5		94%	5	87%	5.0
Emergent cover		na	0			na	0					na	0			na	0				
Canopy cover		35	21.1	60%	5	35	26.9	77%	5			45	48.4	108%	5	45	50.4	112%	5		
Subcanopy cover		37	0	0%	0	37	0	0%	0			38	19.6	52%	5	38	29.2	77%	5		
Shrub canopy cover		5	15	302%	3	5	0	0%	0	151%	1.5	6	27	442%	3	6	5	82%	5	262%	4.0
Native grass cover		45	24	53%	3	45	27.4	61%	3	57%	3.0	17	9	53%	3	17	26	153%	5	103%	4.0
Organic litter		23	24	104%	5	23	22	96%	5	100%	5.0	50	67.6	135%	5	50	47.4	95%	5	115%	5.0
Large trees (euc plus non-euc)		3	2	67%	10	3	6	200%	15	133%	12.5	9	4	44%	5	9	4	44%	5	44%	5.0
Large Euc trees/ha		na	2			na	6					na	4			na	4				
Large non-euc trees/ha		3	0	0%		3	0	0%				9	0	0%		9	0	0%			
Coarse woody debris		441	520	118%	5	441	170	39%	2	78%	3.5	642	970	151%	5	642	1010	157%	5	154%	5.0
Non-native plant cover		0	45		3	0	45		3		3.0	0	3		10	0	2		10		10.0
Quality and availability of food and foraging habitat		10			1	10			1		1.0	10			10	10			10		10.0
Quality and availability of shelter		10			1	10			1		1.0	10			10	10			10		10.0
Site Condition Score					60				59		59.5				84				90		87
MAX Site Condition Score	*100*				*100*				*100*		100.00				*100*				*100*		*100*
Site Condition Score - out of 3	**3**				**1.80**				**1.77**		**1.79**				**2.52**				**2.70**		**87.00**
Site Context																					
Size of patch		10			2	10			2		2.00	10			2	10			2		2.00
Connectedness		5			4	5			4		4.00	5			4	5			4		4.00
Context		5			4	5			4		4.00	5			4	5			4		4.00
Ecological Corridors		6			6	6			6		6.00	6			6	6			6		6.00
Role of site location to species overall population in the state		5			4	5			4		4.00	5			4	5			4		4.00
Threats to the species		15			7	15			7		7.00	15			7	15			7		7.00
Species mobility capacity		10			10	10			10		10.00	10			10	10			10		10.00
Site Context Score					37				37		37.00				37				37		37.00
MAX Site Context Score	*56*				*56*				*56*		*56*				*56*				*56*		*56*
Site Context Score - out of 3	**3**				**1.98**				**1.98**		**1.98**				**1.98**				**1.98**		**1.98**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU06 - RE 11.12.1 Regrowth								AU06 (11.12.1 regrowth)		AU07 - RE 11.3.25 Remnant												AU07 (11.3.25 remnant)	
Site Reference	Benchmark	T-29			Benchmark	T-30					Benchmark	T-19			Benchmark	T-22			Benchmark	T-38				
	11.12.1	Raw Data	% Benchmark	Score	11.12.1	Raw Data	% Benchmark	Score	Average % Benchmark	Average score	11.3.25	Raw Data	% Benchmark	Score	11.3.25	Raw Data	% Benchmark	Score	11.3.25	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0	100	100	100%	5	100	50	50%	3	100	100	100%	5	83%	4.3
Native plant species richness - trees	3	9	300%	5	3	10	333%	5	317%	5.0	4	7	175%	5	4	7	175%	5	4	6	150%	5	167%	5.0
Native plant species richness - shrubs	6	4	67%	3	6	5	83%	3	75%	3.0	4	7	175%	5	4	4	100%	5	4	8	200%	5	158%	5.0
Native plant species richness - grasses	8	11	138%	5	8	14	175%	5	156%	5.0	8	4	50%	3	8	2	25%	3	8	3	38%	3	38%	3.0
Native plant species richness - forbes	13	18	138%	5	13	16	123%	5	131%	5.0	13	8	62%	3	13	5	38%	3	13	5	38%	3	46%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	12.5		22%	1.5	12.5		20%	1.5	21%	1.5	17		111%	5	17		143%	5	17		54%	2.5	103%	4.2
Emergent height	na		4.4		na		0				na		0		na		0		na		0			
Canopy height	15	6.5	43%	3	15	6	40%	3			23	24	104%	5	23	32.5	141%	5	23	25	109%	5		
Subcanopy height	10	0	0%	0	10	0	0%	0			11	13	118%	5	11	16	145%	5	11	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	37.5		31%	2.5	37.5		49%	2.5	40%	2.5	43.5		68%	3.5	43.5		75%	2.5	43.5		38%	2.5	60%	2.8
Emergent cover	na	15			na	17					na	0			na	0			na	0				
Canopy cover	35	21.5	61%	5	35	34.1	97%	5			34	40.4	119%	5	34	50.9	150%	5	34	25.8	76%	5		
Subcanopy cover	40	0	0%	0	40	0	0%	0			53	9.2	17%	2	53	0	0%	0	53	0	0%	0		
Shrub canopy cover	7	4	60%	5	7	6	79%	5	69%	5.0	12	5	45%	3	12	50	415%	3	12	31	256%	3	239%	3.0
Native grass cover	41	30	73%	3	41	22	54%	3	63%	3.0	35	37	106%	5	35	7.6	22%	1	35	7.2	21%	1	48%	2.3
Organic litter	28	20.6	74%	5	28	37	132%	5	103%	5.0	21	27	129%	5	21	20	95%	5	21	31.6	150%	5	125%	5.0
Large trees (euc plus non-euc)	4	2	50%	5	4	2	50%	5	50%	5.0	20	26	130%	15	20	16	80%	10	20	6	30%	5	80%	10.0
Large Euc trees/ha	na	2			na	2					13	24	185%		13	16	123%		13	6	46%			
Large non-euc trees/ha		4	0	0%		4	0	0%			7	2	29%		7	0	0%		7	0	0%			
Coarse woody debris	408	1180	289%	2	408	1280	314%	2	301%	2.0	473	590	125%	5	473	310	66%	5	473	850	180%	5	123%	5.0
Non-native plant cover	0	30		3	0	20		5		4.0	0	30		3	0	40		3	0	10		5		3.7
Quality and availability of food and foraging habitat	10			1	10			1		1.0	10			5	10			5	10			5		5.0
Quality and availability of shelter	10			10	10			10		10.0	10			5	10			5	10			10		6.7
Site Condition Score				61				63		62				75.5				63.5				65		68
MAX Site Condition Score				*100*				*100*		*100*				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**1.83**				**1.89**		**1.86**				**2.27**				**1.91**				**1.95**		**2.04**
Site Context																								
Size of patch	10			2	10			2		2.00	10			2	10			2	10			2		2.00
Connectedness	5			4	5			4		4.00	5			4	5			4	5			5		4.33
Context	5			4	5			4		4.00	5			4	5			4	5			5		4.33
Ecological Corridors	6			6	6			6		6.00	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			4	5			4		4.00	5			4	5			4	5			4		4.00
Threats to the species	15			7	15			7		7.00	15			7	15			7	15			7		7.00
Species mobility capacity	10			10	10			10		10.00	10			10	10			10	10			10		10.00
Site Context Score				37				37		37.00				37				37				39		37.67
MAX Site Context Score				56				56		56				56				56				56		56
Site Context Score - out of 3				**1.98**				**1.98**		**1.98**				**1.98**				**1.98**				**2.09**		**2.02**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU08 - RE 11.3.4 Remnant				AU08 (11.3.4 remnant)		AU10 - RE 11.7.4 Remnant							
Site Reference	Benchmark	T-12					Benchmark	T-05			Benchmark	T-06		
	11.3.4	Raw Data	% Benchmark	Score	Average % Benchmark	Average score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100%	5.00	100	100	100%	5	100	100	100%	5
Native plant species richness - trees	4	5	125%	5	125%	5.00	4	10	250%	5	4	8	200%	5
Native plant species richness - shrubs	2	5	250%	5	250%	5.00	6	13	217%	5	6	5	83%	3
Native plant species richness - grasses	7	11	157%	5	157%	5.00	7	6	86%	3	7	10	143%	5
Native plant species richness - forbes	10	12	120%	5	120%	5.00	9	9	100%	5	9	16	178%	5
Tree canopy height (average of emergent, canopy, sub-canopy)	17		80%	5	80%	5.00	13.5		78%	5	13.5		72%	4
Emergent height	na	0					na	0			na	0		
Canopy height	22	18	82%	5			18	14	78%	5	18	14	78%	5
Subcanopy height	12	10	83%	5			9	7	78%	5	9	6	67%	3
Tree canopy cover (average of emergent, canopy, sub-canopy)	32.5		163%	4	163%	4.00	37.5		108%	3.5	37.5		84%	3.5
Emergent cover	na	0					na	0			na	0		
Canopy cover	17	45.0	266%	3			29	51	176%	5	29	38.3	132%	5
Subcanopy cover	48	28.5	59%	5			46	18.2	40%	2	46	16.5	36%	2
Shrub canopy cover	5	7	135%	5	135%	5.00	8	29	365%	3	8	32	401%	3
Native grass cover	43	51.6	120%	5	120%	5.00	12	10	83%	3	12	16	133%	5
Organic litter	20	19.4	97%	5	97%	5.00	50	62	124%	5	50	52	104%	5
Large trees (euc plus non-euc)	10	12	120%	15	120%	15.00	14	28	200%	15	14	26	186%	15
Large Euc trees/ha	9	12	133%				7	20	286%		7	26	371%	
Large non-euc trees/ha	1	0	0%				7	8	114%		7	0	0%	
Coarse woody debris	384	170	44%	2	44%	2.00	320	400	125%	5	320	620	194%	5
Non-native plant cover	0	40		3		3.00	0	0		10	0	1		10
Quality and availability of food and foraging habitat	10			5		5.00	10			10	10			10
Quality and availability of shelter	10			5		5.00	10			10	10			10
Site Condition Score				79		79				92.5				93.5
MAX Site Condition Score				*100*		*100*				*100*				*100*
Site Condition Score - out of 3				2.37		2.37				2.78				2.81
Site Context														
Size of patch	10			2		2	10			10	10			7
Connectedness	5			4		4	5			5	5			5
Context	5			4		4	5			5	5			5
Ecological Corridors	6			6		6	6			6	6			6
Role of site location to species overall population in the state	5			4		4	5			4	5			4
Threats to the species	15			7		7	15			7	15			7
Species mobility capacity	10			10		10	10			10	10			10
Site Context Score				37		37.00				47				44
MAX Site Context Score				*56*		*56*				*56*				*56*
Site Context Score - out of 3				1.98		1.98				2.52				2.36

Assessment Unit - Regional Ecosystem	AU10 - RE 11.7.4 Remnant											
Site Reference	Benchmark	T-10			Benchmark	T-20			Benchmark	T-32		
	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	50	50%	3	100	57.14	57%	3
Native plant species richness - trees	4	8	200%	5	4	6	150%	5	4	11	275%	5
Native plant species richness - shrubs	6	15	250%	5	6	10	167%	5	6	10	167%	5
Native plant species richness - grasses	7	7	100%	5	7	7	100%	5	7	5	71%	3
Native plant species richness - forbes	9	11	122%	5	9	9	100%	5	9	9	100%	5
Tree canopy height (average of emergent, canopy, sub-canopy)	13.5		122%	5	13.5		96%	5	13.5		97%	5
Emergent height	na	0			na	0			na	0		
Canopy height	18	20	111%	5	18	16.5	92%	5	18	17	94%	5
Subcanopy height	9	12	133%	5	9	9	100%	5	9	9	100%	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	37.5		108%	1.5	37.5		58%	2.5	37.5		89%	3.5
Emergent cover	na	0			na	0			na	0		
Canopy cover	29	60.5	209%	3	29	31.6	109%	5	29	42.7	147%	5
Subcanopy cover	46	3.8	8%	0	46	3.2	7%	0	46	14.1	31%	2
Shrub canopy cover	8	20	250%	3	8	10	119%	5	8	24	300%	3
Native grass cover	12	32	267%	5	12	8	67%	3	12	7.6	63%	3
Organic litter	50	36	72%	5	50	47	94%	5	50	62.4	125%	5
Large trees (euc plus non-euc)	14	40	286%	15	14	14	100%	10	14	26	186%	15
Large Euc trees/ha	7	18	257%		7	10	143%		7	20	286%	
Large non-euc trees/ha	7	22	314%		7	4	57%		7	6	86%	
Coarse woody debris	320	230	72%	5	320	170	53%	5	320	660	206%	2
Non-native plant cover	0	1		10	0	1		10	0	10		5
Quality and availability of food and foraging habitat	10			10	10			5	10			10
Quality and availability of shelter	10			10	10			5	10			10
Site Condition Score				94.5				78.5				82.5
MAX Site Condition Score				*100*				*100*				*100*
Site Condition Score - out of 3				2.84				2.36				2.48
Site Context												
Size of patch	10			10	10			10	10			10
Connectedness	5			5	5			5	5			5
Context	5			5	5			5	5			5
Ecological Corridors	6			6	6			6	6			6
Role of site location to species overall population in the state	5			4	5			4	5			4
Threats to the species	15			7	15			7	15			7
Species mobility capacity	10			10	10			10	10			10
Site Context Score				47				47				47
MAX Site Context Score				*56*				*56*				*56*
Site Context Score - out of 3				2.52				2.52				2.52

Assessment Unit - Regional Ecosystem	AU10 - RE 11.7.4 Remnant												AU10 (11.7.4 remnant)	
Site Reference	Benchmark	T-34			Benchmark	T-37			Benchmark	T-41				
	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	75	75%	3	100	60	60%	3	100	100	100%	5	80%	4.0
Native plant species richness - trees	4	11	275%	5	4	11	275%	5	4	11	275%	5	238%	5.0
Native plant species richness - shrubs	6	9	150%	5	6	11	183%	5	6	16	267%	5	185%	4.8
Native plant species richness - grasses	7	7	100%	5	7	8	114%	5	7	9	129%	5	105%	4.5
Native plant species richness - forbes	9	7	78%	3	9	14	156%	5	9	12	133%	5	121%	4.8
Tree canopy height (average of emergent, canopy, sub-canopy)	13.5		97%	5	13.5		128%	5	13.5		94%	5	98%	4.9
Emergent height	na	0			na	0			na	0				
Canopy height	18	17	94%	5	18	22	122%	5	18	16	89%	5		
Subcanopy height	9	9	100%	5	9	12	133%	5	9	9	100%	5		
Tree canopy cover (average of emergent, canopy, sub-canopy)	37.5		114%	3.5	37.5		118%	5	37.5		92%	5	99%	3.5
Emergent cover	na	0			na	0			na	0				
Canopy cover	29	52.7	182%	5	29	53.3	184%	5	29	38.6	133%	5		
Subcanopy cover	46	21	46%	2	46	24.4	53%	5	46	23.4	51%	5		
Shrub canopy cover	8	47	591%	3	8	47	584%	3	8	32	404%	3	377%	3.3
Native grass cover	12	27	225%	5	12	29	242%	5	12	15.6	130%	5	151%	4.3
Organic litter	50	41	82%	5	50	58	116%	5	50	47.6	95%	5	102%	5.0
Large trees (euc plus non-euc)	14	10	71%	10	14	12	86%	10	14	28	200%	15	164%	13.1
Large Euc trees/ha	7	8	114%		7	8	114%		7	4	57%			
Large non-euc trees/ha	7	2	29%		7	4	57%		7	24	343%			
Coarse woody debris	320	770	241%	2	320	660	206%	2	320	520	163%	5	157%	3.9
Non-native plant cover	0	0		10	0	3		10	0	1		10		9.4
Quality and availability of food and foraging habitat	10			10	10			10	10			10		9.4
Quality and availability of shelter	10			10	10			10	10			10		9.4
Site Condition Score				84.5				88				98		89
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				2.54				2.64				2.94		2.67
Site Context														
Size of patch	10			10	10			7	10			7		8.88
Connectedness	5			5	5			4	5			4		4.75
Context	5			5	5			4	5			4		4.75
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			4	5			4	5			4		4.00
Threats to the species	15			7	15			7	15			7		7.00
Species mobility capacity	10			10	10			10	10			10		10.00
Site Context Score				47				42				42		45.38
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				2.52				2.25				2.25		2.43

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem: AU12 - RE 11.7.6 Remnant

Site Reference	Benchmark 11.7.6	T-01 Raw Data	T-01 % Benchmark	T-01 Score	Benchmark 11.7.6	T-02 Raw Data	T-02 % Benchmark	T-02 Score	Benchmark 11.7.6	T-08 Raw Data	T-08 % Benchmark	T-08 Score	Benchmark 11.7.6	T-18 Raw Data	T-18 % Benchmark	T-18 Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	75	75%	3	100	100	100%	5	100	100	100%	5
Native plant species richness - trees	4	5	125%	5	4	9	225%	5	4	4	100%	5	4	6	150%	5
Native plant species richness - shrubs	5	7	140%	5	5	15	300%	5	5	9	180%	5	5	9	180%	5
Native plant species richness - grasses	10	7	70%	3	10	3	30%	3	10	7	70%	3	10	6	60%	3
Native plant species richness - forbes	16	8	50%	3	16	6	38%	3	16	11	69%	3	16	6	38%	3
Tree canopy height (average of emergent, canopy, sub-canopy)	19		98%	5	19		97%	5	19		74%	5	19		78%	5
Emergent height	na	0			na	0			na	0			na	0		
Canopy height	25	21	84%	5	25	20.5	82%	5	25	18	72%	5	25	20.5	82%	5
Subcanopy height	13	14.5	112%	5	13	14.5	112%	5	13	10	77%	5	13	9.5	73%	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	43		54%	3.5	43		95%	3.5	43		59%	3.5	43		46%	3.5
Emergent cover	na	0			na	0			na	0			na	0		
Canopy cover	40	35	88%	5	40	60.3	151%	5	40	38.3	96%	5	40	25.3	63%	5
Subcanopy cover	46	9.4	20%	2	46	18.3	40%	2	46	9.8	21%	2	46	13.5	29%	2
Shrub canopy cover	7	46	661%	3	7	30	424%	3	7	48	686%	3	7	73	1036%	3
Native grass cover	23	17	74%	3	23	11	48%	1	23	20	87%	3	23	29	126%	5
Organic litter	52	55	106%	5	52	62	119%	5	52	40	77%	5	52	46.6	90%	5
Large trees (euc plus non-euc)	22	20	91%	10	22	8	36%	5	22	12	55%	10	22	18	82%	10
Large Euc trees/ha	11	16	145%		11	8	73%		11	12	109%		11	18	164%	
Large non-euc trees/ha	11	4	36%		11	0	0%		11	0	0%		11	0	0%	
Coarse woody debris	217	980	452%	2	217	920	424%	2	217	560	258%	2	217	510	235%	2
Non-native plant cover	0	0		10	0	0		10	0	2		10	0	1		10
Quality and availability of food and foraging habitat	10			10	10			10	10			10	10			10
Quality and availability of shelter	10			10	10			10	10			10	10			10
Site Condition Score				82.5				73.5				82.5				84.5
MAX Site Condition Score				*100*				*100*				*100*				*100*
Site Condition Score - out of 3				**2.48**				**2.21**				**2.48**				**2.54**
Site Context																
Size of patch	10			10	10			10	10			5	10			10
Connectedness	5			5	5			5	5			4	5			5
Context	5			5	5			5	5			4	5			5
Ecological Corridors	6			6	6			6	6			6	6			6
Role of site location to species overall population in the state	5			4	5			4	5			4	5			4
Threats to the species	15			7	15			7	15			7	15			7
Species mobility capacity	10			10	10			10	10			10	10			10
Site Context Score								47								47
MAX Site Context Score								56								56
Site Context Score - out of 3								**2.52**								**2.52**

Site Reference	Benchmark 11.7.6	T-35 Raw Data	T-35 % Benchmark	T-35 Score	Benchmark 11.7.6	T-36 Raw Data	T-36 % Benchmark	T-36 Score	Benchmark 11.7.6	T-38 Raw Data	T-38 % Benchmark	T-38 Score	Benchmark 11.7.6	T-40 Raw Data	T-40 % Benchmark	T-40 Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	66.66	67%	3	100	100	100%	5	100	100	100%	5
Native plant species richness - trees	4	8	200%	5	4	10	250%	5	4	7	175%	5	4	11	275%	5
Native plant species richness - shrubs	5	8	160%	5	5	8	160%	5	5	6	120%	5	5	10	200%	5
Native plant species richness - grasses	10	6	60%	3	10	8	80%	3	10	7	70%	3	10	10	100%	5
Native plant species richness - forbes	16	16	100%	5	16	13	81%	3	16	12	75%	3	16	16	100%	5
Tree canopy height (average of emergent, canopy, sub-canopy)	19		80%	5	19		74%	5	19		66%	5	19		91%	5
Emergent height	na	0			na	0			na	0			na	0		
Canopy height	25	21	84%	5	25	18	72%	5	25	22	88%	5	25	22.5	90%	5
Subcanopy height	13	10	77%	5	13	10	77%	5	13	11	85%	5	13	12	92%	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	43		77%	3.5	43		49%	3.5	43		72%	2.5	43		79%	3.5
Emergent cover	na	0			na	0			na	0			na	0		
Canopy cover	40	51.7	129%	5	40	26.4	66%	5	40	56.5	141%	5	40	46.6	117%	5
Subcanopy cover	46	11.2	24%	2	46	14.4	31%	2	46	1.6	3%	0	46	19.3	42%	2
Shrub canopy cover	7	58	830%	3	7	41	586%	3	7	6	81%	5	7	53	760%	3
Native grass cover	23	18.6	81%	3	23	16	70%	3	23	23.2	101%	5	23	21	91%	5
Organic litter	52	57.6	111%	5	52	56.2	108%	5	52	37.8	73%	5	52	45.8	88%	5
Large trees (euc plus non-euc)	22	12	55%	10	22	2	9%	5	22	4	18%	5	22	12	55%	10
Large Euc trees/ha	11	12	109%		11	2	18%		11	4	36%		11	10	91%	
Large non-euc trees/ha	11	0	0%		11	0	0%		11	0	0%		11	2	18%	
Coarse woody debris	217	1190	548%	2	217	1270	585%	2	217	570	263%	2	217	1440	664%	2
Non-native plant cover	0	1		10	0	1		10	0	3		10	0	0		10
Quality and availability of food and foraging habitat	10			10	10			10	10			5	10			10
Quality and availability of shelter	10			10	10			10	10			5	10			10
Site Condition Score				84.5				75.5				70.5				88.5
MAX Site Condition Score				*100*				*100*				*100*				*100*
Site Condition Score - out of 3				**2.54**				**2.27**				**2.12**				**2.66**
Site Context																
Size of patch	10			10	10			10	10			7	10			7
Connectedness	5			5	5			5	5			4	5			4
Context	5			5	5			5	5			4	5			4
Ecological Corridors	6			6	6			6	6			6	6			6
Role of site location to species overall population in the state	5			4	5			4	5			4	5			4
Threats to the species	15			7	15			7	15			7	15			7
Species mobility capacity	10			10	10			10	10			10	10			10
Site Context Score								47								42
MAX Site Context Score								56								56
Site Context Score - out of 3								**2.52**								**2.25**

AU12 (11.7.6 remnant)	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	93%	4.5
Native plant species richness - trees	188%	5.0
Native plant species richness - shrubs	180%	5.0
Native plant species richness - grasses	68%	3.3
Native plant species richness - forbes	69%	3.5
Tree canopy height (average of emergent, canopy, sub-canopy)	85%	5.0
Emergent height		
Canopy height		
Subcanopy height		
Tree canopy cover (average of emergent, canopy, sub-canopy)	66%	3.4
Emergent cover		
Canopy cover		
Subcanopy cover		
Shrub canopy cover	633%	3.3
Native grass cover	85%	3.5
Organic litter	96%	5.0
Large trees (euc plus non-euc)	50%	8.1
Large Euc trees/ha		
Large non-euc trees/ha		
Coarse woody debris	429%	2.0
Non-native plant cover		10.0
Quality and availability of food and foraging habitat		9.4
Quality and availability of shelter		9.4
Site Condition Score		80.3
MAX Site Condition Score		*100*
Site Condition Score - out of 3		**2.41**
Site Context		
Size of patch		8.63
Connectedness		4.63
Context		4.63
Ecological Corridors		6.00
Role of site location to species overall population in the state		4.00
Threats to the species		7.00
Species mobility capacity		10.00
Site Context Score		44.85
MAX Site Context Score		56
Site Context Score - out of 3		**2.40**

OFFSET - Dunnall's Snake, Glyphodon dunnalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AUH2 - RE 11.11.15 Regrowth								AUH2 (11.11.15 regrowth)		AUH3 - RE 11.11.3c Regrowth								AUH3 (11.11.3c regrowth)		AUH4 - RE 11.11.3 Regrowth								AUH4 (11.11.3 regrowth)	
Site Reference	Benchmark	T-16			Benchmark	T-25					Benchmark	T-17			Benchmark	T-42					Benchmark	T-43			Benchmark	T-44				
	11.11.15	Raw Data	% Benchmark	Score	11.11.15	Raw Data	% Benchmark	Score	Average % Benchmark	Average score	11.11.3c	Raw Data	% Benchmark	Score	11.11.3c	Raw Data	% Benchmark	Score	Average % Benchmark	Average score	11.11.3	Raw Data	% Benchmark	Score	11.11.3	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0	100	100	100%	5	100	100	100%	5	100%	5.0	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species rich ness - trees	4	0	0%	2.5	4	3	75%	3	38%	2.8	3	2	67%	3	3	3	100%	5	83%	4.0	3	5	167%	5	3	6	200%	5	183%	5.0
Native plant species rich ness - shrubs	3	5	167%	5	3	5	167%	5	167%	5.0	6	6	100%	5	6	6	100%	5	100%	5.0	6	7	117%	5	6	10	167%	5	142%	5.0
Native plant species rich ness - grasses	7	5	71%	3	7	5	71%	3	71%	3.0	6	10	167%	5	6	13	217%	5	192%	5.0	6	8	133%	5	6	7	117%	5	125%	5.0
Native plant species rich ness - forbes	12	17	142%	5	12	15	125%	5	133%	5.0	14	9	64%	3	14	10	71%	3	68%	3.0	14	13	93%	5	14	13	93%	5	93%	5.0
Tree canopy height (average of emergent, canopy, sub-canopy)	14		0%	0	14		0%	0	0%	0.0	21.5		0%	0	21.5		0%	0	4%	0.0	21.5		0%	0	21.5		0%	0	0%	0.0
Emergent height	na				na						na				na						na				na		0.0			
Canopy height	18	0	0%	0	18	0	0%	0			28	4.5	16%	0	28	0	0%	0			28	0	0%	0	28	0	0%	0		
Sub canopy height	10	0	0%	0	10	0	0%	0			15	0	0%	0	15	0	0%	0			15	0	0%	0	15	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	36		0%	0	36		0%	0	0%	0.0	41.5		7%	1	41.5		0%	0	4%	0.5	41.5		0%	0	41.5		0%	0	0%	0.0
Emergent cover	na				na						na				na	22					na				na	25				
Canopy cover	35	0	0%	0	35	0	0%	0			45	6.5	14%	2	45	0	0%	0			45	0	0%	0	45	0	0%	0		
Sub canopy cover	37	0	0%	0	37	0	0%	0			38	0	0%	0	38	0	0%	0			38	0	0%	0	38	0	0%	0		
Shrub canopy cover	5	8	164%	5	5	6	128%	5	146%	5.0	6	11	180%	5	6	26	433%	3	306%	4.0	6	15	246%	3	6	18	313%	3	280%	3.0
Native grass cover	45	15.2	34%	1	45	18	40%	1	37%	1.0	17	40	235%	5	17	51	300%	5	268%	5.0	17	35.6	209%	5	17	15	88%	3	149%	4.0
Organic litter	23	24.4	106%	5	23	19.4	84%	5	95%	5.0	50	16.4	33%	3	50	26	52%	5	42%	4.0	50	25.6	51%	5	50	31	62%	5	57%	5.0
Large trees (euc plus non-euc)	3	0	0%	0	3	0	0%	0	0%	0.0	9	0	0%	0	9	0	0%	0	0%	0.0	9	0	0%	0	9	4	44%	5	22%	2.5
Large Euc trees/ha	na	0			na	0					na	0			na	0					na	0			na	4				
Large non-euc trees/ha	3	0	0%		3	0	0%				9	0	0%		9	0	0%				9	0	0%		9	0	0%			
Coarse woody debris	441	1160	263%	2	441	870	220%	2	241%	2.0	642	830	129%	5	642	1310	204%	2	167%	3.5	642	760	118%	5	642	840	131%	5	125%	5.0
Non-native plant cover	0	55		0	0	50		0		0.0	0	20		5	0	20		5		5.0	0	20		5	0	40		3		4.0
Quality and availability of food and foraging habitat	10			1	10			1		1.0	10			1	10			1		1.0	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1		1.0	10			1	10			1		1.0	10			1	10			1		1.0
Site Condition Score				35.5				36		35.5				47				45		36				50				51		59.5
MAX Site Condition Score				100				100		100				100				100		100				100				100		100
Site Condition Score - out of 3				1.07				1.08		1.07				1.41				1.35		1.38				1.50				1.53		1.62
Site Context																														
Size of patch	10			2	10			2		2.00	10			2	10			2		2.00	10			2	10			2		2.00
Connectedness	5			2	5			4		3.00	5			0	5			4		2.00	5			4	5			4		4.00
Context	5			2	5			4		3.00	5			2	5			4		3.00	5			4	5			4		4.00
Ecological Corridors	6			6	6			6		6.00	6			6	6			6		6.00	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1		1.00	5			1	5			1		1.00	5			1	5			1		1.00
Threats to the species	15			1	15			1		1.00	15			1	15			1		1.00	15			1	15			1		1.00
Species mobility capacity	10			10	10			10		10.00	10			10	10			10		10.00	10			10	10			10		10.00
Site Context Score				24				28		28.00				22				28		25.00				28				28		28.00
MAX Site Context Score				56				56		56				56				56		56				56				56		56
Site Context Score - out of 3				1.28				1.50		1.38				1.16				1.50		1.34				1.50				1.50		1.50

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem: AU09 - RE 11.5.20 Regrowth

Site Reference	Benchmark 11.5.20	T-13 Raw Data	T-13 % Benchmark	T-13 Score	Benchmark 11.5.20	T-14 Raw Data	T-14 % Benchmark	T-14 Score	Benchmark 11.5.20	T-31 Raw Data	T-31 % Benchmark	T-31 Score	AU09 (11.5.20 regrowth) Average % Benchmark	AU09 (11.5.20 regrowth) Average Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	3	2	67%	3	3	2	67%	3	3	3	100%	5	78%	3.7
Native plant species richness - shrubs	4	8	200%	5	4	4	100%	5	4	6	150%	5	150%	5.0
Native plant species richness - grasses	7	6	86%	3	7	10	143%	5	7	10	143%	5	124%	4.3
Native plant species richness - forbes	13	18	138%	5	13	9	69%	3	13	8	62%	3	90%	3.7
Tree canopy height (average of emergent, canopy, sub-canopy)	16.5		0%	0	16.5		0%	0	16.5		0%	0	0%	0.0
Emergent height	na	0			na	0			na	0				
Canopy height	23	0	0%	0	23	0	0%	0	23	0	0%	0		
Subcanopy height	10	0	0%	0	10	0	0%	0	10	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	44.5		0%	0	44.5		0%	0	44.5		0%	0	0%	0.0
Emergent cover	na	24			na	0			na	0				
Canopy cover	43	0	0%	0	43	0	0%	0	43	0	0%	0		
Subcanopy cover	46	0	0%	0	46	0	0%	0	46	0	0%	0		
Shrub canopy cover	38	14	36%	3	38	27	71%	5	38	9	24%	3	44%	3.7
Native grass cover	8	16	200%	5	8	40	500%	5	8	53	663%	5	454%	5.0
Organic litter	57	6	11%	3	57	6	11%	3	57	19.6	34%	3	18%	3.0
Large trees (euc plus non-euc)	15	2	13%	5	15	0	0%	0	15	0	0%	0	4%	1.7
Large Euc trees/ha	10	2	20%		10	0	0%		10	0	0%			
Large non-euc trees/ha	5	0	0%		5	0	0%		5	0	0%			
Coarse woody debris	178	600	337%	2	178	410	230%	2	178	330	185%	5	251%	3.0
Non-native plant cover	0	25		5	0	30		3	0	10		5		4.3
Quality and availability of food and foraging habitat	10			1	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1	10			1		1.0
Site Condition Score				46				41				46		44.3
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				1.38				1.23				1.38		1.33
Site Context														
Size of patch	10			5	10			5	10			2		4.00
Connectedness	5			2	5			2	5			4		2.67
Context	5			2	5			2	5			4		2.67
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1		1.00
Threats to the species	15			1	15			1	15			1		1.00
Species mobility capacity	10			10	10			10	10			10		10.00
Site Context Score				27				27				28		27.33
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				1.45				1.45				1.50		1.48

Assessment Unit - Regional Ecosystem: AU11 - RE 11.7.6 Regrowth

Site Reference	Benchmark 11.7.6	T-07 Raw Data	T-07 % Benchmark	T-07 Score	Benchmark 11.7.6	T-09 Raw Data	T-09 % Benchmark	T-09 Score	Benchmark 11.7.6	T-11 Raw Data	T-11 % Benchmark	T-11 Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100	100	100%	5
Native plant species richness - trees	4	3	75%	3	4	2	50%	3	4	6	150%	5
Native plant species richness - shrubs	5	7	140%	5	5	4	80%	3	5	7	140%	5
Native plant species richness - grasses	10	8	80%	3	10	8	80%	3	10	5	50%	3
Native plant species richness - forbes	16	18	113%	5	16	16	100%	5	16	13	81%	3
Tree canopy height (average of emergent, canopy, sub-canopy)	19		0%	0	19		0%	0	19		13%	1.5
Emergent height	na	0			na	0			na	6.9		
Canopy height	25	0	0%	0	25	0	0%	0	25	6.5	26%	3
Subcanopy height	13	0	0%	0	13	0	0%	0	13	0	0%	0
Tree canopy cover (average of emergent, canopy, sub-canopy)	43		0%	0	43		0%	0	43		101%	1.5
Emergent cover	na	0			na	0			na	21		
Canopy cover	40	0	0%	0	40	0	0%	0	40	80.9	202%	3
Subcanopy cover	46	0	0%	0	46	0	0%	0	46	0	0%	0
Shrub canopy cover	7	18	254%	3	7	4	59%	5	7	17	241%	3
Native grass cover	23	24	104%	5	23	31	135%	5	23	8	35%	1
Organic litter	52	22	42%	3	52	2	4%	0	52	78	150%	5
Large trees (euc plus non-euc)	22	0	0%	0	22	0	0%	0	22	8	36%	5
Large Euc trees/ha	11	0	0%		11	0	0%		11	8		
Large non-euc trees/ha	11	0	0%		11	0	0%		11	0	0%	
Coarse woody debris	217	210	97%	5	217	40	18%	2	217	530	244%	2
Non-native plant cover	0	10		5	0	80		0	0	3		10
Quality and availability of food and foraging habitat	10			1	10			1	10			1
Quality and availability of shelter	10			1	10			1	10			1
Site Condition Score				44				33				52
MAX Site Condition Score				*100*				*100*				*100*
Site Condition Score - out of 3				1.32				0.99				1.56
Site Context												
Size of patch	10			5	10			2	10			5
Connectedness	5			4	5			4	5			5
Context	5			4	5			4	5			5
Ecological Corridors	6			6	6			6	6			6
Role of site location to species overall population in the state	5			1	5			1	5			1
Threats to the species	15			1	15			1	15			1
Species mobility capacity	10			10	10			10	10			10
Site Context Score				31				28				33
MAX Site Context Score				*56*				*56*				*56*
Site Context Score - out of 3				1.66				1.50				1.77

Assessment Unit - Regional Ecosystem: AU11 - RE 11.7.6 Regrowth (continued)

Site Reference	Benchmark 11.7.6	T-21 Raw Data	T-21 % Benchmark	T-21 Score	Benchmark 11.7.6	T-27 Raw Data	T-27 % Benchmark	T-27 Score	Benchmark 11.7.6	T-33 Raw Data	T-33 % Benchmark	T-33 Score	AU11 (11.7.6 regrowth) Average % Benchmark	AU11 (11.7.6 regrowth) Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	4	3	75%	3	4	8	200%	5	4	6	150%	5	117%	4.0
Native plant species richness - shrubs	5	7	140%	5	5	3	60%	3	5	6	120%	5	113%	4.3
Native plant species richness - grasses	10	6	60%	3	10	7	70%	3	10	6	60%	3	67%	3.0
Native plant species richness - forbes	16	8	50%	3	16	13	81%	3	16	15	94%	5	86%	4.0
Tree canopy height (average of emergent, canopy, sub-canopy)	19		0%	0	19		12%	0	19		10%	1.5	8%	0.5
Emergent height	na	0			na	0			na	2.9				
Canopy height	25	0	0%	0	25	6	24%	0	25	6.5	26%	3		
Subcanopy height	13	0	0%	0	13	0	0%	0	13	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	43		0%	0	43		83%	2.5	43		88%	2.5	45%	1.1
Emergent cover	na	22			na	0			na	16				
Canopy cover	40	0	0%	0	40	66.8	167%	5	40	70.2	176%	5		
Subcanopy cover	46	0	0%	0	46	0	0%	0	46	0	0%	0		
Shrub canopy cover	7	31	445%	3	7	27	386%	3	7	20	286%	3	279%	3.3
Native grass cover	23	11.4	50%	1	23	16	70%	3	23	12	52%	3	74%	3.0
Organic litter	52	27	52%	5	52	56	108%	5	52	47.4	91%	5	74%	3.8
Large trees (euc plus non-euc)	22	0	0%	0	22	0	0%	0	22	2	9%	5	8%	1.7
Large Euc trees/ha	11	0			11	0			11	0				
Large non-euc trees/ha	11	0	0%		11	0	0%		11	2	18%			
Coarse woody debris	217	2570	1184%	2	217	1610	742%	2	217	2440	1124%	2	588%	2.5
Non-native plant cover	0	60		0	0	3		10	0	10		5		5.0
Quality and availability of food and foraging habitat	10			1	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1	10			1		1.0
Site Condition Score				32				46.5				52		40.3
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				0.96				1.40				1.56		1.30
Site Context														
Size of patch	10			5	10			10	10			2		4.83
Connectedness	5			5	5			5	5			2		4.17
Context	5			5	5			5	5			2		4.17
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1		1.00
Threats to the species	15			1	15			1	15			1		1.00
Species mobility capacity	10			10	10			10	10			10		10.00
Site Context Score				33				38				24		31.17
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				1.77				2.04				1.29		1.67

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU13 - RE 11.9.5a Regrowth												U12 (11.9.5a regrowth)	
Site Reference	Benchmar	T-03			Benchmar	T-04			Benchmar	T-15			Average % Benchmark	Average score
	11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score		
Recruitment of woody perennial species in EDL	100	0	0%	0	100	100	100%	5	100	0	0%	0	33%	1.7
Native plant species richness - trees	7	2	29%	3	7	5	71%	3	7	2	29%	3	43%	3.0
Native plant species richness - shrubs	7	3	43%	3	7	2	29%	3	7	8	114%	5	62%	3.7
Native plant species richness - grasses	5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.8
Native plant species richness - forbes	9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.3
Tree canopy height (average of emergent, canopy, sub-canopy)	12		22%	1.5	12		19%	1.5	12		0%	0	14%	1.0
Emergent height	na	0			na	0			na	0				
Canopy height	16	7	44%	3	16	6	38%	3	16	0	0%	0		
Subcanopy height	8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	26		26%	2	26		30%	2	26		0%	0	19%	1.3
Emergent cover	na	0			na	0			na	0				
Canopy cover	26	6.8	26%	2	26	7.8	30%	2	26	0	0%	0		
Subcanopy cover	na	0			na	0			na	0				
Shrub canopy cover	31	2	8%	0	31	4	13%	3	31	28	89%	5	36%	2.7
Native grass cover	19	28	147%	5	19	2	11%	1	19	0	0%	0	53%	2.0
Organic litter	35	2	6%	0	35	8	23%	3	35	19	54%	5	28%	2.7
Large trees (euc plus non-euc)	51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.0
Large Euc trees/ha	30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha	21	0			21	0			21	0				
Coarse woody debris	735	0	0%	0	735	10	1%	0	735	90	12%	2	5%	0.7
Non-native plant cover	0	75		0	0	90		0	0	50		3		1.0
Quality and availability of food and foraging habitat	10			1	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1	10			1		1.0
Site Condition Score				24.5				29				33		28.8
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**0.74**				**0.87**				**0.99**		**0.87**
Site Context														
Size of patch	10			2	10			0	10			2		1.33
Connectedness	5			2	5			4	5			4		3.33
Context	5			2	5			2	5			4		2.67
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1		1.00
Threats to the species	15			1	15			1	15			1		1.00
Species mobility capacity	10			10	10			10	10			10		10.00
Site Context Score				24				24				28		25.33
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				**1.29**				**1.29**				**1.50**		**1.36**

TABLE 3

Species Stocking Rate (SSR)								Hab	Rest	Hab	Rest
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		Score	0	5		10		0	0		
			No	Yes - adjacent		Yes - on site					
Species usage of the site (habitat type & evidenced usage)		Score	0	5	10	15		15	0		
			Not habitat	Dispersal	Foraging	Breeding				If present, species likely to be breeding	
Approximate density (per ha)		Score	0	10	20	30		0	0		
			0%								
Role/importance of species population on site*		Score (*Total*	0	5	10		15	10	0		
			0	5 - 15	20 - 35		40 - 45				
Total SRR score (out of 70)								25	0		
SRR Score (out of 4)	4							1.43	0.00		

TABLE 4

*SSR Supplementary Table					Hab	Rest	Hab	Rest
*Key source population for breeding		Score	0	10	10	0	If present, likely to be l	No population considered likely due to current habitat condition (modified, historically cleared)
			No	Yes/ Possibly				
*Key source population for dispersal		Score	0	5	5	0	If breeding, likely to be	No population considered likely due to current habitat condition (modified, historically cleared)
			No	Yes/ Possibly				
*Necessary for maintaining genetic diversity		Score	0	15	15	0	If breeding/dispersing.	No population considered likely due to current habitat condition (modified, historically cleared)
			No	Yes/ Possibly				
*Near the limit of the species range		Score	0	15	0	0	Not near limite of spec	Not near limite of species range
			No	Yes				
				TOTAL	30	0		

TABLE 5

Final habitat quality score (weighted)		AU01 - RE 11.11.15 Adv Regrowth	AU05 - RE 11.11.3 Remnant	AU06 - RE 11.12.1 Regrowth	AU07 - RE 11.3.25 Remnant	AU08 - RE 11.3.4 Remnant	AU10 - RE 11.7.4 Remnant	AU12 - RE 11.7.6 Remnant	AU02 - RE 11.11.15 Regrowth	AU03 - RE 11.11.3c Regrowth	AU04 - RE 11.11.3 Regrowth	AU09 - RE 11.5.20 Regrowth	AU11 - RE 11.7.6 Regrowth	AU13 - RE 11.9.5a Regrowth	Total	
Final habitat quality score (weighted)		**AU01**	**AU05**	**AU06**	**AU07**	**AU08**	**AU10**	**AU12**	**AU02**	**AU03**	**AU04**	**AU09**	**AU11**	**AU13**		
Site Condition score (out of 3)		1.79	2.61	1.86	2.04	2.37	2.67	2.41	1.07	1.38	1.52	1.33	1.30	0.87		
Site Context Score (out of 3)		1.98	1.98	1.98	2.02	1.98	2.43	2.40	1.39	1.34	1.50	1.46	1.67	1.36		
Species Stocking Rate Score (out of 4)		1.43	1.43	1.43	1.43	1.43	1.43	1.43	0.00	0.00	0.00	0.00	0.00	0.00		
Habitat Quality score (out of 10)		*5.20*	*6.02*	*5.27*	*5.49*	*5.78*	*6.53*	*6.24*	*2.47*	*2.72*	*3.02*	*2.79*	*2.97*	*2.22*		
Assessment Unit area (ha)		0.00	0.00	0.00	0.00	0.00	1400.00	0.00	0.00	0.00	0.00	0.00	0.00	28.00	1428.00	
Total offset area (ha) for this MNES		1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00		
Size Weighting		0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.00	
Weighted Habitat Quality Score		0.00	0.00	0.00	0.00	0.00	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.04	6.44	**6.00**
																rounded

Appendix 10 - Habitat quality scores - Dunmall's Snake - quality without offset

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

DunSink (Hab)

Assessment Unit - Regional Ecosystem		AU01 - RE 11.11.15 Adv Regrowth								AU01 (11.11.15 regrowth)		AU05 - RE 11.11.3 Remnant								AU05 (11.11.3 remnant)	
Site Reference		Benchmark	T-23			Benchmark	T-24					Benchmark	T-26			Benchmark	T-28				
		11.11.15	Raw Data	% Benchmark	Score	11.11.15	Raw Data	% Benchmark	Score	Average % Benchmark	Average score	11.11.3	Raw Data	% Benchmark	Score	11.11.3	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL		100	100	100%	5	100	100	100%	5	100%	5.0	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees		4	4	100%	0	4	5	125%	0	113%	0.0	3	5	167%	5	3	8	267%	5	217%	5.0
Native plant species richness - shrubs		3	6	200%	0	3	3	100%	0	150%	0.0	6	7	117%	5	6	10	167%	5	142%	5.0
Native plant species richness - grasses		7	7	100%	5	7	7	100%	5	100%	5.0	6	11	183%	5	6	14	233%	5	206%	5.0
Native plant species richness - forbes		12	12	100%	5	12	11	92%	5	96%	5.0	14	9	64%	3	14	17	121%	3	93%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)		14	3.333333333	28%	0	14		28%	0	28%	0.0	21.5		83%	5	21.5		77%	5	80%	5.0
Emergent height		na	0			na	0					na	0			na	0				
Canopy height		18	10	56%	3	18	10	56%	3			28	21	75%	5	28	20.5	73%	5		
Subcanopy height		10	0	0%	0	10	0	0%	0			15	13.5	90%	5	15	12	80%	5		
Tree canopy cover (average of emergent, canopy, sub-canopy)		36		30%	0	36		38%	0	34%	0.0	41.5		80%	5	41.5		94%	5	87%	5.0
Emergent cover		na	0			na	0					na	0			na	0				
Canopy cover		35	21.1	60%	5	35	26.9	77%	5			45	48.4	108%	5	45	50.4	112%	5		
Subcanopy cover		37	0	0%	0	37	0	0%	0			38	19.6	52%	5	38	29.2	77%	5		
Shrub canopy cover		5	15	302%	0	5	0	0%	0	151%	0.0	6	27	442%	3	6	5	82%	3	262%	3.0
Native grass cover		45	24	53%	3	45	27.4	61%	3	57%	3.0	17	9	53%	3	17	26	153%	3	103%	3.0
Organic litter		23	24	104%	5	23	22	96%	5	100%	5.0	50	67.6	136%	5	50	47.4	95%	5	115%	5.0
Large trees (euc plus non-euc)		3	2	67%	0	3	6	200%	0	133%	0.0	9	4	44%	5	9	4	44%	5	44%	5.0
Large Euc trees/ha		na	2			na	6					na	4			na	4				
Large non-euc trees/ha		3	0	0%		3	0	0%				9	0	0%		9	0	0%			
Coarse woody debris		441	520	118%	5	441	170	39%	2	78%	3.5	642	970	151%	5	642	1010	157%	5	184%	5.0
Non-native plant cover		0	45		3	0	45		3		3.0	0	3		10	0	2		10		10.0
Quality and availability of food and foraging habitat		10			1	10			1		1.0	10			10	10			10		10.0
Quality and availability of shelter		10			1	10			1		1.0	10			10	10			10		10.0
Site Condition Score					33				30		31.5				84				84		84
MAX Site Condition Score	*100*				*100*				*100*		100.00				*100*				*100*		*100*
Site Condition Score - out of 3	**3**				**0.99**				**0.90**		**0.95**				**2.52**				**2.52**		**2.52**
Site Context																					
Size of patch		10			2	10			2		2.00	10			2	10			2		2.00
Connectedness		5			4	5			4		4.00	5			4	5			4		4.00
Context		5			4	5			4		4.00	5			4	5			4		4.00
Ecological Corridors		6			6	6			6		6.00	6			6	6			6		6.00
Role of site location to species overall population in the state		5			4	5			4		4.00	5			4	5			4		4.00
Threats to the species		15			7	15			7		7.00	15			7	15			7		7.00
Species mobility capacity		10			10	10			10		10.00	10			10	10			10		10.00
Site Context Score					37				37		37.00				37				37		37.00
MAX Site Context Score	*56*				*56*				*56*		*56*				*56*				*56*		*56*
Site Context Score - out of 3	**3**				**1.98**				**1.98**		**1.98**				**1.98**				**1.98**		**1.98**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU06 - RE 11.12.1 Regrowth								AU06 (11.12.1 regrowth)		AU07 - RE 11.3.25 Remnant												AU07 (11.3.25 remnant)	
Site Reference	Benchmark	T-29			Benchmark	T-30					Benchmark	T-19			Benchmark	T-22			Benchmark	T-38				
	11.12.1	Raw Data	% Benchmark	Score	11.12.1	Raw Data	% Benchmark	Score	Average % Benchmark	Average score	11.3.25	Raw Data	% Benchmark	Score	11.3.25	Raw Data	% Benchmark	Score	11.3.25	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0	100	100	100%	3	100	50	50%	3	100	100	100%	3	83%	3.0
Native plant species richness - trees	3	9	300%	0	3	10	333%	0	317%	0.0	4	7	175%	5	4	7	175%	5	4	6	150%	5	167%	5.0
Native plant species richness - shrubs	6	4	67%	0	6	5	83%	0	75%	0.0	4	7	175%	5	4	4	100%	5	4	8	200%	5	158%	5.0
Native plant species richness - grasses	8	11	138%	5	8	14	175%	5	156%	5.0	8	4	50%	3	8	2	25%	3	8	3	38%	3	38%	3.0
Native plant species richness - forbes	13	18	138%	5	13	16	123%	5	131%	5.0	13	8	62%	3	13	5	38%	3	13	5	38%	3	46%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	12.5		22%	0	12.5		20%	0	21%	0.0	17		113%	5	17		145%	5	17		54%	2.5	103%	4.2
Emergent height	na	4.4			na	0					na	0			na	0			na	0				
Canopy height	15	6.5	43%	3	15	6	40%	3			23	24	104%	5	23	32.5	141%	5	23	25	109%	5		
Subcanopy height	10	0	0%	0	10	0	0%	0			11	13	118%	5	11	16	145%	5	11	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	37.5		31%	0	37.5		49%	0	40%	0.0	43.5		68%	3.5	43.5		75%	2.5	43.5		38%	2.5	60%	2.8
Emergent cover	na	15			na	17					na	0			na	0			na	0				
Canopy cover	35	21.5	61%	5	35	34.1	97%	5			34	40.4	119%	5	34	50.9	150%	5	34	25.8	76%	5		
Subcanopy cover	40	0	0%	0	40	0	0%	0			53	9.2	17%	2	53	0	0%	0	53	0	0%	0		
Shrub canopy cover	7	4	60%	0	7	6	79%	0	69%	0.0	12	5	45%	3	12	50	415%	3	12	31	256%	3	239%	3.0
Native grass cover	41	30	73%	3	41	22	54%	3	63%	3.0	35	37	108%	5	35	7.6	22%	1	35	7.2	21%	1	49%	2.3
Organic litter	28	20.6	74%	5	28	37	132%	5	103%	5.0	21	27	129%	5	21	20	95%	5	21	31.6	150%	5	125%	5.0
Large trees (euc plus non-euc)	4	2	50%	0	4	2	50%	0	50%	0.0	20	26	130%	5	20	16	80%	5	20	6	30%	5	80%	5.0
Large Euc trees/ha	na	2			na	2					13	24	185%		13	16	123%		13	6	46%			
Large non-euc trees/ha	4	0	0%		4	0	0%				7	2	29%		7	0	0%		7	0	0%			
Coarse woody debris	408	1180	289%	2	408	1280	314%	2	301%	2.0	473	590	125%	5	473	310	66%	5	473	850	180%	5	123%	5.0
Non-native plant cover	0	30		3	0	20		3		3.0	0	30		3	0	40		3	0	10		3		3.0
Quality and availability of food and foraging habitat	10			1	10			1		1.0	10			5	10			5	10			5		5.0
Quality and availability of shelter	10			10	10			10		10.0	10			5	10			5	10			5		5.0
Site Condition Score				39				39		39				63.5				58.5				56		59.33333333
MAX Site Condition Score				*100*				*100*		*100*				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**1.17**				**1.17**		**1.17**				**1.91**				**1.76**				**1.68**		**1.78**
Site Context																								
Size of patch	10			2	10			2		2.00	10			2	10			2	10			2		2.00
Connectedness	5			4	5			4		4.00	5			4	5			4	5			5		4.33
Context	5			4	5			4		4.00	5			4	5			4	5			5		4.33
Ecological Corridors	6			6	6			6		6.00	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			4	5			4		4.00	5			4	5			4	5			4		4.00
Threats to the species	15			7	15			7		7.00	15			7	15			7	15			7		7.00
Species mobility capacity	10			10	10			10		10.00	10			10	10			10	10			10		10.00
Site Context Score				37				37		37.00				37				37				38		37.67
MAX Site Context Score				*56*				*56*		*56*				56				56				*56*		*56*
Site Context Score - out of 3				**1.98**				**1.98**		**1.98**				**1.98**				**1.98**				**2.09**		**2.02**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Ecological Unit - Regional Ecosystem	ADD - RE 11.3.4 Remnant				OFFSET - 11.3.4 Remnant		AU01 - RE 11.7.4 Remnant																																	
Vegetation Benchmark	Benchmark	T-02					Benchmark	T-05			Benchmark	T-06			Benchmark	T-19			Benchmark	T-29			Benchmark	T-32			Benchmark	T-34			Benchmark	T-37			Benchmark	T-43				
	11.3.4	Raw Data	% Benchmark	Score	Average % Benchmark	Average Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	Average % Benchmark	Average Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100%	5.00	100	100	100%	5	100	100	100%	5	100	100	100%	5	100	50	50%	3	100	57.14	57%	3	100	75	75%	3	100	60	60%	3	100	100	100%	5	90%	3.6
Native plant species richness - trees	4	5	125%	5	125%	5.00	4	10	250%	5	4	8	200%	5	4	8	200%	5	4	6	150%	5	4	11	275%	5	4	11	275%	5	4	11	275%	5	4	11	275%	5	238%	5.0
Native plant species richness - shrubs	2	5	250%	5	250%	5.00	6	13	217%	5	6	5	83%	3	6	15	250%	5	6	10	167%	5	8	10	167%	5	8	9	150%	5	6	11	183%	5	6	16	267%	5	185%	4.0
Native plant species richness - grasses	7	11	157%	5	157%	5.00	7	6	86%	3	7	10	143%	5	7	7	100%	5	7	7	100%	5	7	5	71%	5	7	7	100%	5	7	8	114%	5	7	8	129%	5	105%	3.0
Native plant species richness - forbes	10	12	120%	5	120%	5.00	9	9	100%	5	9	16	178%	5	9	11	122%	5	9	9	100%	5	9	9	100%	5	9	7	78%	3	9	14	156%	5	9	12	133%	5	121%	4.9
Tree canopy height (average of emergent, canopy, sub-canopy)	17		85%	5	85%	5.00	13.5		75%		13.5		75%		13.5		122%		13.5		96%		13.5		67%		13.5		67%		13.5		122%		13.5		96%		86%	3.0
Emergent Height	na						na				na				na				na				na				na				na				na					
Canopy height	22	18	82%	5			18	14	78%	5	18	14	78%	5	18	20	111%	5	18	16.5	92%	5	18	17	94%	5	18	17	94%	5	18	16	89%	5								
Subcanopy height	12	10	83%	5			9	7	75%	5	9	6	67%	3	9	12	133%	5	9	9	100%	5	9	9	100%	5	9	9	100%	5	9	12	133%	5	9	9	100%	5				
Tree canopy cover (average of emergent, canopy, sub-canopy)	32.5		163%	4	163%	4.00	37.5		188%	5	37.5		84%	3	37.5		188%	5	37.5		58%	3	37.5		85%	3	37.5		114%	3	37.5		338%	5	37.5		92%	3	96%	3.9
Emergent cover	na		0				na		0		na		0		na		0		na		0		na		0		na		0		na		0		na		0			
Canopy cover	17	45.5	268%	5			29	51	176%	5	29	38.5	132%	5	29	69.5	240%	5	29	31.6	109%	5	29	42.7	147%	5	29	52.7	182%	5	29	53.5	184%	5	29	38.6	133%	5				
Subcanopy cover	49	28.5	58%	3			46	10.2	40%	2	46	16.5	36%	2	46	3.8	8%	0	46	3.2	7%	0	46	14.1	31%	2	46	21	46%	2	46	24.4	53%	3	46	23.4	51%	2				
Shrub canopy cover	5	7	135%	5	135%	5.00	8	28	368%	3	8	32	401%	3	8	20	256%	3	8	10	119%	3	8	24	300%	3	8	47	581%	5	8	47	584%	5	8	32	404%	3	377%	3.0
Native grass cover	43	51.6	120%	5	120%	5.00	12	10	83%	3	12	16	133%	5	12	32	267%	5	12	8	67%	3	12	7.6	63%	3	12	27	225%	5	12	28	242%	5	12	15.6	130%	3	151%	2.0
Organic litter	20	19.4	97%	5	97%	5.00	50	63	126%	5	50	52	104%	5	50	36	72%	5	50	47	94%	5	50	63.4	127%	5	50	41	82%	5	50	59	118%	5	50	47.6	95%	5	102%	5.0
Large trees (euc plus non-euc)	10	12	120%	5	120%	5.00	14	28	200%	5	14	26	186%	5	14	40	286%	5	14	14	100%	5	14	26	186%	5	14	10	71%	5	14	12	86%	5	14	28	200%	5	164%	5.0
Large Euc trees/ha	8	13	163%				7	20	286%		7	38	371%		7	18	257%		7	10	143%		7	20	286%		7	8	114%		7	8	114%		7	4	57%					
Large non-euc trees/ha	1	0	0%				7	8	114%		7	0	0%		7	22	314%		7	4	57%		7	6	86%		7	2	29%		7	4	57%		7	24	343%					
Coarse woody debris	204	170	44%	2	44%	2.00	320	400	125%	3	320	620	194%	3	320	230	72%	2	320	170	53%	3	320	660	206%	3	320	770	241%	3	320	680	213%	3	320	520	163%	3	157%	2.0
Non native plant cover	0	40		2		2.00	0	0		5	0	1		5	0	1		5	0	1		5	0	10		5	0	0		5	0	2		5	0	1		5		5.0
Quality and availability of food and foraging habitat	10			5		5.00	10			10	10			10	10			10	10			10	10			10	10			10	10			10	10			10		10.0
Quality and availability of shelter	10			5		5.00	10			10	10			10	10			10	10			10	10			10	10			10	10			10	10			10		10.0
Site Condition Score				69		69				69				67				69.5				69				69				67				69				69		102.42%
MAX Site Condition Score				100		100				100				100				100				100				100				100				100				100		100
Site Condition Score - out of 3				**2.07**		**2.07**				**2.07**				**2.01**				**2.09**				**2.07**				**2.07**				**2.01**				**2.07**				**2.07**		**2.05**
Site Context																																								
Size of patch	10			2		2	10			10	10			7	10			10	10			10	10			10	10			10	10			7	10			7		8.88
Connectedness	5			4		4	5			5	5			5	5			5	5			5	5			5	5			5	5			4	5			4		4.75
Corridor	5			4		4	5			5	5			5	5			5	5			5	5			5	5			5	5			4	5			4		4.75
Ecological Corridors	6			6		6	6			6	6			6	6			6	6			6	6			6	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			4		4	5			4	5			4	5			4	5			4	5			4	5			4	5			4	5			4		4.00
Threats to the species	15			7		7	15			1	15			1	15			1	15			1	15			1	15			1	15			1	15			1		1.00
Species mobility capacity	10			10		10	10			1	10			1	10			1	10			1	10			1	10			1	10			1	10			1		1.00
Site Context Score				37		37.00				32				29				32				32				32				32				27				27		29.25
MAX Site Context Score				58		58				58				58				58				58				58				58				58				58		58
Site Context Score - out of 3				**1.88**		**1.88**				**1.71**				**1.55**				**1.71**				**1.71**				**1.71**				**1.71**				**1.45**				**1.45**		**1.82**

OFFSET - Dunmall's Snake, Clyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem																																	AU12 (11.7.8 remnant)	
Site Reference	Benchmark		T-01		Benchmark		T-02		Benchmark		T-08		Benchmark		T-16		Benchmark		T-35		Benchmark		T-36		Benchmark		T-39		Benchmark		T-40			
	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	Average % Benchmark	Average Score
Recruitment of woody perennial species in EOL	100	100	100%	5	100	75	75%	3	100	100	100%	5	100	100	100%	5	100	100	100%	5	100	66.66	67%	3	100	100	100%	5	100	100	100%	5	93%	4.5
Native plant species richness - trees	4	5	125%	5	4	9	225%	5	4	4	100%	5	4	8	150%	5	4	8	200%	5	4	10	250%	5	4	7	175%	5	4	11	275%	5	188%	5.0
Native plant species richness - shrubs	5	7	140%	5	5	15	300%	5	5	9	180%	5	5	9	180%	5	5	8	160%	5	5	8	160%	5	5	6	120%	5	5	10	200%	5	160%	5.0
Native plant species richness - grasses	10	7	70%	3	10	3	30%	3	10	7	70%	3	10	6	60%	3	10	6	60%	3	10	8	80%	3	10	7	70%	3	10	10	100%	3	98%	3.0
Native plant species richness - forbes	16	8	50%	3	16	6	38%	3	16	11	69%	3	16	6	38%	3	16	16	100%	3	16	13	81%	3	16	12	75%	3	16	16	100%	3	69%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	19		99%	5	19		97%	5	19		74%	5	19		78%	5	19		99%	5	19		74%	5	19		96%	5	19		91%	5	85%	5.0
Emergent height	na				na				na				na				na				na				na				na					
Canopy height	25	21	84%	5	25	20.5	82%	5	25	18	72%	5	25	20.5	82%	5	25	21	84%	5	25	18	72%	5	25	22	88%	5	25	22.5	90%	5		
Subcanopy height	13	14.5	112%	5	13	14.5	112%	5	13	10	77%	5	13	9.5	73%	5	13	10	77%	5	13	10	77%	5	13	11	85%	5	13	12	92%	5		
Tree canopy cover (average of emergent, canopy, sub canopy)	43		54%	2.5	43		95%	2.5	43		59%	2.5	43		46%	2.5	43		77%	2.5	43		49%	2.5	43		72%	2.5	43		79%	2.5	68%	2.5
Emergent cover	na	0			na	0			na	0			na	0			na	0			na	0			na	0			na	0				
Canopy cover	40	35	88%	5	40	60.3	151%	5	40	38.3	96%	5	40	25.3	63%	5	40	51.7	129%	5	40	26.4	66%	5	40	56.5	141%	5	40	46.6	117%	5		
Subcanopy cover	46	9.4	20%	0	46	18.3	40%	0	46	9.8	21%	0	46	13.5	29%	0	46	11.2	24%	0	46	14.4	31%	0	46	1.6	3%	0	46	15.3	42%	0		
Shrub canopy cover	7	48	661%	3	7	30	424%	3	7	48	686%	3	7	73	1036%	3	7	58	830%	3	7	41	586%	3	7	6	81%	5	7	53	760%	3	833%	3.3
Native grass cover	23	17	74%	3	23	11	48%	1	23	20	87%	3	23	29	126%	5	23	18.8	81%	3	23	16	70%	3	23	23.2	101%	5	23	21	91%	5	85%	3.5
Organic litter	52	56	106%	5	52	62	119%	5	52	40	77%	5	52	45.6	90%	5	52	57.8	111%	5	52	56.2	108%	5	52	37.8	73%	5	52	45.8	88%	5	98%	5.0
Large trees (euc plus non-euc)	22	20	91%	5	22	8	36%	5	22	12	55%	5	22	18	82%	5	22	12	55%	5	22	2	9%	5	22	4	18%	5	22	12	55%	5	50%	5.0
Large Euc trees/ha	11	16	145%		11	8	73%		11	12	109%		11	18	164%		11	12	109%		11	2	18%		11	4	36%		11	10	91%			
Large non-euc trees/ha	11	4	36%		11	0	0%		11	0	0%		11	0	0%		11	0	0%		11	0	0%		11	0	0%		11	2	18%			
Coarse woody debris	217	980	452%	2	217	920	424%	2	217	560	258%	2	217	510	235%	2	217	1160	548%	2	217	1270	585%	2	217	570	263%	2	217	1440	664%	2	423%	2.0
Non native plant cover	9	9		10	0	8		10	9	2		10	0	1		10	0	1		10	0	1		10	0	3		10	0	0		10		10.0
Quality and availability of food and foraging habitat	10			5	10			5	10			5	10			5	10			5	10			5	10			5	10			5		5.0
Quality and availability of shelter	10			5	10			5	10			5	10			5	10			5	10			5	10			5	10			5		5.0
Site Condition Score				66.5				62.5				66.5				68.5				66.5				64.5				70.5				68.5		68.8
MAX Site Condition Score				*100*				*100*				*100*				*100*				*100*				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**2.00**				**1.88**				**2.00**				**2.06**				**2.00**				**1.94**				**2.12**				**2.06**		**2.00**
Site Context																																		
Size of patch	10			10	10			10	10			5	10			10	10			10	10			10	10			7	10			7		8.83
Connectedness	5			5	5			5	5			4	5			5	5			5	5			5	5			4	5			4		4.83
Context	5			5	5			5	5			4	5			5	5			5	5			5	5			4	5			4		4.83
Ecological Corridor	6			6	6			6	6			6	6			6	6			6	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			4	5			5	5			4	5			4	5			4	5			4	5			4	5			4		4.00
Threats to the species	15			7	15			7	15			7	15			7	15			7	15			7	15			7	15			7		7.00
Species mobility capacity	10			10	10			10	10			10	10			10	10			10	10			10	10			10	10			10		10.00
Site Context Score								47								47								47				42				42		44.89
MAX Site Context Score								*56*								*56*								*56*				*56*				*56*		*56*
Site Context Score - out of 3								**2.52**								**2.52**								**2.52**				**2.25**				**2.40**		

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU02 - RE 11.11.15 Regrowth								AU02	11.11.15 (regrowth)	
Site Reference	Benchmark	T-16			Benchmark	T-25					
	11.11.15	Raw Data	% Benchmark	Score	11.11.15	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	4	0	0%	0	4	3	75%	0	38%	0.0
Native plant species richness - shrubs	3	5	167%	0	3	5	167%	0	167%	0.0
Native plant species richness - grasses	7	5	71%	3	7	5	71%	3	71%	3.0
Native plant species richness - forbes	12	17	142%	5	12	15	125%	5	133%	5.0
Tree canopy height (average of emergent, canopy, sub-canopy)	14		0%	0	14		0%	0	0%	0.0
Emergent height	na	0			na	0				
Canopy height	18	0	0%	0	18	0	0%	0		
Subcanopy height	10	0	0%	0	10	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	38		0%	0	38		0%	0	0%	0.0
Emergent cover	na	0			na	0				
Canopy cover	35	0	0%	0	35	0	0%	0		
Subcanopy cover	37	0	0%	0	37	0	0%	0		
Shrub canopy cover	5	8	164%	0	5	6	128%	0	146%	0.0
Native grass cover	45	15.2	34%	1	45	18	40%	1	37%	1.0
Organic litter	23	24.4	106%	5	23	19.4	84%	5	95%	5.0
Large trees (euc plus non-euc)	3	0	0%	0	3	0	0%	0	0%	0.0
Large Euc trees/ha	na	0			na	0				
Large non-euc trees/ha	3	0	0%		3	0	0%			
Coarse woody debris	441	1160	263%	2	441	970	220%	2	241%	2.0
Non-native plant cover	0	55		0	0	50		0		0.0
Quality and availability of food and foraging habitat	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1		1.0
Site Condition Score				23				23		23.0
MAX Site Condition Score				*100*				*100*		*100*
Site Condition Score - out of 3				**0.69**				**0.69**		**0.69**
Site Context										
Size of patch	10			2	10			2		2.00
Connectedness	5			2	5			4		3.00
Context	5			2	5			4		3.00
Ecological Corridors	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1		1.00
Threats to the species	15			1	15			1		1.00
Species mobility capacity	10			10	10			10		10.00
Site Context Score				24				28		28.00
MAX Site Context Score				*56*				*56*		*56*
Site Context Score - out of 3				**1.29**				**1.50**		**1.50**

Assessment Unit - Regional Ecosystem	AU03 - RE 11.11.26 Regrowth								AU03	11.11.26 (regrowth)	
Site Reference	Benchmark	T-17			Benchmark	T-42					
	11.11.3c	Raw Data	% Benchmark	Score	11.11.3c	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	6	2	67%	0	3	3	100%	0	83%	0.0
Native plant species richness - shrubs	6	6	100%	0	6	6	100%	0	100%	0.0
Native plant species richness - grasses	6	10	167%	5	6	13	217%	5	192%	5.0
Native plant species richness - forbes	14	9	64%	3	14	10	71%	3	68%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	21.5		0%	0	21.5		0%	0	4%	0.0
Emergent height	na	0			na	0				
Canopy height	28	4.5	16%	0	28	0	0%	0		
Subcanopy height	15	0	0%	0	15	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	41.5		7%	0	41.5		0%	0	4%	0.0
Emergent cover	na	0			na	22				
Canopy cover	45	6.5	14%	0	45	0	0%	0		
Subcanopy cover	38	0	0%	0	38	0	0%	0		
Shrub canopy cover	6	11	180%	0	6	26	433%	0	306%	0.0
Native grass cover	17	40	235%	5	17	51	300%	5	268%	5.0
Organic litter	50	16.4	33%	3	50	26	52%	5	42%	4.0
Large trees (euc plus non-euc)	9	0	0%	0	9	0	0%	0	0%	0.0
Large Euc trees/ha	na	0			na	0				
Large non-euc trees/ha	9	0	0%		9	0	0%			
Coarse woody debris	642	830	129%	2	642	1310	204%	2	167%	2.0
Non-native plant cover	0	20		5	0	20		5		5.0
Quality and availability of food and foraging habitat	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1		1.0
Site Condition Score				30				32		31
MAX Site Condition Score				*100*				*100*		*100*
Site Condition Score - out of 3				**0.90**				**0.96**		**0.93**
Site Context										
Size of patch	10			2	10			2		2.00
Connectedness	5			0	5			4		2.00
Context	5			2	5			4		3.00
Ecological Corridors	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1		1.00
Threats to the species	15			1	15			1		1.00
Species mobility capacity	10			10	10			10		10.00
Site Context Score				22				28		25.00
MAX Site Context Score				*56*				*56*		*56*
Site Context Score - out of 3				**1.18**				**1.50**		**1.34**

Assessment Unit - Regional Ecosystem	AU04 - RE 11.11.3 Regrowth								AU04	11.11.3 (regrowth)	
Site Reference	Benchmark	T-43			Benchmark	T-44					
	11.11.3	Raw Data	% Benchmark	Score	11.11.3	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	3	6	200%	0	3	6	200%	0	183%	0.0
Native plant species richness - shrubs	6	7	117%	0	6	10	167%	0	142%	0.0
Native plant species richness - grasses	6	8	133%	5	6	7	117%	5	125%	5.0
Native plant species richness - forbes	14	13	93%	5	14	13	93%	5	93%	5.0
Tree canopy height (average of emergent, canopy, sub-canopy)	21.5		0%	0	21.5		0%	0	0%	0.0
Emergent height	na	0			na	0				
Canopy height	28	0	0%	0	28	0	0%	0		
Subcanopy height	15	0	0%	0	15	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	41.5		0%	0	41.5		0%	0	0%	0.0
Emergent cover	na	0			na	25				
Canopy cover	45	0	0%	0	45	0	0%	0		
Subcanopy cover	38	0	0%	0	38	0	0%	0		
Shrub canopy cover	6	15	248%	0	6	19	313%	0	280%	0.0
Native grass cover	17	35.6	209%	5	17	15	88%	3	149%	4.0
Organic litter	50	25.6	51%	5	50	31	62%	5	57%	5.0
Large trees (euc plus non-euc)	9	0	0%	0	9	4	44%	0	22%	0.0
Large Euc trees/ha	na	0			na	4				
Large non-euc trees/ha	9	0	0%		9	0	0%			
Coarse woody debris	642	760	118%	5	642	840	131%	5	125%	5.0
Non-native plant cover	0	20		5	0	40		3		4.0
Quality and availability of food and foraging habitat	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1		1.0
Site Condition Score				37				33		35
MAX Site Condition Score				*100*				*100*		*100*
Site Condition Score - out of 3				**1.11**				**0.99**		**1.05**
Site Context										
Size of patch	10			2	10			2		2.00
Connectedness	5			4	5			4		4.00
Context	5			4	5			4		4.00
Ecological Corridors	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1		1.00
Threats to the species	15			1	15			1		1.00
Species mobility capacity	10			10	10			10		10.00
Site Context Score				28				28		28.00
MAX Site Context Score				*56*				*56*		*56*
Site Context Score - out of 3				**1.50**				**1.50**		**1.50**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU09 - RE 11.5.20 Regrowth												AU09 (11.5.20 regrowth)	
Site Reference	Benchmark	T-13			Benchmark	T-14			Benchmark	T-31			Average % Benchmark	Average score
	11.5.20	Raw Data	% Benchmark	Score	11.5.20	Raw Data	% Benchmark	Score	11.5.20	Raw Data	% Benchmark	Score		
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	3	2	67%	0	3	2	67%	0	3	3	100%	0	78%	0.0
Native plant species richness - shrubs	4	8	200%	0	4	4	100%	0	4	6	150%	0	150%	0.0
Native plant species richness - grasses	7	6	86%	3	7	10	143%	5	7	10	143%	5	124%	4.3
Native plant species richness - forbes	13	18	138%	3	13	9	69%	3	13	8	62%	3	90%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	16.5		0%	0	16.5		0%	0	16.5		0%	0	0%	0.0
Emergent height	na	0			na	0			na	0				
Canopy height	23	0	0%	0	23	0	0%	0	23	0	0%	0		
Subcanopy height	10	0	0%	0	10	0	0%	0	10	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	44.5		0%	0	44.5		0%	0	44.5		0%	0	0%	0.0
Emergent cover	na	24			na	0			na	0				
Canopy cover	43	0	0%	0	43	0	0%	0	43	0	0%	0		
Subcanopy cover	46	0	0%	0	46	0	0%	0	46	0	0%	0		
Shrub canopy cover	38	14	36%	0	38	27	71%	0	38	9	24%	0	44%	0.0
Native grass cover	8	16	200%	5	8	40	500%	5	8	53	663%	5	454%	5.0
Organic litter	57	6	11%	3	57	6	11%	3	57	19.6	34%	3	18%	3.0
Large trees (euc plus non-euc)	15	2	13%	0	15	0	0%	0	15	0	0%	0	4%	0.0
Large Euc trees/ha	10	2	20%		10	0	0%		10	0	0%			
Large non-euc trees/ha	5	0	0%		5	0	0%		5	0	0%			
Coarse woody debris	178	600	337%	2	178	410	230%	2	178	330	185%	2	251%	2.0
Non-native plant cover	0	25		3	0	30		3	0	10		3		3.0
Quality and availability of food and foraging habitat	10			1	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1	10			1		1.0
Site Condition Score				26				28				28		27.3
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**0.78**				**0.84**				**0.84**		**0.82**
Site Context														
Size of patch	10			5	10			5	10			2		4.00
Connectedness	5			2	5			2	5			4		2.67
Context	5			2	5			2	5			4		2.67
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1		1.00
Threats to the species	15			1	15			1	15			1		1.00
Species mobility capacity	10			10	10			10	10			10		10.00
Site Context Score				27				27				28		27.33
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				**1.45**				**1.45**				**1.50**		**1.46**

Assessment Unit - Regional Ecosystem	AU11 - RE 11.7.6 Regrowth											
Site Reference	Benchmark	T-07			Benchmark	T-09			Benchmark	T-11		
	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100	100	100%	5
Native plant species richness - trees	4	3	75%	0	4	2	50%	0	4	6	150%	0
Native plant species richness - shrubs	5	7	140%	0	5	4	80%	0	5	7	140%	0
Native plant species richness - grasses	10	8	80%	3	10	8	80%	3	10	5	50%	3
Native plant species richness - forbes	16	18	113%	3	16	16	100%	3	16	13	81%	3
Tree canopy height (average of emergent, canopy, sub-canopy)	19		0%	0	19		0%	0	19		13%	
Emergent height	na	0			na	0			na	6.9		
Canopy height	25	0	0%	0	25	0	0%	0	25	6.5	26%	0
Subcanopy height	13	0	0%	0	13	0	0%	0	13	0	0%	0
Tree canopy cover (average of emergent, canopy, sub-canopy)	43		0%	0	43		0%	0	43		101%	0
Emergent cover	na	0			na	0			na	21		
Canopy cover	40	0	0%	0	40	0	0%	0	40	80.9	202%	0
Subcanopy cover	46	0	0%	0	46	0	0%	0	46	0	0%	0
Shrub canopy cover	7	18	254%	0	7	4	59%	0	7	17	241%	0
Native grass cover	23	24	104%	1	23	31	135%	1	23	8	35%	1
Organic litter	52	22	42%	3	52	2	4%	0	52	78	150%	5
Large trees (euc plus non-euc)	22	0	0%	0	22	0	0%	0	22	8	36%	0
Large Euc trees/ha	11	0	0%		11	0	0%		11	8		
Large non-euc trees/ha	11	0	0%		11	0	0%		11	0	0%	
Coarse woody debris	217	210	97%	5	217	40	18%	2	217	530	244%	2
Non-native plant cover	0	10		0	0	60		0	0	3		0
Quality and availability of food and foraging habitat	10			1	10			1	10			1
Quality and availability of shelter	10			1	10			1	10			1
Site Condition Score				22				16				21
MAX Site Condition Score				*100*				*100*				*100*
Site Condition Score - out of 3				**0.66**				**0.48**				**0.63**
Site Context												
Size of patch	10			5	10			2	10			5
Connectedness	5			4	5			4	5			5
Context	5			4	5			4	5			5
Ecological Corridors	6			6	6			6	6			6
Role of site location to species overall population in the state	5			1	5			1	5			1
Threats to the species	15			1	15			1	15			1
Species mobility capacity	10			10	10			10	10			10
Site Context Score				31				28				33
MAX Site Context Score				*56*				*56*				*56*
Site Context Score - out of 3				**1.66**				**1.50**				**1.77**

Assessment Unit - Regional Ecosystem	AU11 - RE 11.7.6 Regrowth												AU11 (11.7.6 regrowth)	
Site Reference	Benchmark	T-21			Benchmark	T-27			Benchmark	T-33			Average % Benchmark	Average score
	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score		
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	4	3	75%	0	4	8	200%	0	4	6	150%	0	117%	0.0
Native plant species richness - shrubs	5	7	140%	0	5	3	60%	0	5	6	120%	0	113%	0.0
Native plant species richness - grasses	10	6	60%	3	10	7	70%	3	10	6	60%	3	67%	3.0
Native plant species richness - forbes	16	8	50%	3	16	13	81%	3	16	15	94%	3	86%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	19		0%	0	19		12%	0	19		12%	0	6%	0.0
Emergent height	na	0			na	0			na	2.9				
Canopy height	25	0	0%	0	25	6	24%	0	25	6.5	26%	0		
Subcanopy height	13	0	0%	0	13	0	0%	0	13	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	43		0%	0	43		83%	0	43		88%	0	45%	0.0
Emergent cover	na	22			na	0			na	16				
Canopy cover	40	0	0%	0	40	66.6	167%	0	40	70.2	176%	0		
Subcanopy cover	46	0	0%	0	46	0	0%	0	46	0	0%	0		
Shrub canopy cover	7	31	445%	0	7	27	386%	0	7	20	288%	0	279%	0.0
Native grass cover	23	11.4	50%	1	23	16	70%	1	23	12	52%	1	74%	1.0
Organic litter	52	27	52%	5	52	56	108%	5	52	47.4	91%	5	74%	3.8
Large trees (euc plus non-euc)	22	0	0%	0	22	0	0%	0	22	2	9%	0	8%	0.0
Large Euc trees/ha	11	0			11	0			11	0				
Large non-euc trees/ha	11	0	0%		11	0	0%		11	2	18%			
Coarse woody debris	217	2570	1184%	2	217	1610	742%	2	217	2440	1124%	2	568%	2.5
Non-native plant cover	0	60		0	0	3		0	0	10		0		0.0
Quality and availability of food and foraging habitat	10			1	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1	10			1		1.0
Site Condition Score				21				21				21		20.3
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**0.63**				**0.63**				**0.63**		**0.61**
Site Context														
Size of patch	10			5	10			10	10			2		4.83
Connectedness	5			5	5			5	5			2		4.17
Context	5			5	5			5	5			2		4.17
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1		1.00
Threats to the species	15			1	15			1	15			1		1.00
Species mobility capacity	10			10	10			10	10			10		10.00
Site Context Score				33				38				24		31.17
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				**1.77**				**2.04**				**1.29**		**1.67**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU13 - RE 11.9.5a Regrowth												U13 (11.9.5a regrowth)	
Site Reference	Benchmar	T-03			Benchmar	T-04			Benchmar	T-15			Average % Benchmark	Average score
	11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score		
Recruitment of woody perennial species in EDL	100	0	0%	0	100	100	100%	0	100	0	0%	0	33%	0.0
Native plant species richness - trees	7	2	29%	0	7	5	71%	0	7	2	29%	0	43%	0.0
Native plant species richness - shrubs	7	3	43%	0	7	2	29%	0	7	8	114%	0	62%	0.0
Native plant species richness - grasses	5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.8
Native plant species richness - forbes	9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.3
Tree canopy height (average of emergent, canopy, sub-canopy)	12		22%	0	12		19%	0	12		0%	0	14%	0.0
Emergent height	na	0			na	0			na	0				
Canopy height	16	7	44%	3	16	6	38%	3	16	0	0%	0		
Subcanopy height	8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	26		26%	0	26		30%	0	26		0%	0	19%	0.0
Emergent cover	na	0			na	0			na	0				
Canopy cover	26	6.8	26%	2	26	7.8	30%	2	26	0	0%	0		
Subcanopy cover	na	0			na	0			na	0				
Shrub canopy cover	31	2	8%	0	31	4	13%	0	31	28	89%	0	36%	0.0
Native grass cover	19	28	147%	5	19	2	11%	1	19	0	0%	0	53%	2.0
Organic litter	35	2	6%	0	35	8	23%	0	35	19	54%	0	28%	0.0
Large trees (euc plus non-euc)	51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.0
Large Euc trees/ha	30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha	21	0			21	0			21	0				
Coarse woody debris	735	0	0%	0	735	10	1%	0	735	90	12%	0	5%	0.0
Non-native plant cover	0	75		0	0	90		0	0	50		0		0.0
Quality and availability of food and foraging habitat	10			1	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1	10			1		1.0
Site Condition Score				15				8.5				10		11.2
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**0.45**				**0.26**				**0.30**		**0.34**
Site Context														
Size of patch	10			2	10			0	10			2		1.33
Connectedness	5			2	5			4	5			4		3.33
Context	5			2	5			2	5			4		2.67
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1		1.00
Threats to the species	15			1	15			1	15			1		1.00
Species mobility capacity	10			1	10			1	10			1		1.00
Site Context Score				15				15				19		16.33
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				**0.80**				**0.80**				**1.02**		**0.88**

TABLE 3

Species Stocking Rate (SSR)							Hab	Rest	Hab	Rest
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		Score	0	5		10	0	0		
			No	Yes - adjacent		Yes - on site				
Species usage of the site (habitat type & evidenced usage)		Score	0	5	10	15	15	0		
			Not habitat	Dispersal	Foraging	Breeding			If present, species likely to be breeding	
Approximate density (per ha)		Score	0	10	20	30	0	0		
			0%							
Role/importance of species population on site*		Score (*Total*	0	5	10	15	10	0		
			0	5 - 15	20 - 35	40 - 45				
Total SRR score (out of 70)							25	0		
SRR Score (out of 4)	4						1.43	0.00		

TABLE 4

*SSR Supplementary Table					Hab	Rest	Hab	Rest
*Key source population for breeding		Score	0	10	10	0	If present, likely to be I	No population considered likely due to current habitat condition (modified, historically cleared)
			No	Yes/ Possibly				
*Key source population for dispersal		Score	0	5	5	0	If breeding, likely to be	No population considered likely due to current habitat condition (modified, historically cleared)
			No	Yes/ Possibly				
*Necessary for maintaining genetic diversity		Score	0	15	15	0	If breeding/dispersing	No population considered likely due to current habitat condition (modified, historically cleared)
			No	Yes/ Possibly				
*Near the limit of the species range		Score	0	15	0	0	Not near limite of spec	Not near limite of species range
			No	Yes				
				TOTAL	30	0		

TABLE 5

Final habitat quality score (weighted)		AU01 - RE 11.11.15 Adv Regrowth	AU05 - RE 11.11.3 Remnant	AU06 - RE 11.12.1 Regrowth	AU07 - RE 11.3.25 Remnant	AU08 - RE 11.3.4 Remnant	AU10 - RE 11.7.4 Remnant	AU12 - RE 11.7.6 Remnant	AU02 - RE 11.11.15 Regrowth	AU03 - RE 11.11.3c Regrowth	AU04 - RE 11.11.3 Regrowth	AU09 - RE 11.5.20 Regrowth	AU11 - RE 11.7.6 Regrowth	AU13 - RE 11.9.5a Regrowth	Total	
Final habitat quality score (weighted)		**AU01**	**AU05**	**AU06**	**AU07**	**AU08**	**AU10**	**AU12**	**AU02**	**AU03**	**AU04**	**AU09**	**AU11**	**AU13**		
Site Condition score (out of 3)		0.95	2.52	1.17	1.78	2.07	2.05	2.00	0.69	0.93	1.05	0.82	0.61	0.34		
Site Context Score (out of 3)		1.98	1.98	1.98	2.02	1.98	1.63	2.40	1.39	1.34	1.50	1.46	1.67	0.88		
Species Stocking Rate Score (out of 4)		1.43	1.43	1.43	1.43	1.43	1.43	1.43	0.00	0.00	0.00	0.00	0.00	0.00		
Habitat Quality score (out of 10)		*4.36*	*5.93*	*4.58*	*5.23*	*5.48*	*5.11*	*5.84*	*2.08*	*2.27*	*2.55*	*2.28*	*2.28*	*1.21*		
Assessment Unit area (ha)		0.00	0.00	0.00	0.00	0.00	1400.00	0.00	0.00	0.00	0.00	0.00	0.00	28.00	1428.00	
Total offset area (ha) for this MNES		1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00		
Size Weighting		0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.00	
Weighted Habitat Quality Score		0.00	0.00	0.00	0.00	0.00	5.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	5.03	**5.00**
																rounded

Appendix 11 - Habitat quality scores - Dunmall's Snake - quality with offset

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

DunSnk (Hab)

Assessment Unit - Regional Ecosystem		AU01 - RE 11.11.15 Adv Regrowth								AU01 (11.11.15 regrowth)		AU05 - RE 11.11.3 Remnant								AU05 (11.11.3 remnan	
Site Reference		Benchmark	T-23			Benchmark	T-24					Benchmar	T-26			Benchmar	T-28			Average %	Average
		11.11.15	Raw Data	% Benchmark	Score	11.11.15	Raw Data	% Benchmark	Score	Average % Benchmark	Average Score	11.11.3	Raw Data	% Benchm	Score	11.11.3	Raw Data	% Benchm	Score	Benchmar	score
Recruitment of woody perennial species in EDL		100	100	100%	5	100	100	100%	5	100%	5.0	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees		4	4	100%	5	4	5	125%	5	113%	5.0	3	5	167%	5	3	8	267%	5	217%	5.0
Native plant species richness - shrubs		3	6	200%	5	3	3	100%	5	150%	5.0	6	7	117%	5	6	10	167%	5	142%	5.0
Native plant species richness - grasses		7	7	100%	5	7	7	100%	5	100%	5.0	6	11	183%	5	6	14	233%	5	208%	5.0
Native plant species richness - forbes		12	12	100%	5	12	11	92%	5	96%	5.0	14	9	64%	3	14	17	121%	5	93%	4.0
Tree canopy height (average of emergent, canopy, sub-canopy)		14	3.333333333	28%	1.5	14		28%	1.5	28%	1.5	21.5		83%	5	21.5		77%	5	80%	5.0
Emergent height		na		0		na	0					na	0			na	0				
Canopy height		18	10	56%	3	18	10	56%	3			28	21	75%	5	28	20.5	73%	5		
Subcanopy height		10	0	0%	0	10	0	0%	0			15	13.5	90%	5	15	12	80%	5		
Tree canopy cover (average of emergent, canopy, sub-canopy)		36		30%	2.5	36		38%	2.5	34%	2.5	41.5		80%	5	41.5		94%	5	87%	5.0
Emergent cover		na	0			na	0					na	0			na	0				
Canopy cover		35	21.1	60%	5	35	26.9	77%	5			45	48.4	108%	5	45	50.4	112%	5		
Subcanopy cover		37	0	0%	0	37	0	0%	0			38	19.6	52%	5	38	29.2	77%	5		
Shrub canopy cover		5	15	302%	3	5	0	0%	0	151%	1.5	6	27	442%	3	6	5	82%	5	262%	4.0
Native grass cover		45	24	53%	3	45	27.4	61%	3	57%	3.0	17	9	53%	3	17	26	153%	5	103%	4.0
Organic litter		23	24	104%	5	23	22	96%	5	100%	5.0	50	67.6	135%	5	50	47.4	95%	5	115%	5.0
Large trees (euc plus non-euc)		3	2	67%	10	3	6	200%	15	133%	12.5	9	4	44%	5	9	4	44%	5	44%	5.0
Large Euc trees/ha		na	2			na	6					na	4			na	4				
Large non-euc trees/ha		3	0	0%		3	0	0%				9	0	0%		9	0	0%			
Coarse woody debris		441	520	118%	5	441	170	39%	2	78%	3.5	642	970	151%	5	642	1010	157%	5	154%	5.0
Non-native plant cover		0	45		3	0	45		3		3.0	0	3		10	0	2		10		10.0
Quality and availability of food and foraging habitat		10			1	10			1		1.0	10			10	10			10		10.0
Quality and availability of shelter		10			1	10			1		1.0	10			10	10			10		10.0
Site Condition Score					60				59		59.5				84				90		87
MAX Site Condition Score	*100*				*100*				*100*		100.00				*100*				*100*		*100*
Site Condition Score - out of 3	**3**				**1.80**				**1.77**		**1.79**				**2.52**				**2.70**		**2.61**
Site Context																					
Size of patch		10			2	10			2		2.00	10			2	10			2		2.00
Connectedness		5			4	5			4		4.00	5			4	5			4		4.00
Context		5			4	5			4		4.00	5			4	5			4		4.00
Ecological Corridors		6			6	6			6		6.00	6			6	6			6		6.00
Role of site location to species overall population in the state		5			4	5			4		4.00	5			4	5			4		4.00
Threats to the species		15			7	15			7		7.00	15			7	15			7		7.00
Species mobility capacity		10			10	10			10		10.00	10			10	10			10		10.00
Site Context Score					37				37		37.00				37				37		37.00
MAX Site Context Score	*56*				*56*				*56*		56				*56*				*56*		*56*
Site Context Score - out of 3	**3**				**1.98**				**1.98**		**1.98**				**1.98**				**1.98**		**1.98**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU06 - RE 11.12.1 Regrowth								AU06 (11.12.1 regrowth)		AU07 - RE 11.3.25 Remnant												AU07 (11.3.25 remnant)	
Site Reference	Benchmark	T-29			Benchmark	T-30					Benchmark	T-19			Benchmark	T-22			Benchmark	T-38				
	11.12.1	Raw Data	% Benchmark	Score	11.12.1	Raw Data	% Benchmark	Score	Average % Benchmark	Average score	11.3.25	Raw Data	% Benchmark	Score	11.3.25	Raw Data	% Benchmark	Score	11.3.25	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0	100	100	100%	5	100	50	50%	3	100	100	100%	5	83%	4.3
Native plant species richness - trees	3	9	300%	5	3	10	333%	5	317%	5.0	4	7	175%	5	4	7	175%	5	4	6	150%	5	167%	5.0
Native plant species richness - shrubs	6	4	67%	3	6	5	83%	3	75%	3.0	4	7	175%	5	4	4	100%	5	4	8	200%	5	158%	5.0
Native plant species richness - grasses	8	11	138%	5	8	14	175%	5	156%	5.0	8	4	50%	3	8	2	25%	3	8	3	38%	3	38%	3.0
Native plant species richness - forbes	13	18	138%	5	13	16	123%	5	131%	5.0	13	8	62%	3	13	5	38%	3	13	5	38%	3	46%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	12.5		22%	1.5	12.5		20%	1.5	21%	1.5	17		111%	5	17		143%	5	17		54%	2.5	103%	4.2
Emergent height	na	4.4			na	0					na	0			na	0			na	0				
Canopy height	15	6.5	43%	3	15	6	40%	3			23	24	104%	5	23	32.5	141%	5	23	25	109%	5		
Subcanopy height	10	0	0%	0	10	0	0%	0			11	13	118%	5	11	16	145%	5	11	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	37.5		31%	2.5	37.5		49%	2.5	40%	2.5	43.5		68%	3.5	43.5		75%	2.5	43.5		38%	2.5	60%	2.8
Emergent cover	na	15			na	17					na	0			na	0			na	0				
Canopy cover	35	21.5	61%	5	35	34.1	97%	5			34	40.4	119%	5	34	50.9	150%	5	34	25.8	76%	5		
Subcanopy cover	40	0	0%	0	40	0	0%	0			53	9.2	17%	2	53	0	0%	0	53	0	0%	0		
Shrub canopy cover	7	4	60%	5	7	6	79%	5	69%	5.0	12	5	45%	3	12	50	415%	3	12	31	256%	3	239%	3.0
Native grass cover	41	30	73%	3	41	22	54%	3	63%	3.0	35	37	106%	5	35	7.6	22%	1	35	7.2	21%	1	49%	2.3
Organic litter	28	20.6	74%	5	28	37	132%	5	103%	5.0	21	27	129%	5	21	20	95%	5	21	31.6	150%	5	125%	5.0
Large trees (euc plus non-euc)	4	2	50%	5	4	2	50%	5	50%	5.0	20	26	130%	15	20	16	80%	10	20	6	30%	5	80%	10.0
Large Euc trees/ha	na	2			na	2					13	24	185%		13	16	123%		13	6	46%			
Large non-euc trees/ha	4	0	0%		4	0	0%				7	2	29%		7	0	0%		7	0	0%			
Coarse woody debris	408	1180	289%	2	408	1280	314%	2	301%	2.0	473	590	125%	5	473	310	66%	5	473	850	180%	5	123%	5.0
Non-native plant cover	0	30		3	0	20		5		4.0	0	30		3	0	40		3	0	10		5		3.7
Quality and availability of food and foraging habitat	10			1	10			1		1.0	10			5	10			5	10			5		5.0
Quality and availability of shelter	10			10	10			10		10.0	10			5	10			5	10			10		6.7
Site Condition Score				61				63		62				75.5				63.5				65		68
MAX Site Condition Score				*100*				*100*		*100*				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**1.83**				**1.89**		**1.86**				**2.27**				**1.91**				**1.95**		**2.04**
Site Context																								
Size of patch	10			2	10			2		2.00	10			2	10			2	10			2		2.00
Connectedness	5			4	5			4		4.00	5			4	5			4	5			5		4.33
Context	5			4	5			4		4.00	5			4	5			4	5			5		4.33
Ecological Corridors	6			6	6			6		6.00	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			4	5			4		4.00	5			4	5			4	5			4		4.00
Threats to the species	15			7	15			7		7.00	15			7	15			7	15			7		7.00
Species mobility capacity	10			10	10			10		10.00	10			10	10			10	10			10		10.00
Site Context Score				37				37		37.00				37				37				39		37.67
MAX Site Context Score				*56*				*56*		*56*				*56*				*56*				*56*		*56*
Site Context Score - out of 3				**1.98**				**1.98**		**1.98**				**1.98**				**1.98**				**2.09**		**2.02**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Date - Regional Ecosystem	AUB5 - RE 11.3.4 Remnant				AUB5 (11.3.4 remnant)		AUB6 - RE 11.3.4 Remnant																												AUB9 (11.3.4 remnant)	
Sub Reference	Benchmark	T-12					Benchmark	T-03			Benchmark	T-06			Benchmark	T-10			Benchmark	T-20			Benchmark	T-22			Benchmark	T-34			Benchmark	T-37			Benchmark	T-41				
	11.3.4	Raw Data	% Benchmark	Score	Average % Benchmark	Average Score	11.3.4	Raw Data	% Benchmark	Score	11.3.4	Raw Data	% Benchmark	Score	11.3.4	Raw Data	% Benchmark	Score	11.3.4	Raw Data	% Benchmark	Score	11.3.4	Raw Data	% Benchmark	Score	11.3.4	Raw Data	% Benchmark	Score	11.3.4	Raw Data	% Benchmark	Score	11.3.4	Raw Data	% Benchmark	Score	Average % Benchmark	Average Score
Recruitment of woody perennial species in EDL	100	100	100%	5	100%	5.00	100	100	100%	5	100	100	100%	5	100	100	100%	5	100	50	50%	5	100	57.14	57%	5	100	75	75%	5	100	60	60%	5	100	100	100%	5	90%	5.0
Native plant species richness - trees	4	5	125%	5	125%	5.00	4	10	250%	5	4	8	200%	5	4	8	200%	5	4	6	150%	5	4	11	275%	5	4	11	275%	5	4	11	275%	5	4	11	275%	5	238%	5.0
Native plant species richness - shrubs	2	5	250%	5	250%	5.00	6	13	217%	5	6	5	83%	0	6	15	250%	5	6	10	167%	5	6	10	167%	5	6	9	150%	5	6	11	183%	5	6	16	267%	5	186%	4.8
Native plant species richness - grasses	7	11	157%	5	157%	5.00	7	6	86%	0	7	10	143%	5	7	7	100%	5	7	7	100%	5	7	5	71%	0	7	7	100%	5	7	8	114%	5	7	9	129%	5	105%	4.5
Native plant species richness - forbs	10	12	120%	5	120%	5.00	9	9	100%	5	9	16	178%	5	9	11	122%	5	9	9	100%	5	9	9	100%	5	9	7	78%	0	9	14	156%	5	9	12	133%	5	122%	4.8
Tree canopy height (average of emergent, canopy, sub-canopy)	17		83%	5	83%	5.00	13.5		78%	5	13.5		72%	4	13.5		122%	5	13.5		96%	5	13.5		97%	5	13.5		97%	5	13.5		129%	5	13.5		93%	5	98%	4.9
Emergent height	na	0					na	0			na	0			na	0			na	0			na	0			na	0			na	0			na	0				
Canopy height	22	18	82%	5			18	14	78%	5	18	14	78%	5	18	20	111%	5	18	16.5	92%	5	18	17	94%	5	18	17	94%	5	18	22	122%	5	18	16	89%	5		
Subcanopy height	12	10	83%	5			9	7	78%	5	9	6	67%	0	9	12	133%	5	9	9	100%	5	9	9	100%	5	9	9	100%	5	9	12	133%	5	9	9	100%	5		
Tree canopy cover (average of emergent, canopy, sub-canopy)	32.5		163%	4	163%	4.00	37.5		108%	0.5	37.5		94%	0.5	37.5		109%	1.5	37.5		58%	2.5	37.5		89%	0.5	37.5		115%	0.5	37.5		92%	0.5	37.5		98%	0.5		
Emergent cover	na	0					na	0			na	0			na	0			na	0			na	0			na	0			na	0			na	0				
Canopy cover	17	45.0	265%	0			29	51	176%	5	29	38.0	132%	5	29	60.5	209%	0	29	31.6	109%	5	29	42.7	147%	5	29	52.7	182%	5	29	53.0	184%	5	29	38.6	133%	5		
Subcanopy cover	48	28.5	59%	5			46	18.2	40%	2	46	16.5	36%	2	46	3.8	8%	0	46	3.2	7%	0	46	14.1	31%	2	46	21	46%	2	46	24.4	53%	5	46	23.4	51%	5		
Shrub canopy cover	5	7	135%	5	135%	5.00	8	29	365%	0	8	32	401%	0	8	20	256%	0	8	10	119%	5	8	24	300%	0	8	47	591%	0	8	47	584%	0	8	32	404%	0	377%	0.0
Native grass cover	43	51.6	120%	5	120%	5.00	12	10	83%	0	12	16	133%	5	12	32	267%	5	12	8	67%	0	12	7.6	63%	0	12	27	225%	5	12	29	242%	5	12	15.6	130%	5	151%	4.0
Organic litter	20	19.4	97%	5	97%	5.00	50	62	124%	5	50	52	104%	5	50	30	72%	5	50	47	94%	5	50	62.4	125%	5	50	41	82%	5	50	59	118%	5	50	47.6	95%	5	102%	5.0
Large trees (euc stub not euc)	10	12	120%	15	120%	15.00	14	28	200%	15	14	26	186%	15	14	40	286%	15	14	14	100%	10	14	26	186%	15	14	10	71%	15	14	12	86%	10	14	28	200%	15	164%	13.8
Large Euc trees/ha	9	12	133%				7	20	286%		7	26	371%		7	18	257%		7	10	143%		7	20	286%		7	8	114%		7	8	114%		7	4	57%			
Large non-euc trees/ha	1	0	0%				7	8	114%		7	0	0%		7	22	314%		7	4	57%		7	6	86%		7	2	29%		7	4	57%		7	24	343%			
Coarse woody debris	284	126	44%	2	44%	2.00	320	400	125%	5	320	620	194%	5	320	200	72%	5	320	170	53%	5	320	990	309%	5	320	770	241%	5	320	990	309%	2	320	520	163%	5	157%	4.6
Non-native plant cover	0	40		0		0.00	0	0		10	0	1		10	0	1		10	0	1		10	0	10		10	0	0		10	0	0		10	0	0		10	10.0
Quality and availability of food and foraging habitat	10			5		5.00	10			10	10			10	10			10	10			5	10			10	10			10	10			10	10	1		10	9.4
Quality and availability of shelter	10			5		5.00	10			10	10			10	10			10	10			5	10			10	10			10	10			10	10			10	9.4
Site Condition Score				79		79				92.5				93.5				94.5				80.5				92.5				94.5				93				92	
MAX Site Condition Score				100		100				100				100				100				100				100				100				100				100	
Site Condition Score - out of 5				2.37		2.37				2.78				2.81				2.84				2.42				2.78				2.84				2.78				2.76	
Site Context																																								
Size of patch	10			2		2	10			10	10			7	10			10	10			10	10			10	10			10	10			7	10			8.8	
Connectedness	5			4		4	5			5	5			5	5			5	5			5	5			5	5			5	5			4	5			4.75	
Corridor	5			4		4	5			5	5			5	5			5	5			5	5			5	5			5	5			4	5			4.75	
Ecological Corridors	6			6		6	6			6	6			6	6			6	6			6	6			6	6			6	6			6	6			6.00	
Role of this location to species overall population in the state	5			4		4	5			4	5			4	5			4	5			4	5			4	5			4	5			4	5			4.00	
Feedback to the species	15			7		7	15			15	15			15	15			15	15			15	15			15	15			15	15			15	15			15.00	
Species mobility capacity	10			10		10	10			10	10			10	10			10	10			10	10			10	10			10	10			10	10			10.00	
Site Context Score				37		37.00				55				52				55				50				55				55				50				53.38	
MAX Site Context Score				50		50				50				50				50				50				50				50				50				50	
Site Context Score - out of 5				1.85		1.85				2.75				2.79				2.75				2.75				2.75				2.75				2.75				2.66	

OFFSET - Dunnall's Snake, Glyphodon dunnalli (not currently habitat)

DunSnk|Habj

Assessment Unit - Regional Ecosystem	AU82 - RE 11.7.6 Remnant																												AU82 (11.7.6 remnant)	
Site Reference	Benchmark		T-01		Benchmark		T-02		Benchmark		T-05		Benchmark		T-18		Benchmark		T-35		Benchmark		T-36		Benchmark		T-38		Benchmark		T-39			
	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	75	75%	3	100	100	100%	5	100	100	100%	5	100	100	100%	5	100	66.66	67%	3	100	100	100%	5	100	100	100%	5	93%	4.5
Native plant species richness - trees	4	5	125%	5	4	9	225%	5	4	4	100%	5	4	6	150%	5	4	8	200%	5	4	10	250%	5	4	7	175%	5	4	11	275%	5	156%	5.0
Native plant species richness - shrubs	5	7	140%	5	5	15	300%	5	5	9	180%	5	5	9	180%	5	5	8	160%	5	5	8	160%	5	5	6	120%	5	5	10	200%	5	180%	5.0
Native plant species richness - grasses	10	7	70%	3	10	3	30%	3	10	7	70%	3	10	6	60%	3	10	6	60%	3	10	8	80%	3	10	7	70%	3	10	10	100%	5	68%	3.3
Native plant species richness - forbes	16	6	50%	3	16	6	38%	3	16	11	69%	3	16	6	38%	3	16	16	100%	5	16	13	81%	3	16	12	75%	3	16	16	100%	5	69%	3.5
Tree canopy height (average of emergent, canopy, sub-canopy)	19		98%	5	19		97%	5	19		74%	5	19		75%	5	19		60%	3	19		74%	3	19		96%	5	19		91%	5	85%	5.0
Emergent height	na	0			na	0			na	0			na	0			na	0			na	0			na	0			na	0				
Canopy height	25	21	84%	5	25	20.5	82%	5	25	18	72%	5	25	20.5	82%	5	25	21	84%	5	25	18	72%	5	25	22	88%	5	25	22.5	90%	5		
Subcanopy height	13	14.5	112%	5	13	14.5	112%	5	13	10	77%	5	13	9.5	73%	5	13	10	77%	5	13	10	77%	5	13	11	85%	5	13	12	92%	5		
Tree canopy cover (average of emergent, canopy, sub-canopy)	43		54%	3.5	43		95%	3.5	43		58%	3.5	43		46%	3.5	43		77%	3.5	43		49%	3.5	43		72%	2.5	43		79%	3.5	66%	3.4
Emergent cover	na	0			na	0			na	0			na	0			na	0			na	0			na	0			na	0				
Canopy cover	40	35	88%	5	40	60.3	151%	5	40	38.3	96%	5	40	25.3	63%	5	40	51.7	129%	5	40	25.4	66%	5	40	56.5	141%	5	40	46.6	117%	5		
Subcanopy cover	46	9.4	20%	2	46	18.3	40%	2	46	9.8	21%	2	46	13.5	29%	2	46	11.2	24%	2	46	14.4	31%	2	46	1.6	3%	0	46	19.3	42%	2		
Shrub canopy cover	7	46	661%	3	7	30	424%	3	7	43	686%	3	7	73	1036%	3	7	58	830%	3	7	41	588%	3	7	6	81%	5	7	53	760%	3	633%	3.3
Native grass cover	23	17	74%	3	23	11	48%	1	23	20	87%	3	23	29	126%	5	23	15.6	51%	3	23	16	70%	3	23	23.2	101%	5	23	21	91%	5	65%	3.5
Organic litter	52	55	106%	5	52	62	119%	5	52	40	77%	5	52	46.8	90%	5	52	57.6	111%	5	52	56.2	108%	5	52	37.8	73%	5	52	45.8	88%	5	96%	5.0
Large trees (exc plus non-exc)	22	20	91%	10	22	8	36%	5	22	12	55%	10	22	18	82%	10	22	12	55%	10	22	2	9%	5	22	4	18%	5	22	12	55%	10	50%	8.1
Large Exc trees/ha	11	16	145%		11	8	73%		11	12	109%		11	18	164%		11	12	109%		11	2	18%		11	4	36%		11	10	91%			
Large non-exc trees/ha	11	4	36%		11	0	0%		11	0	0%		11	0	0%		11	0	0%		11	0	0%		11	0	0%		11	2	18%			
Coarse woody debris	217	920	424%	2	217	920	424%	2	217	560	258%	2	217	510	235%	2	217	1180	544%	2	217	1270	585%	2	217	570	263%	2	217	1440	664%	2	429%	2.0
Non-native plant cover	0	0		10	0	0		10	0	2		10	0	1		10	0	1		10	0	1		10	0	3		10	0	0		10		10.0
Quality and availability of food and foraging habitat	10			10	10			10	10			10	10			10	10			10	10			10	10			5	10			10		9.4
Quality and availability of shelter	10			10	10			10	10			10	10			10	10			10	10			10	10			5	10			10		9.4
Site Condition Score				82.5				73.5				82.5				84.5				84.5				75.5				70.5				88.5		80.3
MAX Site Condition Score				100				100				100				100				100				100				100				100		100
Site Condition Score - out of 3				2.48				2.21				2.48				2.54				2.54				2.27				2.12				2.66		2.41
Site Context																																		
Size of patch	10			10	10			10	10			5	10			10	10			10	10			10	10			7	10			7		8.63
Connectedness	5			5	5			5	5			4	5			5	5			5	5			5	5			4	5			4		4.63
Context	5			5	5			5	5			4	5			5	5			5	5			5	5			4	5			4		4.63
Ecological Corridors	6			6	6			6	6			6	6			6	6			6	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			4	5			4	5			4	5			4	5			4	5			4	5			4	5			4		4.00
Threats to the species	15			7	15			7	15			7	15			7	15			7	15			7	15			7	15			7		7.00
Species mobility capacity	10			10	10			10	10			10	10			10	10			10	10			10	10			10	10			10		10.00
Site Context Score								47								47								47								42		44.88
MAX Site Context Score								56								56								56								56		56
Site Context Score - out of 3								2.52								2.52								2.52								2.25		2.40

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

DunSnk (Hab)

Assessment Unit - Regional Ecosystem	AU02 - RE 11.11.15 Regrowth								AU2 (11.11.15 regrowth)	
Site Reference	Benchmark 11.11.15	T-16 Raw Data	T-16 % Benchmark	T-16 Score	Benchmark 11.11.15	T-25 Raw Data	T-25 % Benchmark	T-25 Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	4	0	0%	2.5	4	3	75%	3	38%	2.8
Native plant species richness - shrubs	3	5	167%	5	3	5	167%	5	167%	5.0
Native plant species richness - grasses	7	5	71%	3	7	5	71%	3	71%	3.0
Native plant species richness - forbs	12	17	142%	5	12	15	125%	5	133%	5.0
Tree canopy height (average of emergent, canopy, sub-canopy)	14		0%	0	14		0%	0	0%	0.0
Emergent height	na	0			na	0				
Canopy height	18	0	0%	0	18	0	0%	0		
Subcanopy height	10	0	0%	0	10	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	36	0	0%	0	36		0%	0	0%	0.0
Emergent cover	na	0			na	0				
Canopy cover	35	0	0%	0	35	0	0%	0		
Subcanopy cover	37	0	0%	0	37	0	0%	0		
Shrub canopy cover	5	8	164%	5	5	6	128%	5	146%	5.0
Native grass cover	45	15.2	34%	1	45	18	40%	1	37%	1.0
Organic litter	23	24.4	106%	5	23	19.4	84%	5	95%	5.0
Large trees (euc plus non-euc)	3	0	0%	0	3	0	0%	0	0%	0.0
Large Euc trees/ha	na	0			na	0				
Large non-euc trees/ha	3	0	0%		3	0	0%			
Coarse woody debris	441	1160	263%	2	441	970	220%	2	241%	2.0
Non-native plant cover	0	55		0	0	60		0		0.0
Quality and availability of food and foraging habitat	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1		1.0
Site Condition Score				35.5				36		35.8
MAX Site Condition Score				*100*				*100*		*100*
Site Condition Score - out of 3				1.07				1.08		1.07
Site Context										
Size of patch	10			2	10			2		2.00
Connectedness	5			2	5			4		3.00
Context	5			2	5			4		3.00
Ecological Corridors	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1		1.00
Threats to the species	15			1	15			1		1.00
Species mobility capacity	10			10	10			10		10.00
Site Context Score				24				28		26.00
MAX Site Context Score				*56*				*56*		*56*
Site Context Score - out of 3				1.29				1.50		1.39

Assessment Unit - Regional Ecosystem	AU03 - RE 11.11.3c Regrowth								AU3 (11.11.3c regrowth)	
Site Reference	Benchmark 11.11.3c	T-17 Raw Data	T-17 % Benchmark	T-17 Score	Benchmark 11.11.3c	T-42 Raw Data	T-42 % Benchmark	T-42 Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	3	2	67%	3	3	3	100%	5	80%	4.0
Native plant species richness - shrubs	6	6	100%	5	6	6	100%	5	100%	5.0
Native plant species richness - grasses	6	10	167%	5	6	13	217%	5	192%	5.0
Native plant species richness - forbs	14	9	64%	3	14	10	71%	3	68%	3.0
Tree canopy height (average of emergent, canopy, sub-canopy)	21.5		8%	0	21.5		0%	0	4%	0.0
Emergent height	na	0			na	0				
Canopy height	28	4.5	16%	0	28	0	0%	0		
Subcanopy height	15	0	0%	0	15	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	41.5		7%	1	41.5		0%	0	4%	0.5
Emergent cover	na	0			na	22				
Canopy cover	45	6.5	14%	2	45	0	0%	0		
Subcanopy cover	38	0	0%	0	38	0	0%	0		
Shrub canopy cover	6	11	180%	5	6	26	433%	3	306%	4.0
Native grass cover	17	40	235%	5	17	51	300%	5	268%	5.0
Organic litter	50	16.4	33%	3	50	26	52%	5	42%	4.0
Large trees (euc plus non-euc)	9	0	0%	0	9	0	0%	0	0%	0.0
Large Euc trees/ha	na	0			na	0				
Large non-euc trees/ha	9	0	0%		9	0	0%			
Coarse woody debris	642	830	129%	5	642	1310	204%	2	167%	3.5
Non-native plant cover	0	20		5	0	20		5		5.0
Quality and availability of food and foraging habitat	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1		1.0
Site Condition Score				47				45		46
MAX Site Condition Score				*100*				*100*		*100*
Site Condition Score - out of 3				1.41				1.35		1.38
Site Context										
Size of patch	10			2	10			2		2.00
Connectedness	5			0	5			4		2.00
Context	5			2	5			4		3.00
Ecological Corridors	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1		1.00
Threats to the species	15			1	15			1		1.00
Species mobility capacity	10			10	10			10		10.00
Site Context Score				22				28		25.00
MAX Site Context Score				*56*				*56*		*56*
Site Context Score - out of 3				1.18				1.50		1.34

Assessment Unit - Regional Ecosystem	AU04 - RE 11.11.3 Regrowth								AU4 (11.11.3 regrowth)	
Site Reference	Benchmark 11.11.3	T-40 Raw Data	T-40 % Benchmark	T-40 Score	Benchmark 11.11.3	T-44 Raw Data	T-44 % Benchmark	T-44 Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	3	5	167%	5	3	6	200%	5	183%	5.0
Native plant species richness - shrubs	6	7	117%	5	6	10	167%	5	142%	5.0
Native plant species richness - grasses	6	8	133%	5	6	7	117%	5	125%	5.0
Native plant species richness - forbs	14	13	93%	5	14	13	93%	5	93%	5.0
Tree canopy height (average of emergent, canopy, sub-canopy)	21.5		0%	0	21.5		0%	0	0%	0.0
Emergent height	na	0			na	9.9				
Canopy height	28	0	0%	0	28	0	0%	0		
Subcanopy height	15	0	0%	0	15	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	41.5		0%	0	41.5		0%	0	0%	0.0
Emergent cover	na	0			na	26				
Canopy cover	45	0	0%	0	45	0	0%	0		
Subcanopy cover	38	0	0%	0	38	0	0%	0		
Shrub canopy cover	6	15	248%	3	6	19	313%	3	280%	3.0
Native grass cover	17	35.6	209%	5	17	15	88%	3	149%	4.0
Organic litter	50	25.6	51%	5	50	31	62%	5	57%	5.0
Large trees (euc plus non-euc)	9	0	0%	0	9	4	44%	5	22%	2.5
Large Euc trees/ha	na	0			na	4				
Large non-euc trees/ha	9	0	0%		9	0	0%			
Coarse woody debris	642	760	118%	5	642	840	131%	5	125%	5.0
Non-native plant cover	0	20		5	0	40		3		4.0
Quality and availability of food and foraging habitat	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1		1.0
Site Condition Score				50				51		50.5
MAX Site Condition Score				*100*				*100*		*100*
Site Condition Score - out of 3				1.50				1.53		1.52
Site Context										
Size of patch	10			2	10			2		2.00
Connectedness	5			4	5			4		4.00
Context	5			4	5			4		4.00
Ecological Corridors	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1		1.00
Threats to the species	15			1	15			1		1.00
Species mobility capacity	10			10	10			10		10.00
Site Context Score				28				28		28.00
MAX Site Context Score				*56*				*56*		*56*
Site Context Score - out of 3				1.50				1.50		1.50

Assessment Unit - Regional Ecosystem	AU08 - RE 11.5.20 Regrowth												AU8 (11.5.20 regrowth)	
Site Reference	Benchmark 11.5.20	T-13 Raw Data	T-13 % Benchmark	T-13 Score	Benchmark 11.5.20	T-14 Raw Data	T-14 % Benchmark	T-14 Score	Benchmark 11.5.20	T-31 Raw Data	T-31 % Benchmark	T-31 Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	3	2	67%	3	3	2	67%	3	3	3	100%	5	78%	3.7
Native plant species richness - shrubs	4	8	200%	5	4	4	100%	5	4	6	150%	5	150%	5.0
Native plant species richness - grasses	7	6	86%	3	7	10	143%	5	7	10	143%	5	124%	4.3
Native plant species richness - forbs	13	18	138%	5	13	9	69%	3	13	8	62%	3	90%	3.7
Tree canopy height (average of emergent, canopy, sub-canopy)	16.5		0%	0	16.5		0%	0	16.5		0%	0	0%	0.0
Emergent height	na	0			na	0			na	0				
Canopy height	23	0	0%	0	23	0	0%	0	23	0	0%	0		
Subcanopy height	10	0	0%	0	10	0	0%	0	10	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	44.5		0%	0	44.5		0%	0	44.5		0%	0	0%	0.0
Emergent cover	na	24			na	0			na	0				
Canopy cover	43	0	0%	0	43	0	0%	0	43	0	0%	0		
Subcanopy cover	46	0	0%	0	46	0	0%	0	46	0	0%	0		
Shrub canopy cover	38	14	36%	3	38	27	71%	5	38	9	24%	3	44%	3.7
Native grass cover	8	16	200%	5	8	40	500%	5	8	53	663%	5	454%	5.0
Organic litter	57	6	11%	3	57	6	11%	3	57	19.6	34%	3	18%	3.0
Large trees (euc plus non-euc)	15	2	13%	5	15	0	0%	0	15	0	0%	0	4%	1.7
Large Euc trees/ha	10	2	20%		10	0	0%		10	0	0%			
Large non-euc trees/ha	5	0	0%		5	0	0%		5	0	0%			
Coarse woody debris	178	600	337%	2	178	410	230%	2	178	330	185%	5	251%	3.0
Non-native plant cover	0	25		5	0	30		3	0	10		5		4.3
Quality and availability of food and foraging habitat	10			1	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1	10			1		1.0
Site Condition Score				46				41				46		44.3
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				1.38				1.23				1.38		1.33
Site Context														
Size of patch	10			5	10			5	10			2		4.00
Connectedness	5			2	5			2	5			4		2.67
Context	5			2	5			2	5			4		2.67
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1		1.00
Threats to the species	15			1	15			1	15			1		1.00
Species mobility capacity	10			10	10			10	10			10		10.00
Site Context Score				27				27				28		27.33
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				1.45				1.45				1.50		1.48

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

DunSnk (Hab)

Assessment Unit - Regional Ecosystem	AU11 - RE 11.7.6 Regrowth																				AU11 (11.7.6 regrowth)	
Site Reference	Benchmark	T-07			Benchmark	T-09			Benchmark	T-11			Benchmark	T-21			Benchmark	T-27			Benchmark	T-33			Average % Benchmark	Average score
	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score	11.7.6	Raw Data	% Benchmark	Score		
Recruitment of woody perennial species in EDL	100	100	100%	5	100	100	100%	5	100	100	100%	5	100	100	100%	5	100	100	100%	5	100	100	100%	5	100%	5.0
Native plant species richness - trees	4	3	75%	3	4	2	50%	3	4	6	150%	5	4	3	75%	3	4	8	200%	5	4	6	150%	5	117%	4.0
Native plant species richness - shrubs	5	7	140%	5	5	4	80%	3	5	7	140%	5	5	7	140%	5	5	3	60%	3	5	6	120%	5	113%	4.3
Native plant species richness - grasses	10	8	80%	3	10	8	80%	3	10	5	50%	3	10	6	60%	3	10	7	70%	3	10	6	60%	3	67%	3.0
Native plant species richness - forbes	16	18	113%	5	16	16	100%	5	16	13	81%	3	16	8	50%	3	16	13	81%	3	16	15	94%	5	86%	4.0
Tree canopy height (average of emergent, canopy, sub-canopy)	19		0%	0	19		0%	0	19		13%	1.5	19		0%	0	19		12%	0	19		13%	1.5	6%	0.5
Emergent height	na		0		na		0		na	6.9			na		0		na	0			na	2.9				
Canopy height	25	0	0%	0	25	0	0%	0	25	6.5	26%	3	25	0	0%	0	25	6	24%	0	25	6.5	26%	3		
Subcanopy height	13	0	0%	0	13	0	0%	0	13	0	0%	0	13	0	0%	0	13	0	0%	0	13	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	43		0%	0	43		0%	0	43		101%	1.5	43		0%	0	43		83%	2.5	43		88%	2.5	45%	1.1
Emergent cover	na	0			na	0			na	21			na	22			na	0			na	16				
Canopy cover	40	0	0%	0	40	0	0%	0	40	80.9	202%	3	40	0	0%	0	40	66.6	167%	5	40	70.2	176%	5		
Subcanopy cover	46	0	0%	0	46	0	0%	0	46	0	0%	0	46	0	0%	0	46	0	0%	0	46	0	0%	0		
Shrub canopy cover	7	18	254%	3	7	4	59%	5	7	17	241%	3	7	31	445%	3	7	27	386%	3	7	20	288%	3	279%	3.3
Native grass cover	23	24	104%	5	23	31	135%	5	23	8	35%	1	23	11.4	50%	1	23	16	70%	3	23	12	52%	3	74%	3.0
Organic litter	52	22	42%	3	52	2	4%	0	52	78	150%	5	52	27	52%	5	52	56	108%	5	52	47.4	91%	5	74%	3.8
Large trees (euc plus non-euc)	22	0	0%	0	22	0	0%	0	22	8	36%	5	22	0	0%	0	22	0	0%	0	22	2	9%	5	8%	1.7
Large Euc trees/ha	11	0	0%		11	0	0%		11	8			11	0			11	0			11	0				
Large non-euc trees/ha	11	0	0%		11	0	0%		11	0	0%		11	0	0%		11	0	0%		11	2	18%			
Coarse woody debris	217	210	97%	5	217	40	18%	2	217	530	244%	2	217	2570	1184%	2	217	1610	742%	2	217	2440	1124%	2	568%	2.5
Non-native plant cover	0	10		5	0	60		0	0	3		10	0	60		0	0	3		10	0	10		5		5.0
Quality and availability of food and foraging habitat	10			1	10			1	10			1	10			1	10			1	10			1		1.0
Quality and availability of shelter	10			1	10			1	10			1	10			1	10			1	10			1		1.0
Site Condition Score				44				33				52				32				46.5				52		43.3
MAX Site Condition Score				*100*				*100*				*100*				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**1.32**				**0.99**				**1.56**				**0.96**				**1.40**				**1.56**		**1.30**
Site Context																										
Size of patch	10			5	10			2	10			5	10			5	10			10	10			2		4.83
Connectedness	5			4	5			4	5			5	5			5	5			5	5			2		4.17
Context	5			4	5			4	5			5	5			5	5			5	5			2		4.17
Ecological Corridors	6			6	6			6	6			6	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1	5			1	5			1	5			1		1.00
Threats to the species	15			1	15			1	15			1	15			1	15			1	15			1		1.00
Species mobility capacity	10			10	10			10	10			10	10			10	10			10	10			10		10.00
Site Context Score				31				28				33				33				38				24		31.17
MAX Site Context Score				56				56				56				56				56				56		56
Site Context Score - out of 3				**1.66**				**1.50**				**1.77**				**1.77**				**2.04**				**1.29**		**1.67**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Assessment Unit - Regional Ecosystem	AU13 - RE 11.9.5a Regrowth												AU13 (11.9.5a regrowth)	
Site Reference	Benchmark	T-03			Benchmark	T-04			Benchmark	T-15			Average % Benchmark	Average score
	11.9.5a	Raw Data	% Benchmark	Score	11.9.5a	Raw Data	% Benchmark	Score	11.9.5a	Raw Data	% Benchmark	Score		
Recruitment of woody perennial species in EDL	100	0	0%	3	100	100	100%	5	100	0	0%	3	33%	3.7
Native plant species richness - trees	7	2	29%	3	7	5	71%	3	7	2	29%	3	43%	3.0
Native plant species richness - shrubs	7	3	43%	3	7	2	29%	3	7	8	114%	5	62%	3.7
Native plant species richness - grasses	5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.8
Native plant species richness - forbes	9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.3
Tree canopy height (average of emergent, canopy, sub-canopy)	12		22%	2.5	12		19%	2.5	12		0%	2.5	14%	2.5
Emergent height	na	0			na	0			na	0				
Canopy height	16	7	44%	5	16	6	38%	5	16	0	0%	5		
Subcanopy height	8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)	26		26%	5	26		30%	5	26		0%	5	19%	5.0
Emergent cover	na	0			na	0			na	0				
Canopy cover	26	6.8	26%	5	26	7.8	30%	5	26	0	0%	5		
Subcanopy cover	na	0			na	0			na	0				
Shrub canopy cover	31	2	8%	3	31	4	13%	3	31	28	89%	5	36%	3.7
Native grass cover	19	28	147%	5	19	2	11%	3	19	0	0%	3	53%	3.7
Organic litter	35	2	6%	3	35	8	23%	5	35	19	54%	5	28%	4.3
Large trees (euc plus non-euc)	51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.0
Large Euc trees/ha	30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha	21	0			21	0			21	0				
Coarse woody debris	735	0	0%	2	735	10	1%	2	735	90	12%	2	5%	2.0
Non-native plant cover	0	75		3	0	90		3	0	50		3		3.0
Quality and availability of food and foraging habitat	10			10	10			10	10			10		10.0
Quality and availability of shelter	10			10	10			10	10			10		10.0
Site Condition Score				60.5				60				64.5		61.7
MAX Site Condition Score				*100*				*100*				*100*		*100*
Site Condition Score - out of 3				**1.82**				**1.80**				**1.94**		**1.85**
Site Context														
Size of patch	10			5	10			5	10			5		5.00
Connectedness	5			4	5			4	5			4		4.00
Context	5			4	5			4	5			4		4.00
Ecological Corridors	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state	5			1	5			1	5			1		1.00
Threats to the species	15			15	15			15	15			15		15.00
Species mobility capacity	10			10	10			10	10			10		10.00
Site Context Score				45				45				45		45.00
MAX Site Context Score				*56*				*56*				*56*		*56*
Site Context Score - out of 3				**2.41**				**2.41**				**2.41**		**2.41**

TABLE 3

Species Stocking Rate (SSR)								Hab	Rest	Hab	Rest
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		Score	0	5		10		0	0		
			No	Yes - adjacent		Yes - on site					
Species usage of the site (habitat type & evidenced usage)		Score	0	5	10	15		15	0		
			Not habitat	Dispersal	Foraging	Breeding				If present, species likely to be breeding	
Approximate density (per ha)		Score	0	10	20	30		0	0		
			0%								
Role/importance of species population on site*		Score	0	5	10		15	10	0		
		(Total	0	5 - 15	20 - 35		40 - 45				
Total SRR score (out of 70)								25	0		
SRR Score (out of 4)	4							1.43	0.00		

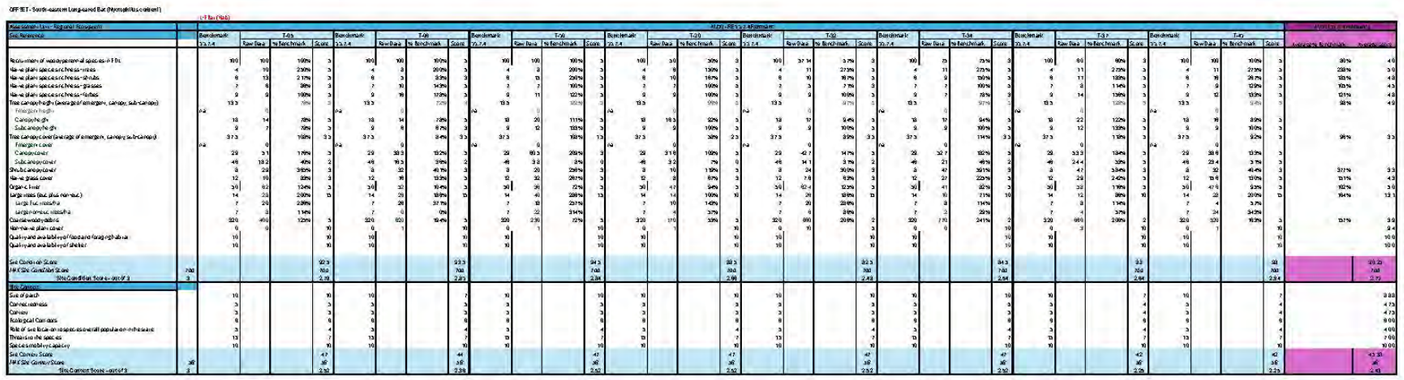
TABLE 4

*SSR Supplementary Table					Hab	Rest	Hab	Rest
*Key source population for breeding		Score	0	10	10	0	If present, likely to be I	No population considered likely due to current habitat condition (modified, historically cleared)
		No	Yes/ Possibly					
*Key source population for dispersal		Score	0	5	5	0	If breeding, likely to be	No population considered likely due to current habitat condition (modified, historically cleared)
		No	Yes/ Possibly					
*Necessary for maintaining genetic diversity		Score	0	15	15	0	If breeding/dispersing.	No population considered likely due to current habitat condition (modified, historically cleared)
		No	Yes/ Possibly					
*Near the limit of the species range		Score	0	15	0	0	Not near limite of spec	Not near limite of species range
		No	Yes					
				TOTAL	30	0		

TABLE 5

Final habitat quality score (weighted)		AU01 - RE 11.11.15 Adv Regrowth	AU05 - RE 11.11.3 Remnant	AU06 - RE 11.12.1 Regrowth	AU07 - RE 11.3.25 Remnant	AU08 - RE 11.3.4 Remnant	AU10 - RE 11.7.4 Remnant	AU12 - RE 11.7.6 Remnant	AU02 - RE 11.11.15 Regrowth	AU03 - RE 11.11.3c Regrowth	AU04 - RE 11.11.3 Regrowth	AU09 - RE 11.5.20 Regrowth	AU11 - RE 11.7.6 Regrowth	AU13 - RE 11.9.5a Regrowth	Total	
Final habitat quality score (weighted)		**AU01**	**AU05**	**AU06**	**AU07**	**AU08**	**AU10**	**AU12**	**AU02**	**AU03**	**AU04**	**AU09**	**AU11**	**AU13**		
Site Condition score (out of 3)		1.79	2.61	1.86	2.04	2.37	2.76	2.41	1.07	1.38	1.52	1.33	1.30	1.85		
Site Context Score (out of 3)		1.98	1.98	1.98	2.02	1.98	2.86	2.40	1.39	1.34	1.50	1.46	1.67	2.41		
Species Stocking Rate Score (out of 4)		1.43	1.43	1.43	1.43	1.43	1.43	1.43	0.00	0.00	0.00	0.00	0.00	0.00		
Habitat Quality score (out of 10)		*5.20*	*6.02*	*5.27*	*5.49*	*5.78*	*7.05*	*6.24*	*2.47*	*2.72*	*3.02*	*2.79*	*2.97*	*4.26*		
Assessment Unit area (ha)		0.00	0.00	0.00	0.00	0.00	1400.00	0.00	0.00	0.00	0.00	0.00	0.00	28.00	1428.00	
Total offset area (ha) for this MNES		1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00		
Size Weighting		0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.00	
Weighted Habitat Quality Score		0.00	0.00	0.00	0.00	0.00	6.91	0.00	0.00	0.00	0.00	0.00	0.00	0.08	6.99	**7.00**
																rounded

Appendix 12 - Habitat quality scores - South-eastern Long-eared Bat - offset start quality



OFFSET - South-eastern Long-eared Bat (Nyctophilus corbeni)

L-EBat (Rest.)

Assessment Unit - Regional Ecosystem		AU13 - RE 11.9.5a Regrowth												AU13 (11.9.5a regrowth)	
Site Reference		Benchmark	T-03			Benchmark	T-04			Benchmark	T-15				
		11.9.5a	Raw Data	% Benchmark	Score	11.9.5a	Raw Data	% Benchmark	Score	11.9.5a	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL		100	0	0%	0	100	100	100%	5	100	0	0%	0	33%	1.7
Native plant species richness - trees		7	2	29%	3	7	5	71%	3	7	2	29%	3	43%	3.0
Native plant species richness - shrubs		7	3	43%	3	7	2	29%	3	7	8	114%	5	62%	3.7
Native plant species richness - grasses		5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.8
Native plant species richness - forbes		9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.3
Tree canopy height (average of emergent, canopy, sub-canopy)		12		22%	1.5	12		19%	1.5	12		0%	0	14%	1.0
Emergent height		na		0		na		0		na		0			
Canopy height		16	7	44%	3	16	6	38%	3	16	0	0%	0		
Subcanopy height		8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)		26		26%	1	26		30%	1	26		0%	0	19%	0.7
Emergent cover		na		0		na		0		na		0			
Canopy cover		26	6.8	26%	2	26	7.8	30%	2	26	0	0%	0		
Subcanopy cover		na		0	0	na		0	0	na		0	0		
Shrub canopy cover		31	2	8%	0	31	4	13%	3	31	28	89%	5	36%	2.7
Native grass cover		19	28	147%	5	19	2	11%	1	19	0	0%	0	53%	2.0
Organic litter		35	2	6%	0	35	8	23%	3	35	19	54%	5	28%	2.7
Large trees (euc plus non-euc)		51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.0
Large Euc trees/ha		30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha		21	0			21	0			21	0				
Coarse woody debris		735	0	0%	0	735	10	1%	0	735	90	12%	2	5%	0.7
Non-native plant cover		0	75		0	0	90		0	0	50		3		1.0
Quality and availability of food and foraging habitat		10			1	10			1	10			1		1.0
Quality and availability of shelter		10			1	10			1	10			1		1.0
Site Condition Score					23.5				28				33		28.16666667
MAX Site Condition Score	*100*				*100*				*100*				*100*		*100*
Site Condition Score - out of 3	**3**				**0.71**				**0.84**				**0.99**		**0.85**
Site Context															
Size of patch		10			2	10			0	10			2		1.33
Connectedness		5			2	5			4	5			4		3.33
Context		5			2	5			2	5			4		2.67
Ecological Corridors		6			6	6			6	6			6		6.00
Role of site location to species overall population in the state		5			1	5			1	5			1		1.00
Threats to the species		15			1	15			1	15			1		1.00
Species mobility capacity		10			10	10			10	10			10		10.00
Site Context Score					24				24				28		25.33
MAX Site Context Score	*56*				*56*				*56*				*56*		*56*
Site Context Score - out of 3	**3**				**1.29**				**1.29**				**1.50**		**1.36**

TABLE 3

Species Stocking Rate (SSR)							Hab	Rest	Hab	Rest
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		Score	0	5		10	0	0		
			No	Yes - adjacent		Yes - on site				
Species usage of the site (habitat type & evidenced usage)		Score	0	5	10	15	15	0		
			Not habitat	Dispersal	Foraging	Breeding			If present, species like	If present, breeding likely
Approximate density (per ha)		Score	0	10	20	30	0	0		
			0%							
Role/importance of species population on site*		Score	0	5	10	15	10	0		
		(Total	0	5 - 15	20 - 35	40 - 45				
Total SRR score (out of 70)							25	0		
SRR Score (out of 4)	4						1.43	0.00		

TABLE 4

*SSR Supplementary Table					Hab	Rest	Hab	Rest
*Key source population for breeding		Score	0	10	10	0	If present, likely to be l	If present, breeding likely
		No	Yes/ Possibly					If breeding, dispersal likely
*Key source population for dispersal		Score	0	5	5	0	If breeding, likely to be important population for dispersal	
		No	Yes/ Possibly					
*Necessary for maintaining genetic diversity		Score	0	15	15	0	If breeding/dispersing	Resident population not considered present and unlikely to establish
		No	Yes/ Possibly					
*Near the limit of the species range		Score	0	15	0	0	Not near limit of spec	Not near limit of species range
		No	Yes					
				TOTAL	30	0		

TABLE 5

Final habitat quality score (weighted)		AU10 - RE 11.7.4 Remnant	AU13 - RE 11.9.5a Regrowth	Total	
Final habitat quality score (weighted)		AU10	AU13		
Site Condition score (out of 3)		2.71	0.85		
Site Context Score (out of 3)		2.43	1.36		
Species Stocking Rate Score (out of 4)		1.43	0.00		
Habitat Quality score (out of 10)		6.57	2.20		
Assessment Unit area (ha)		2242.00	28.00	2270.00	
Total offset area (ha) for this MNES		2270.00	2270.00		
Size Weighting		0.99	0.01	1.00	
Weighted Habitat Quality Score		6.49	0.03	6.51	7.00
					rounded

Appendix 13 - Habitat quality scores - South-eastern Long-eared Bat - quality without offset

OFFSET - South-eastern Long-eared Bat (Nyctophilus corbeni)

L-E Bat (Hab)

Assessment unit - Regional Ecosystem: AU10 - RE 11.7.4 Remnant

Site Reference		Benchmark 11.7.4	T-06 Raw Data	T-06 % Benchmark	T-06 Score	Benchmark 11.7.4	T-08 Raw Data	T-08 % Benchmark	T-08 Score
Recruitment of woody perennial species in EDL		100	100	100%	3	100	100	100%	3
Native plant species richness - trees		4	10	250%	5	4	8	200%	5
Native plant species richness - shrubs		6	13	217%	5	6	5	83%	3
Native plant species richness - grasses		7	6	86%	3	7	10	143%	3
Native plant species richness - forbs		9	9	100%	5	9	16	178%	5
Tree canopy height (average of emergent, canopy, sub-canopy)		13.5		78%		13.5		72%	
Emergent height		na	0			na	0		
Canopy height		18	14	78%	5	18	14	78%	5
Subcanopy height		9	7	78%	5	9	6	67%	3
Tree canopy cover (average of emergent, canopy, sub-canopy)		37.5		108%	2	37.5		84%	2
Emergent cover		na	0			na	0		
Canopy cover		29	51	176%	5	29	38.3	132%	5
Subcanopy cover		46	18.2	40%	2	46	16.5	36%	2
Shrub canopy cover		8	29	363%	3	8	32	401%	3
Native grass cover		12	10	83%	3	12	16	133%	3
Organic litter		50	62	124%	5	50	52	104%	5
Large trees (euc plus non-euc)		14	28	200%	5	14	26	186%	5
Large Euc trees/ha		7	20	286%		7	26	371%	
Large non-euc trees/ha		7	8	114%		7	0	0%	
Coarse woody debris		320	400	125%	2	320	620	194%	2
Non-native plant cover		0	0		5	0	1		5
Quality and availability of food and foraging habitat		10			10	10			10
Quality and availability of shelter		10			10	10			10
Site Condition Score					69				67
MAX Site Condition Score	*100*				*100*				*100*
Site Condition Score - out of 3	3				2.07				2.01
Site Context									
Size of patch		10			10	10			7
Connectedness		5			5	5			5
Context		5			5	5			5
Ecological Corridors		6			6	6			6
Role of site location to species overall population in the state		5			4	5			4
Threats to the species		15			1	15			1
Species mobility capacity		10			1	10			1
Site Context Score					32				29
MAX Site Context Score	56				56				56
Site Context Score - out of 3	3				1.71				1.66

Site Reference	Benchmark 11.7.4	T-10 Raw Data	T-10 % Benchmark	T-10 Score	Benchmark 11.7.4	T-20 Raw Data	T-20 % Benchmark	T-20 Score
Recruitment of woody perennial species in EDL	100	100	100%	3	100	50	50%	3
Native plant species richness - trees	4	8	200%	5	4	6	150%	5
Native plant species richness - shrubs	6	15	250%	5	6	10	167%	5
Native plant species richness - grasses	7	7	100%	3	7	7	100%	3
Native plant species richness - forbs	9	11	122%	5	9	9	100%	5
Tree canopy height (average of emergent, canopy, sub-canopy)	13.5		122%		13.5		96%	
Emergent height	na	0			na	0		
Canopy height	18	20	111%	5	18	16.5	92%	5
Subcanopy height	9	12	133%	5	9	9	100%	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	37.5		108%	1.5	37.5		98%	2
Emergent cover	na	0			na	0		
Canopy cover	29	60.5	209%	3	29	31.6	109%	5
Subcanopy cover	46	3.8	8%	0	46	3.2	7%	0
Shrub canopy cover	8	20	256%	3	8	10	119%	3
Native grass cover	12	32	267%	3	12	8	67%	3
Organic litter	50	36	72%	5	50	47	94%	5
Large trees (euc plus non-euc)	14	40	286%	5	14	14	100%	5
Large Euc trees/ha	7	18	257%		7	10	143%	
Large non-euc trees/ha	7	22	314%		7	4	57%	
Coarse woody debris	320	230	72%	2	320	170	53%	2
Non-native plant cover	0	1		5	0	1		5
Quality and availability of food and foraging habitat	10			10	10			10
Quality and availability of shelter	10			10	10			10
Site Condition Score				68.5				69
MAX Site Condition Score				*100*				*100*
Site Condition Score - out of 3				2.06				2.07
Site Context								
Size of patch	10			10	10			10
Connectedness	5			5	5			5
Context	5			5	5			5
Ecological Corridors	6			6	6			6
Role of site location to species overall population in the state	5			4	5			4
Threats to the species	15			1	15			1
Species mobility capacity	10			1	10			1
Site Context Score				32				32
MAX Site Context Score				56				56
Site Context Score - out of 3				1.71				1.71

Site Reference	Benchmark 11.7.4	T-32 Raw Data	T-32 % Benchmark	T-32 Score	Benchmark 11.7.4	T-34 Raw Data	T-34 % Benchmark	T-34 Score
Recruitment of woody perennial species in EDL	100	57.14	57%	3	100	75	75%	3
Native plant species richness - trees	4	11	275%	5	4	11	275%	5
Native plant species richness - shrubs	6	10	167%	5	6	9	150%	5
Native plant species richness - grasses	7	5	71%	3	7	7	100%	3
Native plant species richness - forbs	9	9	100%	5	9	7	78%	3
Tree canopy height (average of emergent, canopy, sub-canopy)	13.5		97%		13.5		97%	
Emergent height	na	0			na	0		
Canopy height	18	17	94%	5	18	17	94%	5
Subcanopy height	9	9	100%	5	9	9	100%	5
Tree canopy cover (average of emergent, canopy, sub-canopy)	37.5		89%	2	37.5		114%	2
Emergent cover	na	0			na	0		
Canopy cover	29	42.7	147%	5	29	52.7	182%	5
Subcanopy cover	46	14.1	31%	2	46	21	46%	2
Shrub canopy cover	8	24	300%	3	8	47	591%	3
Native grass cover	12	7.6	63%	3	12	27	225%	3
Organic litter	50	62.4	125%	5	50	41	82%	5
Large trees (euc plus non-euc)	14	26	186%	5	14	10	71%	5
Large Euc trees/ha	7	20	286%		7	8	114%	
Large non-euc trees/ha	7	6	86%		7	2	29%	
Coarse woody debris	320	660	206%	2	320	770	241%	2
Non-native plant cover	0	10		5	0	0		5
Quality and availability of food and foraging habitat	10			10	10			10
Quality and availability of shelter	10			10	10			10
Site Condition Score				69				67
MAX Site Condition Score				*100*				*100*
Site Condition Score - out of 3				2.07				2.01
Site Context								
Size of patch	10			10	10			10
Connectedness	5			5	5			5
Context	5			5	5			5
Ecological Corridors	6			6	6			6
Role of site location to species overall population in the state	5			4	5			4
Threats to the species	15			1	15			1
Species mobility capacity	10			1	10			1
Site Context Score				32				32
MAX Site Context Score				56				56
Site Context Score - out of 3				1.71				1.71

Site Reference	Benchmark 11.7.4	T-37 Raw Data	T-37 % Benchmark	T-37 Score	Benchmark 11.7.4	T-41 Raw Data	T-41 % Benchmark	T-41 Score	AU10 (11.7.4 remnant) Average % Benchmark	AU10 (11.7.4 remnant) Average score
Recruitment of woody perennial species in EDL	100	60	60%	3	100	100	100%	3	80%	3.0
Native plant species richness - trees	4	11	275%	5	4	11	275%	5	238%	5.0
Native plant species richness - shrubs	6	11	183%	5	6	16	267%	5	189%	4.8
Native plant species richness - grasses	7	8	114%	3	7	9	129%	3	109%	3.0
Native plant species richness - forbs	9	14	156%	5	9	12	133%	5	121%	4.8
Tree canopy height (average of emergent, canopy, sub-canopy)	13.5		128%		13.5		94%		98%	3.0
Emergent height	na	0			na	0				
Canopy height	18	22	122%	5	18	16	89%	5		
Subcanopy height	9	12	133%	5	9	9	100%	5		
Tree canopy cover (average of emergent, canopy, sub-canopy)	37.5		116%	2	37.5		92%	2	96%	1.9
Emergent cover	na	0			na	0				
Canopy cover	29	53.3	184%	5	29	38.6	133%	5		
Subcanopy cover	46	24.4	53%	5	46	23.4	51%	2		
Shrub canopy cover	8	47	584%	3	8	32	404%	3	377%	3.0
Native grass cover	12	29	242%	3	12	15.6	130%	3	151%	3.0
Organic litter	50	58	116%	5	50	47.6	95%	5	102%	5.0
Large trees (euc plus non-euc)	14	12	86%	5	14	28	200%	5	164%	5.0
Large Euc trees/ha	7	8	114%		7	4	57%			
Large non-euc trees/ha	7	4	57%		7	24	343%			
Coarse woody debris	320	660	206%	2	320	520	163%	2	157%	2.0
Non-native plant cover	0	3		5	0	1		5		5.0
Quality and availability of food and foraging habitat	10			10	10			10		10.0
Quality and availability of shelter	10			10	10			10		10.0
Site Condition Score				69				69		68.4375
MAX Site Condition Score				*100*				*100*		100
Site Condition Score - out of 3				2.07				2.07		2.06
Site Context										
Size of patch	10			7	10			7		8.88
Connectedness	5			4	5			4		4.75
Context	5			4	5			4		4.75
Ecological Corridors	6			6	6			6		6.00
Role of site location to species overall population in the state	5			4	5			4		4.00
Threats to the species	15			1	15			1		1.00
Species mobility capacity	10			1	10			1		1.00
Site Context Score				27				27		30.38
MAX Site Context Score				56				56		56
Site Context Score - out of 3				1.46				1.46		1.63

OFFSET - South-eastern Long-eared Bat (Nyctophilus corbeni)

L-EBat (Rest.)

Assessment Unit - Regional Ecosystem		AU13 - RE 11.9.5a Regrowth												AU13 (11.9.5a regrowth)	
Site Reference		Benchmark	T-03			Benchmark	T-04			Benchmark	T-15				
		11.9.5a	Raw Data	% Benchmark	Score	11.9.5a	Raw Data	% Benchmark	Score	11.9.5a	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL		100	0	0%	0	100	100	100%	0	100	0	0%	0	33%	0.0
Native plant species richness - trees		7	2	29%	0	7	5	71%	0	7	2	29%	0	43%	0.0
Native plant species richness - shrubs		7	3	43%	0	7	2	29%	0	7	8	114%	0	62%	0.0
Native plant species richness - grasses		5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.8
Native plant species richness - forbes		9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.3
Tree canopy height (average of emergent, canopy, sub-canopy)		12		22%	0	12		19%	0	12		0%	0	14%	0.0
Emergent height		na		0		na		0		na		0			
Canopy height		16	7	44%	3	16	6	38%	3	16	0	0%	0		
Subcanopy height		8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)		26		26%	0	26		30%	0	26		0%	0	19%	0.0
Emergent cover		na		0		na		0		na		0			
Canopy cover		26	6.8	26%	2	26	7.8	30%	2	26	0	0%	0		
Subcanopy cover		na		0	0	na		0	0	na		0	0		
Shrub canopy cover		31	2	8%	0	31	4	13%	0	31	28	89%	0	36%	0.0
Native grass cover		19	28	147%	5	19	2	11%	1	19	0	0%	0	53%	2.0
Organic litter		35	2	6%	0	35	8	23%	0	35	19	54%	0	28%	0.0
Large trees (euc plus non-euc)		51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.0
Large Euc trees/ha		30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha		21	0			21	0			21	0				
Coarse woody debris		735	0	0%	0	735	10	1%	0	735	90	12%	0	5%	0.0
Non-native plant cover		0	75		0	0	90		0	0	50		0		0.0
Quality and availability of food and foraging habitat		10			1	10			1	10			1		1.0
Quality and availability of shelter		10			1	10			1	10			1		1.0
Site Condition Score					15				8.5				10		11.16666667
MAX Site Condition Score	*100*				*100*				*100*				*100*		*100*
Site Condition Score - out of 3	**3**				**0.45**				**0.26**				**0.30**		**0.34**
Site Context															
Size of patch		10			2	10			0	10			2		1.33
Connectedness		5			2	5			4	5			4		3.33
Context		5			2	5			2	5			4		2.67
Ecological Corridors		6			6	6			6	6			6		6.00
Role of site location to species overall population in the state		5			1	5			1	5			1		1.00
Threats to the species		15			1	15			1	15			1		1.00
Species mobility capacity		10			1	10			1	10			1		1.00
Site Context Score					15				15				19		16.33
MAX Site Context Score	*56*				*56*				*56*				*56*		*56*
Site Context Score - out of 3	**3**				**0.80**				**0.80**				**1.02**		**0.88**

TABLE 3

Species Stocking Rate (SSR)								Hab	Rest	Hab	Rest
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		Score	0	5		10		0	0		
			No	Yes - adjacent		Yes - on site					
Species usage of the site (habitat type & evidenced usage)		Score	0	5	10	15		15	0		
			Not habitat	Dispersal	Foraging	Breeding				If present, species like	If present, breeding likely
Approximate density (per ha)		Score	0	10	20	30		0	0		
			0%								
Role/importance of species population on site*		Score (Total	0	5	10		15	10	0		
			0	5 - 15	20 - 35		40 - 45				
Total SRR score (out of 70)								25	0		
SRR Score (out of 4)	4							1.43	0.00		

TABLE 4

*SSR Supplementary Table					Hab	Rest	Hab	Rest
*Key source population for breeding		Score	0	10	10	0	If present, likely to be	If present, breeding likely
		No	Yes/ Possibly					If breeding, dispersal likely
*Key source population for dispersal		Score	0	5	5	0	If breeding, likely to be important population for dispersal	
		No	Yes/ Possibly					
*Necessary for maintaining genetic diversity		Score	0	15	15	0	If breeding/dispersing	Resident population not considered present and unlikely to establish
		No	Yes/ Possibly					
*Near the limit of the species range		Score	0	15	0	0	Not near limite of spe	Not near limite of species range
		No	Yes					
				TOTAL	30	0		

TABLE 5

Final habitat quality score (weighted)		AU10 - RE 11.7.4 Remnant	AU13 - RE 11.9.5a Regrowth	Total	
Final habitat quality score (weighted)		**AU10**	**AU13**		
Site Condition score (out of 3)		2.05	0.34		
Site Context Score (out of 3)		1.63	0.88		
Species Stocking Rate Score (out of 4)		1.43	0.00		
Habitat Quality score (out of 10)		*5.11*	*1.21*		
Assessment Unit area (ha)		2242.00	28.00	2270.00	
Total offset area (ha) for this MNES		2270.00	2270.00		
Size Weighting		0.99	0.01	1.00	
Weighted Habitat Quality Score		5.05	0.01	5.06	**5.00**
					rounded

Appendix 14 - Habitat quality scores - South-eastern Long-eared Bat - quality with offset

OFFSET - South-eastern Long-eared Bat (Nyctophilus corbeni)

		L-EBat (Hab)																																					
Assessment Unit - Regional Ecosystem		Ad10–RE 11.7.4 Remnant																																					(MF10) 11.7.4 (Linemark)
Site Reference		Benchmark	T-05			Benchmark	T-06			Benchmark	T-10			Benchmark	T-20			Benchmark	T-32			Benchmark	T-34			Benchmark	T-37			Benchmark	T-41				
		11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	11.7.4	Raw Data	% Benchmark	Score	Average % Benchmark	Average score
Recruitment of woody perennial species in EDL		100	100	100%	5	100	100	100%	5	100	100	100%	5	100	50	50%	5	100	57.14	57%	5	100	75	75%	5	100	60	60%	5	100	100	100%	5	80%	5.0
Native plant species richness - trees		4	10	250%	5	4	8	200%	5	4	8	200%	5	4	6	150%	5	4	11	275%	5	4	11	275%	5	4	11	275%	5	4	11	275%	5	236%	5.0
Native plant species richness - shrubs		6	13	217%	5	6	5	83%	3	6	15	250%	5	6	10	167%	5	6	10	167%	5	6	9	150%	5	6	11	183%	5	6	16	267%	5	165%	4.8
Native plant species richness - grasses		7	6	86%	3	7	10	143%	5	7	7	100%	5	7	7	100%	5	7	5	71%	3	7	7	100%	5	7	8	114%	5	7	9	129%	5	105%	4.5
Native plant species richness - forbes		9	9	100%	5	9	16	178%	5	9	11	122%	5	9	9	100%	5	9	9	100%	5	9	7	78%	3	9	14	156%	5	9	12	133%	5	121%	4.8
Tree canopy height (average of emergent, canopy, sub-canopy)		13.5		78%	5	13.5		72%	5	13.5		122%	5	13.5		96%	5	13.5		97%	5	13.5		97%	5	13.5		126%	5	13.5		94%	5	98%	4.9
Emergent height		na	0		na	na	0		na	na	0		na	na	0		na	na	0		na	na	0		na	na	0		na	na	0		na							
Canopy height		15	14	78%	5	15	14	78%	5	15	20	111%	5	15	16.5	92%	5	15	17	94%	5	15	17	94%	5	15	22	122%	5	15	15	83%	5							
Subcanopy height		9	7	78%	5	9	6	67%	3	9	12	133%	5	9	9	100%	5	9	9	100%	5	9	9	100%	5	9	12	133%	5	9	9	100%	5							
Tree canopy cover (average of emergent, canopy, sub-canopy)		37.5		105%	3.5	37.5		84%	3.5	37.5		105%	1.5	37.5		56%	2.5	37.5		89%	3.5	37.5		114%	3.5	37.5		116%	5	37.5		92%	5	96%	3.5
Emergent cover		na	0		na	na	0		na	na	0		na	na	0		na	na	0		na	na	0		na	na	0		na	na	0		na							
Canopy cover		29	51	176%	5	29	38.3	132%	5	29	60.5	209%	3	29	31.6	109%	5	29	42.7	147%	5	29	52.7	182%	5	29	53.3	184%	5	29	38.6	133%	5							
Subcanopy cover		46	18.2	40%	2	46	16.5	36%	2	46	3.6	8%	0	46	3.2	7%	0	46	14.1	31%	2	46	21	46%	2	46	24.4	53%	5	46	23.4	51%	5							
Shrub canopy cover		8	29	365%	3	8	32	401%	3	8	20	256%	3	8	10	119%	5	8	24	300%	3	8	47	591%	3	8	47	584%	3	8	32	404%	3	377%	3.3
Native grass cover		12	10	83%	3	12	16	133%	5	12	32	267%	5	12	8	67%	3	12	7.6	63%	3	12	27	225%	5	12	28	242%	5	12	15.6	130%	5	151%	4.3
Organic litter		50	62	124%	5	50	52	104%	5	50	36	72%	5	50	47	94%	5	50	62.4	125%	5	50	41	82%	5	50	58	116%	5	50	47.5	95%	5	102%	5.0
Large trees (exc plus non-euc)		14	28	200%	15	14	26	186%	15	14	40	286%	15	14	14	100%	10	14	26	186%	15	14	10	71%	15	14	12	86%	10	14	28	200%	15	164%	13.8
Large Euc trees/ha		7	20	286%		7	26	371%		7	18	257%		7	10	143%		7	20	286%		7	6	114%		7	8	114%		7	4	57%									
Large non-euc trees/ha		7	8	114%		7	0	0%		7	22	314%		7	4	57%		7	6	86%		7	2	29%		7	4	57%		7	24	343%									
Coarse woody debris		320	400	125%	5	320	620	194%	5	320	230	72%	5	320	170	53%	5	320	660	206%	5	320	770	241%	5	320	660	206%	2	320	320	163%	5	157%	4.6
Non-native plant cover		0	0		10	0	1		10	0	1		10	0	1		10	0	10		10	0	0		10	0	3		10	0	1		10		10.0
Quality and availability of food and foraging habitat		10			10	10			10	10			10	10			10	10			10	10			10	10			10	10			10		10.0
Quality and availability of shelter		10			10	10			10	10			10	10			10	10			10	10			10	10			10	10			10		10.0
Site Condition Score					92.5				93.5				94.5				90.5				92.5				94.5				90				98		93.65
MAX Site Condition Score	100				100				100				100				100				100				100				100				100		100
Site Condition Score - out of 3	3				2.78				2.81				2.84				2.72				2.78				2.84				2.70				2.94		2.81
Site Context																																							
Size of patch		10			10	10			7	10			10	10			10	10			10	10			10	10			7	10			7		8.88
Connectedness		5			5	5			5	5			5	5			5	5			5	5			5	5			4	5			4		4.75
Context		5			5	5			5	5			5	5			5	5			5	5			5	5			4	5			4		4.75
Ecological Corridors		6			6	6			6	6			6	6			6	6			6	6			6	6			6	6			6		6.00
Role of site location to species overall population in the state		5			4	5			4	5			4	5			4	5			4	5			4	5			4	5			4		4.00
Threats to the species		15			15	15			15	15			15	15			15	15			15	15			15	15			15	15			15		15.00
Species mobility capacity		10			10	10			10	10			10	10			10	10			10	10			10	10			10	10			10		10.00
Site Context Score					55				52				55				55				55				55				50				50		53.35
MAX Site Context Score	55				55				55				55				55				55				55				55				55		55
Site Context Score - out of 3	3				2.95				2.78				2.95				2.95				2.95				2.95				2.68				2.86		2.86

OFFSET - South-eastern Long-eared Bat (Nyctophilus corbeni)

L-EBat (Rest.)

Assessment Unit - Regional Ecosystem		AU13 - RE 11.9.5a Regrowth												U13 (11.9.5a regrowth	
Site Reference		Benchmar	T-03			Benchmar	T-04			Benchmar	T-15			Average %	Average
		11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score	Benchmar	score
Recruitment of woody perennial species in EDL		100	0	0%	3	100	100	100%	5	100	0	0%	3	33%	3.7
Native plant species richness - trees		7	2	29%	3	7	5	71%	3	7	2	29%	3	43%	3.0
Native plant species richness - shrubs		7	3	43%	3	7	2	29%	3	7	8	114%	5	62%	3.7
Native plant species richness - grasses		5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.8
Native plant species richness - forbes		9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.3
Tree canopy height (average of emergent, canopy, sub-canopy)		12		22%	2.5	12		19%	2.5	12		0%	2.5	14%	2.5
Emergent height		na		0		na		0		na		0			
Canopy height		16	7	44%	5	16	6	38%	5	16	0	0%	5		
Subcanopy height		8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)		26		26%	2.5	26		30%	2.5	26		0%	2.5	19%	2.5
Emergent cover		na		0		na		0		na		0			
Canopy cover		26	6.8	26%	5	26	7.8	30%	5	26	0	0%	5		
Subcanopy cover		na		0	0	na		0	0	na		0	0		
Shrub canopy cover		31	2	8%	3	31	4	13%	3	31	28	89%	5	36%	3.7
Native grass cover		19	28	147%	5	19	2	11%	3	19	0	0%	3	53%	3.7
Organic litter		35	2	6%	3	35	8	23%	5	35	19	54%	5	28%	4.3
Large trees (euc plus non-euc)		51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.0
Large Euc trees/ha		30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha		21	0			21	0			21	0				
Coarse woody debris		735	0	0%	2	735	10	1%	2	735	90	12%	2	5%	2.0
Non-native plant cover		0	75		3	0	90		3	0	50		3		3.0
Quality and availability of food and foraging habitat		10			10	10			10	10			10		10.0
Quality and availability of shelter		10			10	10			10	10			10		10.0
Site Condition Score					58				57.5				62		59.16667
MAX Site Condition Score	*100*				*100*				*100*				*100*		*100*
Site Condition Score - out of 3	**3**				**1.74**				**1.73**				**1.86**		**1.78**
Site Context															
Size of patch		10			5	10			5	10			5		5.00
Connectedness		5			4	5			4	5			4		4.00
Context		5			4	5			4	5			4		4.00
Ecological Corridors		6			6	6			6	6			6		6.00
Role of site location to species overall population in the state		5			1	5			1	5			1		1.00
Threats to the species		15			15	15			15	15			15		15.00
Species mobility capacity		10			10	10			10	10			10		10.00
Site Context Score					45				45				45		45.00
MAX Site Context Score	*56*				*56*				*56*				*56*		*56*
Site Context Score - out of 3	**3**				**2.41**				**2.41**				**2.41**		**2.41**

TABLE 3

Species Stocking Rate (SSR)								Hab	Rest	Hab	Rest
Presence detected on or adjacent to site (neighbouring property with connecting habitat)		Score	0	5		10		0	0		
			No	Yes - adjacent		Yes - on site					
Species usage of the site (habitat type & evidenced usage)		Score	0	5	10	15		15	0		
			Not habitat	Dispersal	Foraging	Breeding				If present, species like	If present, breeding likely
Approximate density (per ha)		Score	0	10	20	30		0	0		
			0%								
Role/importance of species population on site*		Score (*Total*	0	5	10		15	10	0		
			0	5 - 15	20 - 35		40 - 45				
Total SRR score (out of 70)								25	0		
SRR Score (out of 4)	4							1.43	0.00		

TABLE 4

*SSR Supplementary Table					Hab	Rest	Hab	Rest
*Key source population for breeding		Score	0	10	10	0	If present, likely to be	If present, breeding likely
		No	Yes/ Possibly					If breeding, dispersal likely
*Key source population for dispersal		Score	0	5	5	0	If breeding, likely to be important population for dispersal	
		No	Yes/ Possibly					
*Necessary for maintaining genetic diversity		Score	0	15	15	0	If breeding/dispersing	Resident population not considered present and unlikely to establish
		No	Yes/ Possibly					
*Near the limit of the species range		Score	0	15	0	0	Not near limite of spe	Not near limite of species range
		No	Yes					
				TOTAL	30	0		

TABLE 5

Final habitat quality score (weighted)		AU10 - RE 11.7.4 Remnant	AU13 - RE 11.9.5a Regrowth	Total	
Final habitat quality score (weighted)		**AU10**	**AU13**		
Site Condition score (out of 3)		2.80	1.78		
Site Context Score (out of 3)		2.86	2.41		
Species Stocking Rate Score (out of 4)		1.43	0.00		
Habitat Quality score (out of 10)		*7.09*	*4.19*		
Assessment Unit area (ha)		2242.00	28.00	2270.00	
Total offset area (ha) for this MNES		2270.00	2270.00		
Size Weighting		0.99	0.01	1.00	
Weighted Habitat Quality Score		7.00	0.05	7.05	**7.00**
					rounded

Appendix 15 - Habitat quality scores - Brigalow TEC - offset start quality

OFFSET - Brigalow TEC

		AU13 - RE 11.9.5a Regrowth													
Assessment Unit - Regional Ecosystem		AU13 (11.9.5a T-03)				AU13 (11.9.5a T-04)				AU13 (11.9.5a T-15)				AU13 (11.9.5a)	
Site Reference		Benchmar		T-03		Benchmar		T-04		Benchmark		T-15		Average %	Average
		11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchmar	Score	Benchmark	score
Recruitment of woody perennial species in EDL		100	0	0%	3	100	100	100%	5	100	0	0%	3	33%	3.67
Native plant species richness - trees		7	2	29%	3	7	5	71%	3	7	2	29%	3	43%	3.00
Native plant species richness - shrubs		7	3	43%	3	7	2	29%	3	7	8	114%	5	62%	3.67
Native plant species richness - grasses		5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.83
Native plant species richness - forbes		9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.33
Tree canopy height (average of emergent, canopy, sub-canopy)		12		22%	2.5	12		19%	2.5	12		0%	2.5	14%	2.50
Emergent height		na	0			na	0			na	0				
Canopy height		16	7	44%	5	16	6	38%	5	16	0	0%	5		
Subcanopy height		8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)		26		26%	5	26		30%	5	26		0%	5	19%	5.00
Emergent cover		na	0			na	0			na	0				
Canopy cover		26	6.8	26%	5	26	7.8	30%	5	26	0	0%	5		
Subcanopy cover		na	0			na	0			na	0				
Shrub canopy cover		31	2.4	8%	3	31	3.95	13%	3	31	27.55	89%	5	36%	3.67
Native grass cover		19	28	147%	5	19	2	11%	3	19	0	0%	3	53%	3.67
Organic litter		35	2	6%	3	35	8	23%	5	35	19	54%	5	28%	4.33
Large trees (euc plus non-euc)		51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.00
Large Euc trees/ha		30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha		21	0			21	0			21	0				
Coarse woody debris		735	0	0%	2	735	10	1%	2	735	90	12%	2	5%	2.00
Non-native plant cover		0	75		3	0	90		3	0	50		3		3.00
Site Condition Score					40.5				40				44.5		41.67
MAX Site Condition Score					*100*				*100*				*100*		100
Site Condition Score - out of 7	**7**				**2.84**				**2.80**				**3.12**		2.92
Site Context															
Size of patch	Size of pat	10			5				5				5		5.00
Connectedness	Connectivi	5			4				4				4		4.00
Context	Context (s	5			4				4				4		4.00
Ecological Corridors	Ecological	6			6				6				6		6.00
Site Context Score					19				19				19		19.00
MAX Site Context Score					*26*				*26*				*26*		*26*
Site Context Score - out of 3	**3**				**2.19**				**2.19**				**2.19**		**2.19**

TABLE 3

Final habitat quality score (weighted)	AU13	Total	
Site Condition score (out of 7)	2.92		
Site Context Score (out of 3)	2.19		
Habitat Quality score (out of 10)	5.11		
Assessment Unit area (ha) in offset area	28.00	28.00	
Total offset area (ha) for this MNES	28.00		
Size Weighting	1.00	1.00	
Weighted Habitat Quality Score	***5.11***	***5.11***	**5.00**
			rounded

Appendix 16 - Habitat quality scores - Brigalow TEC - quality without offset

OFFSET - Brigalow TEC

		AU13 - RE 11.9.5a Regrowth													
Assessment Unit – Regional Ecosystem		AU13 (11.9.5a T-03)				AU13 (11.9.5a T-04)				AU13 (11.9.5a T-15)				AU13 (11.9.5a)	
Site Reference		Benchmar	T-03			Benchmar	T-04			Benchmark	T-15				Average
		11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score	Average % Benchmark	score
Recruitment of woody perennial species in EDL		100	0	0%	0	100	100	100%	0	100	0	0%	0	33%	0.00
Native plant species richness - trees		7	2	29%	0	7	5	71%	0	7	2	29%	0	43%	0.00
Native plant species richness - shrubs		7	3	43%	0	7	2	29%	0	7	8	114%	0	62%	0.00
Native plant species richness - grasses		5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.83
Native plant species richness - forbes		9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.33
Tree canopy height (average of emergent, canopy, sub-canopy)		12		22%	0	12		19%	0	12		0%	0	14%	0.00
Emergent height		na	0			na	0			na	0				
Canopy height		16	7	44%	3	16	6	38%	3	16	0	0%	0		
Subcanopy height		8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)		26		26%	0	26		30%	0	26		0%	0	19%	0.00
Emergent cover		na	0			na	0			na	0				
Canopy cover		26	6.8	26%	2	26	7.8	30%	2	26	0	0%	0		
Subcanopy cover		na	0		0	na	0		0	na	0		0		
Shrub canopy cover		31	2.4	8%	0	31	3.95	13%	0	31	27.55	89%	0	38%	0.00
Native grass cover		19	28	147%	5	19	2	11%	1	19	0	0%	0	53%	2.00
Organic litter		35	2	6%	0	35	8	23%	0	35	19	54%	0	28%	0.00
Large trees (euc plus non-euc)		51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.00
Large Euc trees/ha		30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha		21	0			21	0			21	0				
Coarse woody debris		735	0	0%	0	735	10	1%	0	735	90	12%	0	5%	0.00
Non-native plant cover		0	75		0	0	90		0	0	50		0		0.00
Site Condition Score					13				6.5				8		9.17
MAX Site Condition Score					*100*				*100*				*100*		100
Site Condition Score - out of 7	7				0.91				0.46				0.56		0.64
Site Context															
Size of patch	Size of patch (score)	10			2				0				2		1.33
Connectedness	Connectivity (score)	5			2				4				4		3.33
Context	Context (score)	5			2				2				4		2.67
Ecological Corridors	Ecological corridors (score)	6			6				6				6		6.00
Site Context Score					12				12				16		13.33
MAX Site Context Score					*26*				*26*				*26*		*26*
Site Context Score - out of 3	3				1.38				1.38				1.85		1.54

TABLE 3

Final habitat quality score [weighted]	AU13	Total	
Site Condition score (out of 7)	0.64		
Site Context Score (out of 3)	1.54		
Habitat Quality score (out of 10)	2.18		
Assessment Unit area (ha) in offset area	28.00	28.00	
Total offset area (ha) for this MNES	28.00		
Size Weighting	1.00	1.00	
Weighted Habitat Quality Score	*2.18*	*2.18*	2.00
			rounded

TABLE 6 - Justification

OFFSET AREA - Supplementary information/justification (evidence required)	
Detail current threats to species/TEC in Project Area	Clearing, weeds, habitat degredation from cattle, predation key threats considered. Wildfires exacterbated by climate change likely to be most significant. <50% of site affected by fire in last 10 years, intensity unknown. Moderate threat level
Role/importance of the site for the state-wide population	Not at limit of TEC distribution
Role/importance of species/TEC population on site	negligible, currently in poor condition not meeting TEC status
Closest records of species/TEC off site	
Number detected on site (species only)	
Approximate density (per ha) (species only)	
Survey methodology and search effort	
FAUNA SPECIES ONLY	
Species mobility capacity considerations	
Food sources on site and approximate abundance	
Types and availability of shelter at site	
NOT CURRENTLY HABITAT/TEC	
Factors preventing the vegetation from being habitat/TEC	Historical clearing, continued woody vegetation control, ongoing grazing and weed (inc non-naative grass cover) inhibiting recruitment, reducing the seed bank and preventing maturity
How it will become habitat/TEC	Control of woody regrowth ceased,, grazing removed. Weed control and possible seeding may be required to re-establish native vegetation in areas
Estimated time until it becomes habitat/TEC	50+ years

Appendix 17 - Habitat quality scores - Brigalow TEC - quality with offset

OFFSET - Brigalow TEC

		AU13 - RE 11.9.5a Regrowth													
Assessment Unit - Regional Ecosystem		AU13 (11.9.5a T-03)				AU13 (11.9.5a T-04)				AU13 (11.9.5a T-15)				AU13 (11.9.5a)	
Site Reference		Benchmar		T-03		Benchmar		T-04		Benchmark		T-15		Average %	Average
		11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchm	Score	11.9.5a	Raw Data	% Benchmar	Score	Benchmark	score
Recruitment of woody perennial species in EDL		100	0	0%	3	100	100	100%	5	100	0	0%	3	33%	3.67
Native plant species richness - trees		7	2	29%	3	7	5	71%	3	7	2	29%	3	43%	3.00
Native plant species richness - shrubs		7	3	43%	3	7	2	29%	3	7	8	114%	5	62%	3.67
Native plant species richness - grasses		5	4	80%	3	5	1	20%	2.5	5	2	40%	3	47%	2.83
Native plant species richness - forbes		9	11	122%	5	9	6	67%	3	9	14	156%	5	115%	4.33
Tree canopy height (average of emergent, canopy, sub-canopy)		12		22%	2.5	12		19%	2.5	12		0%	2.5	14%	2.50
Emergent height		na	0			na	0			na	0				
Canopy height		16	7	44%	5	16	6	38%	5	16	0	0%	5		
Subcanopy height		8	0	0%	0	8	0	0%	0	8	0	0%	0		
Tree canopy cover (average of emergent, canopy, sub-canopy)		26		26%	5	26		30%	5	26		0%	5	19%	5.00
Emergent cover		na	0			na	0			na	0				
Canopy cover		26	6.8	26%	5	26	7.8	30%	5	26	0	0%	5		
Subcanopy cover		na	0			na	0			na	0				
Shrub canopy cover		31	2.4	8%	3	31	3.95	13%	3	31	27.55	89%	5	36%	3.67
Native grass cover		19	28	147%	5	19	2	11%	3	19	0	0%	3	53%	3.67
Organic litter		35	2	6%	3	35	8	23%	5	35	19	54%	5	28%	4.33
Large trees (euc plus non-euc)		51	0	0%	0	51	0	0%	0	51	0	0%	0	0%	0.00
Large Euc trees/ha		30	0	0%		30	0	0%		30	0	0%			
Large non-euc trees/ha		21	0			21	0			21	0				
Coarse woody debris		735	0	0%	2	735	10	1%	2	735	90	12%	2	5%	2.00
Non-native plant cover		0	75		3	0	90		3	0	50		3		3.00
Site Condition Score					40.5				40				44.5		41.67
MAX Site Condition Score					*100*				*100*				*100*		100
Site Condition Score - out of 7	**7**				**2.84**				**2.80**				**3.12**		2.92
Site Context															
Size of patch	Size of pat	10			5				5				5		5.00
Connectedness	Connectivi	5			4				4				4		4.00
Context	Context (s	5			4				4				4		4.00
Ecological Corridors	Ecological	6			6				6				6		6.00
Site Context Score					19				19				19		19.00
MAX Site Context Score					*26*				*26*				*26*		*26*
Site Context Score - out of 3	**3**				**2.19**				**2.19**				**2.19**		**2.19**

TABLE 3

Final habitat quality score (weighted)	AU13	Total	
Site Condition score (out of 7)	2.92		
Site Context Score (out of 3)	2.19		
Habitat Quality score (out of 10)	5.11		
Assessment Unit area (ha) in offset area	28.00	28.00	
Total offset area (ha) for this MNES	28.00		
Size Weighting	1.00	1.00	
Weighted Habitat Quality Score	***5.11***	***5.11***	**5.00**
			rounded

Appendix 18 - Offset assessment guide output for Dunmall's Snake

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
1 October 2012

This guide relies on Macros being enabled on your browser.

Matter of National Environmental Significance	
Name	Dunmall's snake
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.2%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	No		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		Area	979.1	Hectares	
			Quality	5	Scale 0-10	
			Total quantum of impact	203.03	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**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						
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	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset Future area without offset (adjusted hectares) 0.0	Risk of loss (%) with offset Future area with offset (adjusted hectares) 0.0								
					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)								
Threatened species habitat																
Area of habitat	Yes	203.03	Adjusted hectares		Time over which loss is averted (max. 20 years) 20	Start area (hectares) 1428	Risk of loss (%) without offset 0%	Risk of loss (%) with offset 0%	0.00	100%	0.00	0.00	203.03	101.37%	Yes	
							Future area without offset (adjusted hectares) 1428.0	Future area with offset (adjusted hectares) 1428.0								
					Time until ecological benefit 10	Start quality (scale of 0-10) 6	Future quality without offset (scale of 0-10) 5	Future quality with offset (scale of 0-10) 7	2.00	75%	1.50	1.44				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**	**Start value**	**Future value without offset**	**Future value with offset**	**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g. Nest hollows, habitat trees	No															
Condition of habitat Change in habitat condition, but no change in extent	No															
Threatened species																
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	No															

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	203.03	205.21	101.37%	Yes	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Appendix 19 - Offset assessment guide output for South-eastern Long-eared Bat

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
5 October 2012

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Long-eared bat
EPBC Act status	Vulnerable
Annual probability of extinction Based on IUCN category definitions	0.5%

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes		Area			
			Quality			
			Total quantum of impact	0.00		
Threatened species habitat						
Area of habitat	Yes		Area	650.1	Hectares	
			Quality	5	Scale 0-10	
			Total quantum of impact	325.07	Adjusted hectares	
Protected matter attributes	**Attribute relevant to case?**	**Description**	**Quantum of impact**		**Units**	**Information source**
Number of features e.g Nest hollows, habitat trees	No					
Condition of habitat Change on habitat condition, but no change on extent	No					
Threatened species						
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	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)	Start area and quality	Future area and quality without offset	Future area and quality with offset	Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)	% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																
Area of community	No				Risk-related time horizon (max. 20 years)	Start area (hectares)	Risk of loss (%) without offset	Risk of loss (%) with offset								
							Future area without offset (adjusted hectares) 0.0	Future area with offset (adjusted hectares) 0.0								
					Time until ecological benefit	Start quality (scale of 0-10)	Future quality without offset (scale of 0-10)	Future quality with offset (scale of 0-10)								
Threatened species habitat																
Area of habitat	Yes	325.07	Adjusted hectares		Time over which loss is averted (max. 20 years) 20	Start area (hectares) 2270	Risk of loss (%) without offset 0%	Risk of loss (%) with offset 0%	0.00	100%	0.00	0.00	100.65%	Yes		
							Future area without offset (adjusted hectares) 2270.0	Future area with offset (adjusted hectares) 2270.0				327.16				
					Time until ecological benefit 20	Start quality (scale of 0-10) 7	Future quality without offset (scale of 0-10) 5	Future quality with offset (scale of 0-10) 7	2.00	75%	1.50	1.44				
Protected matter attributes	**Attribute relevant to case?**	**Total quantum of impact**	**Units**	**Proposed offset**	**Time horizon (years)**	**Start value**	**Future value without offset**	**Future value with offset**	**Raw gain**	**Confidence in result (%)**	**Adjusted gain**	**Net present value**	**% of impact offset**	**Minimum (90%) direct offset requirement met?**	**Cost ($ total)**	**Information source**
Number of features e.g Nest hollows, habitat trees	No															
Condition of habitat Change on habitat condition, but no change on extent	No															
Threatened species																
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	No															

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	325.070	327.16	100.65%	Yes	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Appendix 20 - Offset assessment guide output for Brigalow TEC

Offsets Assessment Guide

For use in determining offsets under the *Environment Protection and Biodiversity Conservation Act 1999*
12 October 2012

This guide relies on Macros being enabled in your browser

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

Key to Cell Colours
User input required
Drop-down list
Calculated output
Not applicable to attribute

Impact calculator

Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Ecological communities						
Area of community	Yes		Area	3.04	Hectares	
			Quality	4	Scale 0-10	
			Total quantum of impact	3.22	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		Area			
			Quality			
			Total quantum of impact	0.00		
Protected matter attributes	Attribute relevant to case?	Description	Quantum of impact		Units	Information source
Number of features e.g Hen hollows, habitat trees	No					
Condition of habitat Change in habitat condition, but no change in extent	No					
Threatened species						
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	No					

Offset calculator

Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	3.22	Adjusted hectares		Risk-related time horizon (max. 20 years)	20	Start area (hectares)	20	Risk of loss (%) without offset	0%	Risk of loss (%) with offset	0%	0.00	100%	0.00	0.00	4.66	153.99%	Yes		
					Time until ecological benefit	20	Start quality (scale of 0-10)	5	Future area without offset (adjusted hectares)	20.0	Future area with offset (adjusted hectares)	20.0									
									Future quality without offset (scale of 0-10)	2	Future quality with offset (scale of 0-10)	9	3.00	75%	2.25	1.77					
Threatened species habitat																					
Area of habitat	No				Time over which loss is averted (max. 20 years)		Start area (hectares)		Risk of loss (%) without offset		Risk of loss (%) with offset										
									Future area without offset (adjusted hectares)	0.0	Future area with offset (adjusted hectares)	0.0									
					Time until ecological benefit		Start quality (scale of 0-10)		Future quality without offset (scale of 0-10)		Future quality with offset (scale of 0-10)										
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start value		Future value without offset		Future value with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Number of features e.g Hen hollows, habitat trees	No																				
Condition of habitat Change in habitat condition, but no change in extent	No																				
Threatened species																					
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	No																				

Summary

Protected matter attributes	Quantum of impact	Net present value of offset	% of impact offset	Direct offset adequate?	Cost ($)		
					Direct offset ($)	Other compensatory measures ($)	Total ($)
Birth rate	0				$0.00		$0.00
Mortality rate	0				$0.00		$0.00
Number of individuals	0				$0.00		$0.00
Number of features	0				$0.00		$0.00
Condition of habitat	0				$0.00		$0.00
Area of habitat	0				$0.00		$0.00
Area of community	3.224	4.66	153.99%	Yes	$0.00	N/A	$0.00
					$0.00	**$0.00**	**$0.00**

OFFSET - Dunmall's Snake, Glyphodon dunmalli (not currently habitat)

Final habitat quality score (weighted)		AU01 - RE 11.11.15 Adv Regrowth	AU05 - RE 11.11.3 Remnant	AU06 - RE 11.12.1 Regrowth	AU07 - RE 11.3.25 Remnant	AU08 - RE 11.3.4 Remnant	AU10 - RE 11.7.4 Remnant	AU12 - RE 11.7.6 Remnant	AU02 - RE 11.11.15 Regrowth	AU03 - RE 11.11.3c Regrowth	AU04 - RE 11.11.3 Regrowth	AU09 - RE 11.5.20 Regrowth	AU11 - RE 11.7.6 Regrowth	AU13 - RE 11.9.5a Regrowth	Total	
Final habitat quality score (weighted)		**AU01**	**AU05**	**AU06**	**AU07**	**AU08**	**AU10**	**AU12**	**AU02**	**AU03**	**AU04**	**AU09**	**AU11**	**AU13**		
Site Condition score (out of 3)		1.79	2.61	1.86	2.04	2.37	2.67	2.41	1.07	1.38	1.52	1.33	1.30	0.87		
Site Context Score (out of 3)		1.98	1.98	1.98	2.02	1.98	2.43	2.40	1.39	1.34	1.50	1.46	1.67	1.36		
Species Stocking Rate Score (out of 4)		1.43	1.43	1.43	1.43	1.43	1.43	1.43	0.00	0.00	0.00	0.00	0.00	0.00		
Habitat Quality score (out of 10)		*5.20*	*6.02*	*5.27*	*5.49*	*5.78*	*6.53*	*6.24*	*2.47*	*2.72*	*3.02*	*2.79*	*2.97*	*2.22*		
Assessment Unit area (ha)		0.00	0.00	0.00	0.00	0.00	1400.00	0.00	0.00	0.00	0.00	0.00	0.00	28.00	1428.00	
Total offset area (ha) for this MNES		1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00	1428.00		
Size Weighting		0.00	0.00	0.00	0.00	0.00	0.98	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.00	
Weighted Habitat Quality Score		0.00	0.00	0.00	0.00	0.00	6.40	0.00	0.00	0.00	0.00	0.00	0.00	0.04	6.44	**6.00**
																rounded

OFFSET - South-eastern Long-eared Bat (Nyctophilus corbeni)

Final habitat quality score (weighted)		AU10 - RE 11.7.4 Remnant	AU13 - RE 11.9.5a Regrowth	Total	
Final habitat quality score (weighted)		**AU10**	**AU13**		
Site Condition score (out of 3)		2.71	0.85		
Site Context Score (out of 3)		2.43	1.36		
Species Stocking Rate Score (out of 4)		1.43	0.00		
Habitat Quality score (out of 10)		*6.57*	*2.20*		
Assessment Unit area (ha)		2242.00	28.00	2270.00	
Total offset area (ha) for this MNES		2270.00	2270.00		
Size Weighting		0.99	0.01	1.00	
Weighted Habitat Quality Score		6.49	0.03	6.51	**7.00**
					rounded

OFFSET - Brigalow TEC

Final habitat quality score (weighted)	AU13	Total	
Site Condition score (out of 7)	1.81		
Site Context Score (out of 3)	1.54		
Habitat Quality score (out of 10)	3.35		
Assessment Unit area (ha) in offset area	28.00	28.00	
Total offset area (ha) for this MNES	28.00		
Size Weighting	1.00	1.00	
Weighted Habitat Quality Score	3.35	3.35	**3.00**
			rounded

Attachment 1 – Terrestrial Ecology Reports

SGP Stage 2 – Offset Area Management Plan
EPBC Approval 2010/5344

Terrestrial Ecology Reports

Impact area – desktop and field survey methodology

The methodology undertaken to assess the BioCondition of the impact areas in the Project site is described below.

The assessment consisted of a desktop analysis, including a literature review, followed by several field surveys. The impact area was surveyed by Ecosmart Ecology and 3D Environmental who were commissioned by Arrow. The broader SGP project area was surveyed in detail during dry (September 2016) and wet (February/March 2017) seasons (ESE, 2017).

The mapped locations for the koala and its habitat are based on a combination of known species records, ground-verified mapping and Queensland Government RE mapping. Habitat is presented with regards to 'Core Habitat Known' (being a 1 km buffer around a recent (1980+) accurate (± 500m) record of the species) and 'Core Habitat Possible' (being areas of remnant or regrowth vegetation with a mapped RE known or likely to provide habitat for the koala or contains other environmental features that provide microhabitats). Habitat criteria have been developed for the koala, and these are defined in ESE (2019).

Prior to any clearing within the areas identified above, Arrow will conduct pre-clearance surveys that:

- Validate the presence of EPBC Act species core habitat or threatened ecological communities.
- Record GPS coordinates of the boundary of the core habitat in relation to the proposed clearing boundaries to ensure the limits of the area to be cleared are clearly marked on the ground (e.g., high visibility flagging tape, hazard netting or similar) in accordance with the construction limits shown on construction drawings.
- For areas mapped as core habitat for the koala, the pre-clearance survey will include confirmation of presence of preferred food trees, observations looking for koalas and the distinct koala scratch marks on smooth-barked trees and/or presence of scats.
- The coordinates and total area of cleared core habitat will be recorded and tracked against approved maximum disturbance limits and used for annual compliance reporting. Mapping is updated as pre-clearance surveys are completed to confirm the presence or absence of core habitat.

Habitat quality scoring

The DAWE EOP and How to Use the Offsets Assessment Guide do not provide habitat quality survey guidelines or a methodology on how to calculate the habitat quality scores other than to state that the habitat quality score must consider site condition, site context and species stocking rate.

For the purpose of providing context to the quality of habitat assessed within the pipelines study area, the method applied in the EPBC Act Offset calculator has been completed. It is recognized that this method does not equate to impact criteria as per the EPBC Act Significant Impact Guidelines, however it does provide useful information to inform the suitability of habitat within the study area for the various MNES species. The 'Modified Habitat Quality' from the EPBC Act Offset calculator uses three components: Site Context, Site Condition and Species Stocking Rates. Following advice from the DCCEEW, these components have been weighted as 30%/30%/40% respectively, resulting in an overall score out of 10 (i.e. 3+3+4), and calculated using the methodology summarized below.

Site Context

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Site Context has been calculated using a subset of attributes from the Queensland 'Guide to determining terrestrial habitat quality' (DEHP 2017). Using these attributes, the 'Site context' will score out of a maximum 56 and be converted into a score out of three for inclusion into the calculator. For example, a site context score of 44 would be converted for use in the EPBC Act calculator as 2.36; (44/56) x 3. Using the DEHP (2017) methodology, 'site context' is an estimation of the extent of remnant habitat within one kilometer of the BioCondition site.

Following advice from DotEE, context' was modified to include both remnant and regrowth vegetation (when considered suitable for the target species) based on a buffer distance of 20 km for koala.

Site Condition

Site Condition has also been calculated using the attributes from DEHP (2017). Each attribute is evaluated by comparing the BioCondition data against published benchmarks for the Brigalow Belt Bioregion (Queensland Herbarium 2019). Where benchmarks are not available, BioCondition site data from the ecology assessment for the Surat Gas Project Supplementary EIS (ESE, 2013) was used if suitable benchmark data had been collected. Where no benchmark data was available, surrogate REs were utilized and were supplemented with site-based observations of vegetation condition and disturbance. These attributes provide a score of a possible 100 and have been converted to a score out of three for inclusion in the EPBC Act Offset calculator.

Species Stocking Rates

The Habitat Index value from the 'Guide to determining terrestrial habitat quality' (DEHP 2017) is not directly related to the species stocking rate. Therefore, the species stocking rate has been determined separately, based on the presence of species records and usage of the site. 'Species Stocking Rates have been evaluated as a score out of four as advised by DCCEEW using the following attributes:

- Presence of the species detected on or adjacent to site (out of a maximum score of 10),
- Species usage of the site (i.e. dispersal, foraging or breeding; out of a maximum score of 15), and
- The role/importance of the species population on site (out of a maximum score of 15) based on whether it is a key source population for breeding, a key source population for dispersal, necessary for maintaining genetic diversity and near the limit of the species range.

The full reports referenced herein have been submitted as separate files, as outlined below.

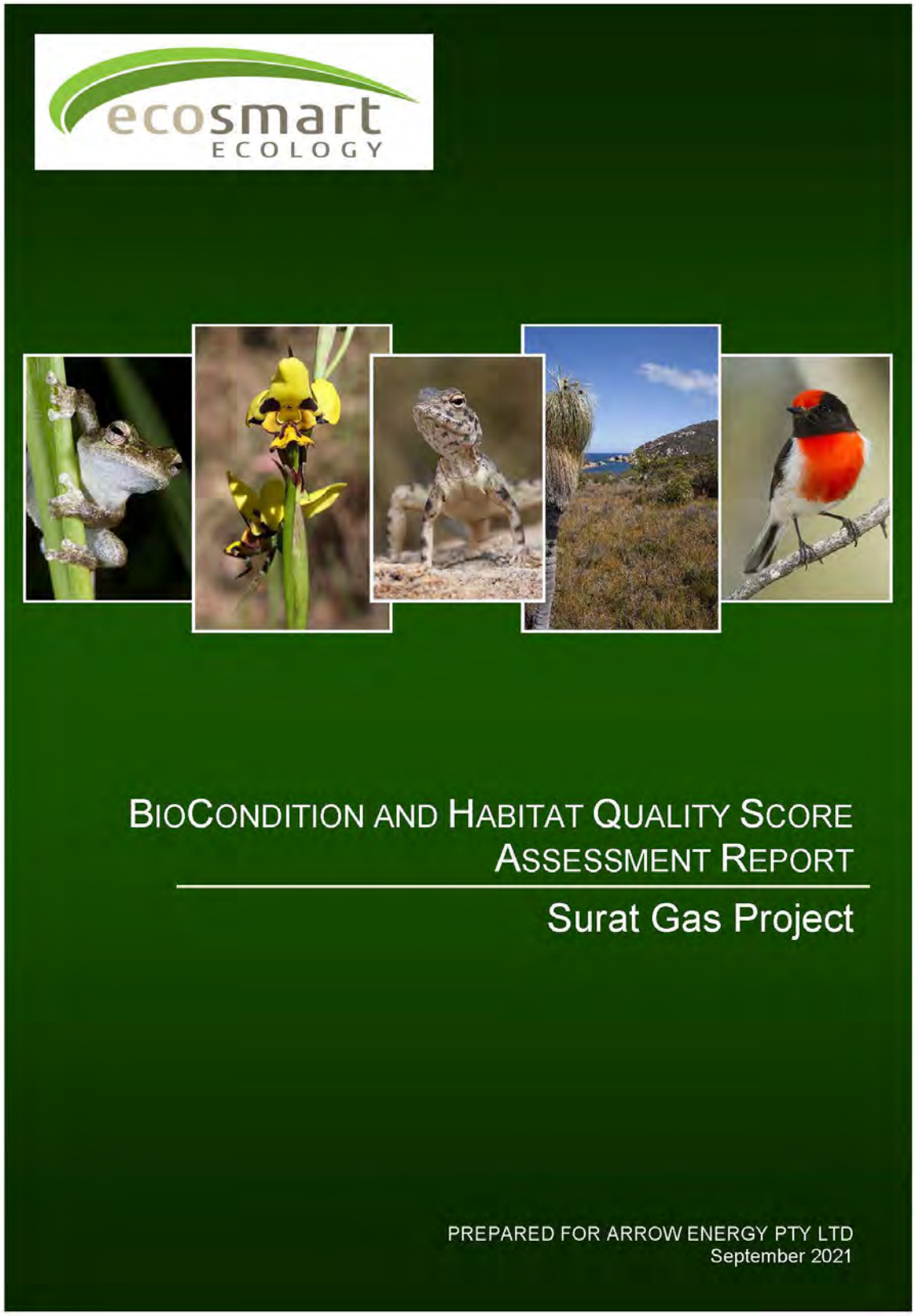
1. Ecosmart Ecology and 3D Environmental (ESE). (2017). Surat Gas Project Terrestrial Ecology Report. Report prepared for Arrow Energy Pty Ltd, June 2017.

2. Ecosmart Ecology (ESE). (2021). Surat Gas Project; BioCondition and Habitat Quality Score Assessment Report; September 2021

3. Ecosmart Ecology (ESE). (2026). Habitat Quality Assessment (Queensland) and Modified Habitat Quality Assessment (Federal) Report, Toondoon Offset Area. May 2026

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Attachment 2 - Surat Gas Project. BioCondition and Habitat Quality Score Assessment Report, September 2021



Surat Gas Project

Biocondition and Habitat Quality Score Assessment Report

September 2021

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DOCUMENT CONTROL

Name of Project:	Surat Gas Project Habitat Quality Assessment
Project Number:	ARW_2101
Project Manager:	Mark Sanders (EcoSmart Ecology)/David Stanton (3D Environmental)
Document Author(s):	Mark Sanders and David Stanton
Name of Document:	Biocondition and Habitat Quality Score Assessment Report
File Name:	ESE (2021) SGP Biocond_HQS.docx
Version:	Version 1.0

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APPENDICES

Appendix A: Site Reconciliation
Appendix B: Habitat Quality Scores – Site Summary Data
Appendix C: Historic Wildfire Maps

1.0 Introduction

1.1 Background

Arrow Energy is preparing their Offset Area Management Plan (OAMP) for the Surat Gas Project (SGP) located in the southern Brigalow Belt. To complete the plan Arrow Energy requires Regional Ecosystems (REs) within their tenements to have their 'habitat condition' evaluated for several Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Relevant MNES which require assessment are outlined in Table 1.1.

Table 1.1. Target MNES for which habitat condition needs to be assessed

Scientific Name	Common Name	Status	
		EPBC Act	VM/NC Act
Threatened Ecological Communities (TEC)			
Brigalow communities (Acacia harpophylla dominant and co-dominant)		End	End
Coolibah-Black Box woodlands of the Darling Riverine Plains and the Brigalow Belt South (BBS) bioregion		End	OC
Poplar Box Grassy Woodland on Alluvial Plains**		Endangered	Of Concern
Threatened Species			
Delma torquata	Collared Delma	Vul	Vul
Anomalopus mackayi	Five-clawed Worm-skink	End	Vul
Egernia rugosa	Yakka Skink	Vul	Vul
Furina dunmalli	Dumnall's Snake	Vul	Vul
Geophaps scripta scripta	Squatter Pigeon	Vul	Vul
Anthochaerea phrygia	Regent Honeyeater	Cr End	Cr End
Grantiella picta	Painted Honeyeater	Vul	Vul
Phascolarctos cinereus	Koala	Vul	Vul
Petauroides volans	Greater Glider	Vul	Vul
Nyctophilus corbeni	Southern Long-eared Bat	Vul	Vul

CR End = Critically Endangered; End = Endangered; Vul = Vulnerable; OC = Of Concern; **Not discussed in this document

Evaluating these REs will allow Arrow Energy to estimate the value of lost habitat for which equivalent offsets must be found.

1.2 Scope of Works

EcoSmart Ecology and 3D Environmental was engaged by Arrow Energy to assist with habitat quality assessments to meet project goals and undertook the following scope of works:

- Reassess MNES likely occurrence within the SGP area in light of additional work and data gathered since the EIS and Supplementary EIS assessments (3d Environmental 2011, 2013).
- A Review of historic BioCondition and habitat quality surveys to identify relevant data.

- A gap analysis to identify REs which have been poorly surveyed or require additional data.
- BioCondition and habitat quality assessments for REs identified as requiring additional data.
- Compile historic and contemporary BioCondition and habitat quality assessments for REs within properties provided by Arrow.
- Calculate habitat quality scores for target MNES using the compiled RE data and modelled habitats.

Offset evaluation will be undertaken in the future and, as this might be conducted by other parties, the habitat quality scoring criteria has been detailed in full. These should be reviewed prior to any future offset actions as some data is collected outside the normal Biocondition methodology.

1.3 Project Team

The survey and study team and their respective roles are detailed in Table 1.2.

Table 1.2. Project team, qualifications/experience and roles

Name	Qualifications	Experience	Role
Mark Sanders	BSc (Hons)	20+ yrs	Principle client liaison, field assessment (fauna), data entry/analysis, GIS, and reporting.
David Stanton	BSc (Hons)	20+ yrs	Data entry/analysis, GIS, and reporting
Peter Moonie	BSc	20+ yrs	Field assessment (flora), data entry
Angus McNab	BSc (hons), MSc.	10+ yrs	Field assessment (fauna), data entry

2.0 Survey and Study Methods

2.1 Literature/Data Review and Gap Analysis

2.1.1 Literature Review

Prior to field investigations a literature review was undertaken on all target fauna species. The review focused on:

- Recent publications which might shed new light on existing fauna habitat mapping rules (i.e., habitat suitability mapping) for the SGP.
- Determining the species ecological requirements and habits with the specific aim of identifying indicators for measuring *Species Habitat Index* attributes.

2.1.2 Data Review and Gap Analysis

For this work Arrow Energy provided a list of REs, the number of habitat quality score (HQS) sites required within each RE as per the *Guide to determining terrestrial habitat quality – Version 1.3* (DES 2020), and a list of properties where further field data could be collected. Comparing this information to work completed in previous assessments (3D Environmental 2013; EcoSmart Ecology 2017, 2018, 2019a) identified the number of additional sites in each RE requiring assessment (Appendix A). Sites were selected within relevant REs to fulfill these gaps based on the properties provided by Arrow.

In total 161 BioCondition sites are required, 87 BioCondition sites were sourced from earlier assessment events leaving a balance of 74 sites for field assessment. Where representations of REs requiring assessment were not present within permitted property boundaries, additional sites were selected in publicly available easements (particularly road reserves) to supplement the field survey effort. We were unable to locate suitable sites within public easements or the supplied properties for RE11.5.21, 11.7.2, 11.7.5 and 11.7.6. No further assessment of these RE's was undertaken.

The SGP threatened fauna database was updated with records collected since the last assessment (EcoSmart Ecology 2019a) and cross-referenced against the SGP ground-verified vegetation map, or Queensland Herbarium RE Mapping (if in the surrounding area), to identify additional REs which should be added to habitat suitability mapping. This also ensures the 'core habitat known' dataset is current.

New records were attained by reinspecting existing databases (e.g., ALA), provided by Arrow from other ecological works (including spotter-catcher reports where available), or garnished from relevant public reports/papers.

2.2 Field Survey Methodology

The field survey was completed over a 12-day period from the 10th to the 21st May 2021. Survey methods were adopted from the *Guide to determining terrestrial habitat quality – Version 1.3* (DES 2020) and the *Queensland BioCondition Assessment Manual* (Eyre *et al.* 2015). BioCondition sites consisted of a 100x50 m plot in which the following parameters were measured:

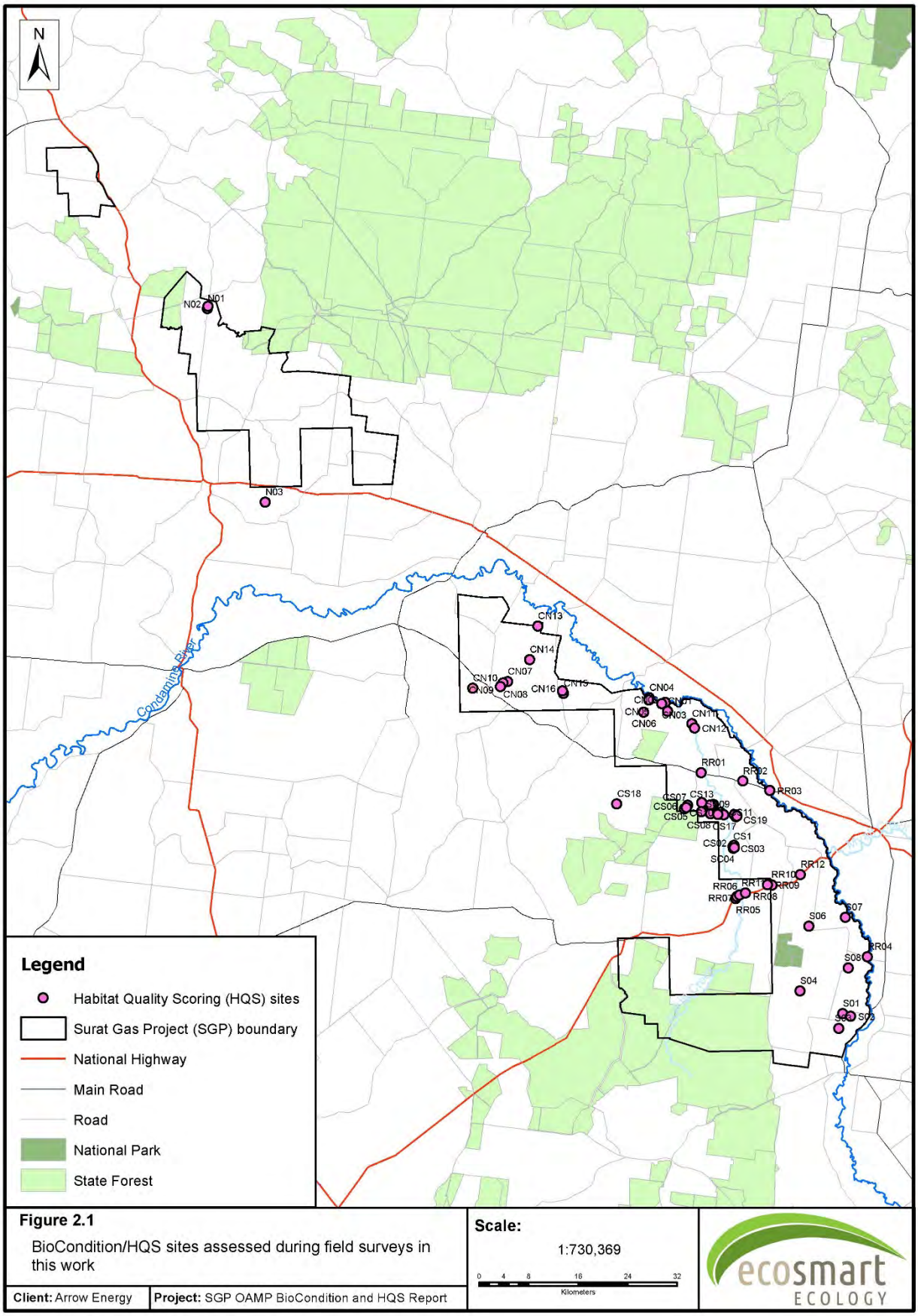
- Large trees assessed against benchmark thresholds (100x50 m plot).
- Canopy cover including sub-canopy and shrub layers (measured along a 100 m plot centreline).
- Native species richness within the following plots:
  - 100x50 m for trees.
  - 50x10 m for shrubs, forbs, grasses and other life forms.
- Coarse woody debris in a 50x20 m plot.
- Groundcover composition (grass, forbs shrubs, exotics) assessed in five 1 m^2 quadrats along the transect centreline.
- Number of tree species recruiting in 100x50 m plot.

A total of 62 HQS sites were assessed with their locations shown in Figure 2.1. A breakdown of the REs assessed is provided in Table 2.1.

Table 2.1. Regional Ecosystems assessed during the current field survey for this work (see also Appendix A and Section 2.1.2).

RE	No. Sites	Site Completed
11.3.1	4	CN10, CS2, RR10-RR12
11.3.2	14	CN11, CN12, S1, CN1, RR1, RR2, RR4, RR8, S2, S3, S7, S8, CS10, CS16
11.3.3	5	CS19, CS21, CN3, CN4, CN5
11.3.4	9	CN15, CN16, CS12-CS14, CS17, CS20, RR3, CN2
11.3.14	2	CS4, CS9
11.3.17	6	CS1, CS3, RR5-RR7, RR9
11.3.17 (regrowth)	4	CS11, CS15, CN8, CN9
11.3.27f	1	S4
11.4.3	6	S6
11.5.1	1	CN13
11.5.20	4	CN7, CS5, CS6, CS7
11.5.20 (Regrowth)	1	CN14
11.5.21	2	N1, N2
11.7.4	1	CS8
11.7.6	1	CS18
11.7.7	1	N3

Habitat searches for evidence of fauna or fauna species was also undertaken during these surveys. Rocks, logs, exfoliating bark and other shelter features were shifted (where possible) in search of signs or individuals. Scat searches were undertaken in suitable Koala habitats and notes were kept of bird species heard or encountered. While these methods can locate most of the fauna species present, they are not sufficient to determine the presence/absence of a species with confidence.


N
N01
N02
N03
CN13
CN14
CN07
CN10
CN09
CN08
CN16
CN15
CN04
CN03
CN11
CN12
CN06
RR01
RR02
RR03
CS18
CS07
CS13
CS06
CS05
CS08
CS17
CS19
CS1
CS02
CS03
SC04
RR12
RR10
RR09
RR06
RR11
RR07
RR08
RR05
S07
S06
RR04
S08
S04
S01
S02
Condamine River
Legend
Habitat Quality Scoring (HQS) sites
Surat Gas Project (SGP) boundary
National Highway
Main Road
Road
National Park
State Forest
Figure 2.1
BioCondition/HQS sites assessed during field surveys in this work
Scale:
1:730,369
0 4 8 16 24 32
Kilometers
Client: Arrow Energy
Project: SGP OAMP BioCondition and HQS Report
ecosmart ECOLOGY

2.3 Evaluating Habitat Condition

Habitat condition was evaluated by sampling a subset of RE patches within properties provided by Arrow Energy for this purpose. Evaluation used methods similar to those within the *Guide to determining terrestrial habitat quality v1.3* (DES 2020) which scores habitat quality using the three following features:

- *Site condition*: evaluates general vegetation condition compared to an undisturbed reference site with most of its natural values intact (a BioCondition benchmark).
- *Site context*: evaluates the landscape position of the site and the influence this has on the site's quality.
- *Species habitat index*: evaluates the ability of the site to support a particular species based on that species' specific habitat requirements.

With each feature scoring a maximum of 3, 3 and 4 respectively, the site is given an accumulative score out of 10 with 10 representing a fully intact and highly suitable habitat for the species/value. Scores are determined by measuring attributes collected within a 100x50m plot and containing various sub-plots, as detailed in Eyre *et al.* (2015). A brief overview of these attributes is provided below.

Site Condition

Site condition is measured by sampling the attributes in Table 1.1 and scored against a 'BioCondition Benchmark' for each RE provided by the Queensland Herbarium (v3.1, 2021). In this study v3.1 benchmark scores were available for all sampled REs except 11.5.1, this RE used benchmarks provided in an earlier version (2015). A final score out of 3 was attained using the following:

$$\left(\frac{Measured\ site\ condition\ score}{Maximum\ (benchmark)\ condition\ score}\right) x3$$

Table 2.2. Site Condition Attributes

Attribute	Maximum Score
Recruitment of woody perennial species in ecological dominant layer (EDL) (%)	5
Native plant species richness - trees	5
Native plant species richness - shrubs	5
Native plant species richness - grasses	5
Native plant species richness - forbes and other	5
Tree canopy - median height	5
Tree canopy - cover	5
Native shrub cover (%)	5
Native perennial grass cover (%)	5
Organic litter cover (%)	5
Large trees (euc plus non-euc)	15
Coarse woody debris (m/ha)	5
Non-native plant cover (%)	10
Maximum Total Score	**80**

Site Context

Site context attributes (Table 2.3) were measured in ARC GIS software using ground-verified RE mapping culminating from result of various flora surveys completed in 2009, 2010, 2013, 2017, 2018 and 2019 (3D Environmental 2019) and scored against predefined thresholds for a fragmented landscape (Eyre *et al* 2015). The final score was converted to a value out of a maximum of 3 according to:

$$\left(\frac{Measured\ context\ score}{Maximum\ context\ score\ (20)}\right) x3$$

Table 2.3. Site Context Attributes

Attribute	Maximum Score
Size of patch	10
Context	5
Connectivity	5
Maximum Total Score	**20**

Species Habitat Index

The ability of the site to support a species is scored according to the attributes in Table 2.4 and converted to a value out of 4 by the following.

$$\left(\frac{Measured\ species\ index\ score}{Maximum\ species\ index\ score\ (100)}\right) x4$$

Table 2.4. Species Habitat Index Attributes

Attribute	Maximum Score
Quality and availability of food and habitat required for foraging	25
Quality and availability of habitat required for sheltering and breeding	25
Quality and availability of habitat required for mobility	25
Absence of threats	25
Maximum Total Score	**100**

For each of the habitat attributes, measurable biotic or abiotic indicator(s) reflecting the species requirements were identified by literature review (e.g., hollow abundance). Were an indicator could not be directly measured, a surrogate measure was selected. Future offset assessments may be undertaken by other parties and, as such, indicators already sampled as part of the *BioCondition Assessment Methodology* were used in preference. While, at times, there may have been a better indicator the use of *BioCondition* data ensures the methodology is repeatable and comparable. However for a small number of species a new indicator was required as the *BioCondition* data was insufficient for sampling important habitat features. Selected indicators for fauna species are documented and justified in Sections 3.2.1 to 3.2.10.

2.4 Survey and Project Limitations

The following limitations of this work are noted:

- Habitat attribute scoring developed for this project is purposed only for comparing suitable habitat (i.e., 'core habitat possible' or 'core habitat known'). It does not consider lower value habitat and the HQS does not accurately reflect the possibility of a species occurring as other factors may affect their presence or absence (e.g., historical use, ancient stochastic events etc).
- Where possible the species habitat index is based on indicators selected from the *BioCondition Assessment Methodology*. These may not always be the best indicator of habitat amenity but ensures future surveys use a consistent, comparable and repeatable measure.
- *Absence of Threats* score has been determined for the broad SGP area, as required under the *Guide to determining terrestrial habitat quality v1.3* (DES 2020). This however may not reflect the extent or severity of threats at a property or local area scale.
- Site Context, Site Condition and Species Habitat Index has been calculated for each BioCondition site and represents a Habitat Quality Score (HQS) for the sampled vegetation polygon. While noting there are some restrictions in land access, effort has been made to encompass spatial and temporal (seasonal) variation in the selection of appropriate HQS sites to achieve a representative sample of habitat variation throughout the SGP areA. Sites were also selected to cover as many different Ecological Stratifications Units (ESUs) as are available in the SGP area, including remnant, regrowth and disturbed REs.
- Habitat amenity has been assessed for REs known within the SGP including 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.25, 11.3.26, 11.3.27, 11.4.3, 11.5.1, 11.5.4, 11.5.20, 11.5.21, 11.7.2, 11.7.4, 11.7.5, 11.7.6, 11.7.7, 11.9.2, 11.9.7 and 11.9.10. A separate assessment for suitability will be required for other REs present within offset properties but not within the SGP. As such the list of suitable REs provided for each MNES value in this document should not be considered exhaustive.

3.0 Assessment Results – Habitat Quality Scores

Habitat quality scores were calculated for sites within REs considered to be suitable habitat for each target MNES value. Individual scores and measured values for each site are provided within the supporting data package[1] with a summary of results provided in the below sections.

3.1 Threatened Ecological Communities

3.1.1 Brigalow communities (*Acacia harpophylla* dominant and co-dominant)

Habitat quality scores for sites within Brigalow communities of the SGP are provided in Table 3.1 below.

Table 3.1. Habitat Quality Scores for assessed Brigalow sites

Regional Ecosystem	Site	Site Condition	Site Context
11.3.1	CS2	1.46	1.35
	CN10	2.44	0.90
	RR10	2.12	0.30
	RR11	1.91	0.30
	RR12	1.99	0.00
	AE06	1.67	1.35
11.4.3	S6	2.06	0.60
	AE01	2.42	2.10
	AE45	2.16	0.90
	AE74	1.54	0.30
Brigalow Regrowth (11.3.1)	CN8	1.44	0.30
Brigalow Regrowth (11.4.3)	CN14	2.14	0.00

3.1.2 Coolibah-Black Box woodlands of the Darling Riverine Plains and the Brigalow Belt South (BBS) bioregion

Habitat quality scores for sites within Coolibah-Black Box communities of the SGP are provided in Table 3.2 below.

Table 3.2. Habitat Quality Scores for assessed Coolibah-Black Box woodland sites

Regional Ecosystem	Site	Site Condition	Site Context
11.3.3	CS19	1.56	2.16
	CS21	1.56	2.16

[1] 'SGP Combined site condition&context scores_Jun 21.xlsx' and 'SGP Combined Threatened Values HQS_Jun 21.xlsx'

3.2 Threatened Fauna Species

3.2.1 Collared Delma (*Delma torquata*)

3.2.1.1 Likely Occurrence

The Collared Delma is a small fossorial legless lizard restricted to the south-eastern area of Queensland. Most records are located in steep hills and slopes around Toowoomba, the Bunya Mountains and areas around the western suburbs of Brisbane. Scatter records occur along the ranges to Kroombit Tops and Don River State Forest west of Gladstone, and they have also been located in ranges associated with Carnarvon Gorge and Expedition National Parks. A cluster of records is present to the west of Roma associated with roadside Poplar Box (*E. populnea*) on alluvial plains (probably RE11.3.2). A single lone record is located approximately 65 km south of the SGP boundary near Wondul Range National Park (probably RE11.9.10).

These records suggest the species is extremely rare and scattered west of the coastal ranges (i.e, Bunya Mountains/Toowoomba Range) and, with the exception of the Roma population, is typically associated with topographically complex areas. Wilmer *et al* (2020) hypothesised *D. torquata* may be adapted to seasonally cool and semi-arid climates and has a dynamic history of expansion and contraction during the Pleistocene; it may have once been more widely spread during glacial periods. Its persistence in the west in more contemporary times is perhaps more likely in areas with complex topographic relief which may provide pockets of stable cool conditions.

Based on the paucity of records surrounding the SGP (excluding those at Bunya Mountains, an area of very different topography and ecology), the species has been previously assessed as unlikely to occur (EcoSmart Ecology 2017). Recent evidence, as detailed above, suggests the SGP is within a region at this species ecological limit and, as such, predicting is occurrence based on habitat preference is likely to be extremely difficult, if not impossible. While there remains a very low possibility that it could persist in isolated localised areas, it is more likely to be absent from extensive areas of seemingly suitable habitat. It is questionable if offsets are worthwhile for such an unlikely and unpredictable species and, if offsets are provided, it is unrealistic to anticipate evidence of occupation.

The above noted, habitats within the SGP which are most suitable would be associated with topographically complex areas. Generally these are absent from the SGP, further evidence the species is unlikely. However small minor jump-ups and low breakaways (typically no more than 1-2 m high) can be associated with RE11.7.2 and 11.7.4, especially in the very north (i.e., Gurulmundi) and south (i.e., steeper relief extending to Wondul Range). An assessment of habitat amenity for the species has been provided for these REs as well as 11.3.2 and 11.9.10 for consistency with REs identified as relevant by DAWE (2021a).

3.2.1.2 Estimating Species Habitat Attributes

Habitat attribute scoring for *D. torquata* is detailed below. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

Quality of Foraging, Shelter and Breeding habitat

The Collared Delma forages, shelters and breeds in similar habitats without distinction between these life-cycle stages. It inhabits eucalypt dominated woodlands and open forest, usually with abundant native grasses. It shelters under logs, bark and other course woody debris, but particularly favours small to mid-sized rocks (Peck 2012). Mats of leaf litter, typically 30-100 mm thick, may also be important (Davidson 1993). They appear to be highly sedentary and occupy a very small area, possibly using the same rock shelter for most of their life (Ryan 2006).

It is suggested within RE11.3.2, 11.7.2, 11.7.4 and 11.9.10 habitat amenity for 'foraging' be based on the extent of exposed, consolidated rock as this is often associated with topographic complexity (i.e., rocky outcrops). The extent of 'rock', as sampled within the *BioCondition Methodology*, will be used noting possible over or under estimation due to i) the lack of distinction between loose small rocks and large consolidated rock slaps and ii) the possibility of missing exposed rock using a transect. Relatively small threshold values have been selected due to the species ability to occur in areas of little rock outcrop.

Table 3.3. Criteria for scoring 'foraging' habitat amenity for Collared Delma

Extent of rock (%)*	<5	5-8	>9-12	>12-16	>16-20	>20
Score	0	5	10	15	20	25

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

'Shelter and breeding' habitat amenity can be estimated using cause woody debris as recorded by the *BioCondition Assessment Methodology*. High scores for 'shelter and breeding' are based on benchmark values for 11.3.2 as this reflects the lowest cause woody debris value for REs within which the species is known to occur in the southern Brigalow Belt.

Table 3.4. Criteria for scoring 'shelter and breeding' habitat amenity for Collared Delma

Cause woody debris (m)*	0-100	>100-150	>150-200	>200-250	>250-300	>300
Score	0	5	10	15	20	25

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

Quality of Habitat required for Mobility

Limited to no data is available on this species mobility or habitat features which may affect its movement potential. However the species is fossorial and individuals are often located under the same rock suggesting their capacity for movement is extremely limited. Populations may be isolated even if surrounded by suitable but un-inhabited habitat. Provision of shelter sites may be the best estimate of movement quality and the scoring system provided in Table 3.4 is adequate.

Absence of Threats

Documented threats to the species include habitat loss and fragmentation, rock removal, in appropriate fire regimes and invasive weeds (DEWHA 2008; Peck 2012). An assessment of these threats across the matter area (i.e., SGP) are provided in Table 3.5.

Table 3.5. An assessment of individual threats for Collared Delma across the broad SGP

Threat	Scope	Severity	Score
Ongoing loss and fragmentation of habitats	Difficult to estimate, but likely < 20% of the SGP affected in next 10 years (score = 5).	No resident Collared Delma populations are known from within the SGP. Within the impacted areas 100% of habitat will be lost, however it is highly unlikely most of these habitats will be, or have ever been, inhabited. While a score of 1 is warranted under a strict interpretation of the criteria (DES 2020), a more realistic score of 5 is warranted as little habitat will be affected.	25
Rock removal	Rock removal within the SGP is highly unlikely to occur and there are no known examples of this impact (score = 5).	The impacts of rock removal in affected areas could theoretically have a moderate impact on habitats or populations. However as argued above (for habitat loss), actual or potential habitat is unlikely and a more moderate score is warranted (score = 5).	25
Inappropriate fire regimes.	Difficult to estimate future fire frequency and extent. Based on historic trends (since 2020), likely to affect 20-39% of the SGP (score = 4).	Within fire affected areas it is likely that a high percentage of habitat will be affected, however as argued above this should be moderated to consider the low probability of the species occurring in affected areas (score = 5).	20
Invasive weeds	While weeds have the potential to affect large areas of vegetation, REs 11.7.2, 11.7.4 and 11.9.10 are robust and currently have little or no evidence of weed infestation. It is unlikely weeds will significantly increase in these areas. In contrast RE11.3.2 is more susceptible to weeds. RE11.3.2 represents approximately < 20% of the of these four habitats within the SGP (Score = 5).	Within RE11.3.2, weeds have the potential to moderately affect Collared Delma habitats, though the species can occur in modified habitats (Peck 2012). As this species is unlikely to occur across large areas of habitat, a more moderate score is warranted (score = 5).	25

3.2.1.3 Habitat Quality Scores

Habitat quality scores for Collared Delma have been evaluated at sites within the REs 11.3.2, 11.7.2 and 11.7.4. These represent all habitats within the SGP[2] considered likely to provide habitat for the species based on current knowledge. However, as discussed in Section 3.2.1.1 the species is unlikely to occur, if at all, and large areas of habitat will be unoccupied. A summary of the score results is provided in Table 3.6 below, with individual site scores provided in Appendix B.

Table 3.6. Summary of Habitat Quality Scores (out of 10) for Collared Delma (*Delma torquata*)

Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.2	14	2.36	6.93	4.34	1.35
11.7.2	4	7.26	8.22	7.79	0.43
11.7.4	8	4.41	8.60	7.30	1.45

3.2.2 Five-clawed Worm-skink (*Anomalopus mackayi*)

3.2.2.1 Likely Occurrence

Within Queensland *A. mackayi* is known from east of the Condamine River, it has never been recorded west of this geographical feature. Furthermore, the species is found on deep cracking clays supporting remnant native grasslands (RE11.3.21) (DAWE 2021b). The SGP is largely situated west of the Condamine River and has no suitable remnant grasslands. Clearing in recent centuries has created some derived (non-remnant) grassland-like communities but, being fossorial in habitat, the Condamine River possess a significant barrier to dispersal. The possibility of colonisation from populations to the east seems improbable.

To summarise, while the SGP is close to, it remains outside this species known distribution and no suitable habitat is present. This species is not expected to occur. With no suitable habitat within the SGP it is not possible to calculate Habitat Quality Scores.

3.2.3 Yakka Skink (*Egernia rugosa*)

3.2.3.1 Likely Occurrence

Records of Yakka Skink are scattered from Mungkan Kandju National Park (NP) on Cape York Peninsula to near St George and Billa Billa in southern QLD. They are coastal around Bundaberg and extend inland to near Charleville. Most records are centred on the Brigalow Belt between St George and Emerald, Chinchilla and Charleville. Few records are located south and east of Chinchilla and the species is regularly absent from seemingly suitable habitat.

The species is typically found in small family aggregations consisting of a single adult pair and their young, though aggregations of up to 21 individuals have been recorded (Peck *et al* 2016). They inhabit a variety of vegetation communities including Brigalow (*Acacia harpophylla*), Mulga (*A. aneura*), Bendee (*A. catenulata*), Lancewood (*A. shirleyi*), Belah (*Casuarina cristata*), Poplar Box (*E. populnea*), Ironbarks and White Cypress Pine (*Callitris glaucophylla*). They

[2] See Section 2.4 for a list of all REs within the SGP

utilise landzones 3, 4, 5, 7, 9 and 10, but typically avoid locations that may be inundated or flooded (DSEWPC 2011).

Habitat modelling followed by field surveys by Johnson *et al* (2017) located only one Yakka Skink colony in the eastern Brigalow Belt South area (Braemar State Forest to the near west of the SGP). Extensive surveys in other suitable habitat on private and public lands, including Barakula State Forest and several State Forests between Dalby and Inglewood (including Braemar, Dunmore, Western Creek, Kumbarilla and Bringalily), failed to locate the species. They concluded that 'there is likely to be a reduced risk of impacts on Yakka Skink habitat within the eastern Brigalow Belt South compared with areas further west'.

The scattered and meagre records (both recent and historical) despite survey effort suggest the SGP is at or near this species climatic limit (Figure 3.1). Its occurrence is likely to be unpredictable based on habitat amenity. Should Yakka Skinks even be present within the SGP, they are likely to be restricted to small, localised areas while absent from extensive, seemingly suitable habitat. It is questionable if offsets are worthwhile for the Yakka Skink until they have been confirmed within disturbance areas. If offset habitats are provided, it is unrealistic to expect habitation by this species.

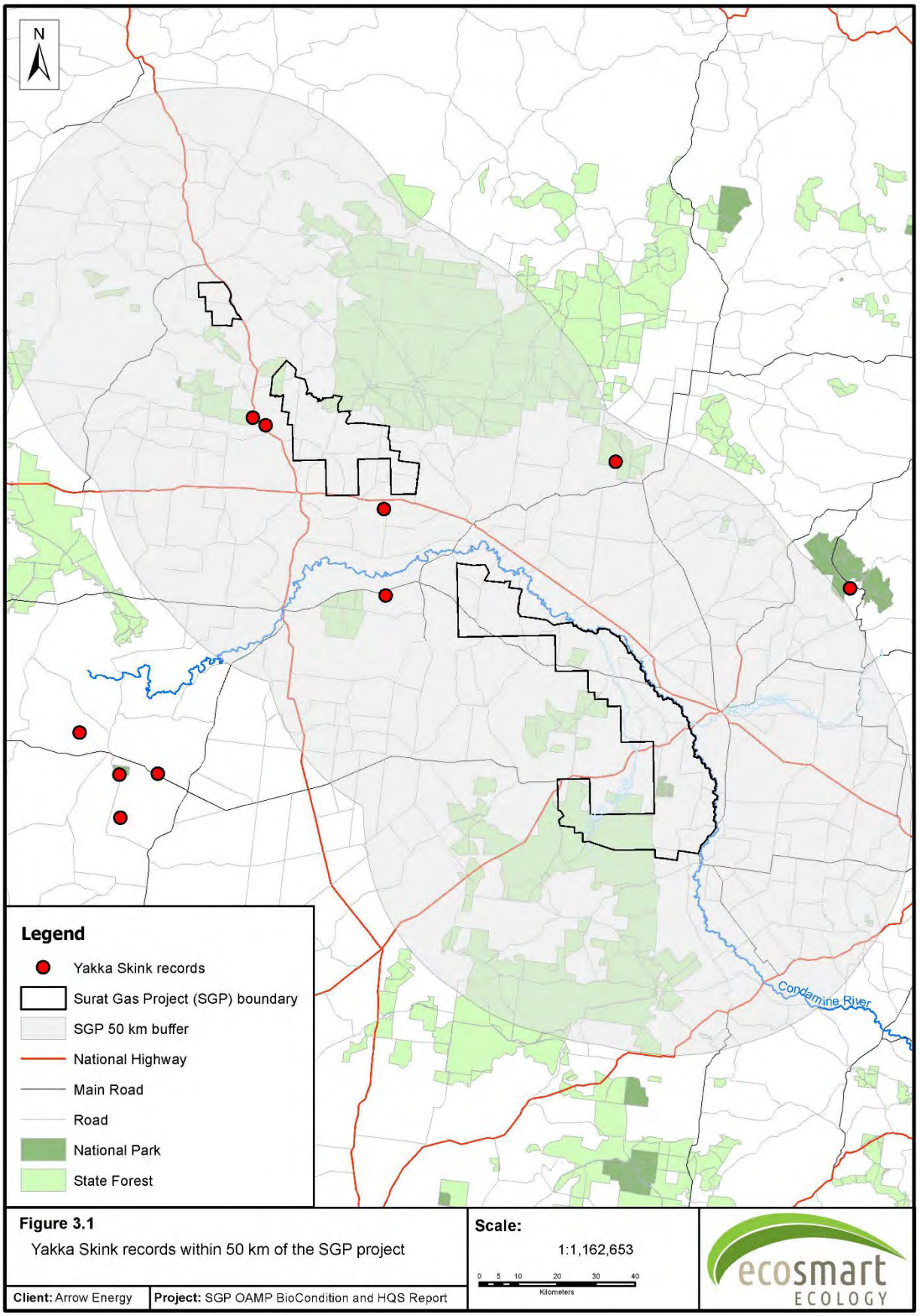
3.2.3.2 Estimating Species Habitat Attributes

Habitat attribute scoring for the Yakka Skink is detailed below. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

Quality of Foraging, Shelter and Breeding habitat

Yakka Skinks are omnivorous feeding on arthropods, small vertebrates, soft plant materials and fruits (Wilson and Knowles 1988; Ehmann 1992). Measuring food abundance, either directly or indirectly, is problematic. Further, reptiles have low metabolic rates and do not have high energetic requirements (Heatwole and Taylor 1987); these lizards are likely to have ample dietary resources in most habitat types as evident by their occasional occurrence in highly disturbed habitats. Assessing habitat amenity based on 'foraging quality' is likely to be arbitrary and possibly misleading.

Where present Yakka Skink colonies inhabit burrow systems under partially buried rocks, logs and tree-stumps. Both used and abandoned rabbit warrens may also be utilised (Peck *et al* 2016). Lizards will persist in cleared or modified habitats where these shelter sites remain intact and will use stick-raked log piles and spoil heaps (Johnson *et al* 2017). Less often they are known to inhabit human structures such as under and around sheds, houses, loading ramps and hold rubble piles.


N
Legend
Yakka Skink records
Surat Gas Project (SGP) boundary
SGP 50 km buffer
National Highway
Main Road
Road
National Park
State Forest
Condamine River
Figure 3.1
Yakka Skink records within 50 km of the SGP project
Scale:
1:1,162,653
0 5 10 20 30 40
Kilometers
Client: Arrow Energy
Project: SGP OAMP BioCondition and HQS Report
ecosmart ECOLOGY

In a research project to identify important habitat features for Yakka Skink in the south-east Brigalow Belt, Johnson *et al* (2017) concluded that these lizards require woodlands and open forests with a soil structure suitable for burrowing (loam and sandy loams, not clay or silt soils), prefer a canopy (T1) height of <16.5 m and woody debris exceeding 37 m^3/ha^3. However the species could still be present where log volume fell below this threshold if canopy (T1) cover was < 11%.

Based on the above evidence we suggest habitat scoring for Yakka Skink should focus on Canopy (T1) height/cover and log abundance. The influence of soil is considered during habitat suitability mapping which includes REs with suitable soils while avoiding RE's with unsuitable soils. Canopy (T1) height/cover can be used to evaluate 'forage habitat', though it is recognising this is not a score of foraging amenity *per sae* (Table 3.8).

Table 3.7. Criteria and matrix for scoring 'forage' habitat amenity for Yakka Skink

		Median canopy (T1) height (m)				
		<10	10-13	13-16	16-19	>19 m
Canopy (T1) cover*	0-8	25	25	25	20	10
	>8-11	25	20	20	15	5
	>11-15	20	15	15	10	5
	>15-19	15	15	10	5	0
	>19	10	10	10	5	0

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

While log volume would best evaluate 'shelter and breeding' habitat amenity, course woody debris has been selected as this measure is already sampled by the *BioCondition Methodology*. This will ensure a repeatable and consistent measure is used between surveys/assessments. The score should be manually increased if there is evidence of structures that might provide burrows or aid burrow creation (e.g., obvious burrows under rocks, large hollow logs, rabbit warrens).

Table 3.8. Criteria for scoring 'shelter and breeding' habitat amenity for Yakka Skink

Course woody debris (m/ha)^	0-100	>100-200	>200-300	>300-400	>400-500	>500
Score^	0	5	10	15	20	25

^ As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015). Score manually increased if the site contains rabbit burrows (active or abandoned), suitable building debris or rock structures which are considered for Yakka Skink use or burrow creation.

Quality of Habitat required for Mobility

Yakka Skinks show high site fidelity and, while poorly studied, dispersal seems to be limited. At Charleville they were found to disperse between 50 and 570 m (average 260 m; Peck *et al* 2016). Peck *et al* 2016 postulated that dispersal may be unsuccessful if the individual is not able to establish within an existing aggregation. This may explain why the species is often absent from habitats which appear suitable.

[3] Woody debris volume is disproportionately increased by larger logs which provide better habitat for Yakka Skink. This is therefore a better measurement for assessing shelter amenity than total than length.

Habitat factors which affect movement are poorly understood. However it is likely that lizards will be able to move through most habitat types, provided sufficient cover is present to avoid predation. Course ground debris, as measured by using the *BioCondition Methodology*, can be used as a surrogacy to estimate habitat amenity for mobility. However the scoring should be based on total extent of debris and not compared to a benchmark.

Table 3.9. Criteria for scoring 'Mobility' habitat amenity for Yakka Skink

Course woody debris (m/ha)*	< 100	100-200	<200-300	<300-400	<400-500	>500
Score	0	5	10	15	20	25

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

Absence of Threats

Known threats to the species include habitat clearing and fragmentation, introduction of exotic weeds, and modification and the destruction of refugia sites (QPWS 2001; DSEWPC 2011). Suspect threats include (i) degradation of microhabitat features, food supplies and burrow systems from intensive grazing and associated trampling, (ii) inappropriate fire regimes and (iii) predation by feral cats and foxes.

With Yakka Skinks difficult to detect and most suitable habitat not specially protected by legislation, habitat loss for land clearing remains a threat to the species within and around the SGP. Quantifying the extent of this loss is difficult to predict. Predicting the possible impact from weeds, intensive grazing and predation from feral predators is also difficult to predict with some areas likely to be more susceptible than others; however all these impacts are likely to occur across a broad areA. All these impacts will be significantly influenced by land use and likely to vary from location to location, assessing impact on this species is problematic and even determining which threat factor possesses the greatest risk to the species in the SGP is difficult.

Overall, impacts to this species within the next decade is estimated to possibly affect 40-59% (a medium scope) of habitat within the SGP and possibly degrade or reduce the species habitat by 5-10%. This results in an absence of threat score of 12 for the broad SGP area, however it should be noted this will vary significantly between properties and land management practices.

3.2.3.3 Habitat Quality Scores

Habitat quality scores for Yakka Skink have been evaluated at sites within the REs 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.5.1, 11.5.4, 11.5.20, 11.5.21, 11.7.4, 11.7.5, 11.7.6 and 11.7.7. While these represent most of the suitable REs within the SGP[4], the following REs have not been assessed: 11.9.2, 11.9.7 and 11.9.10 due to land access restrictions A summary of scores for each RE is provided in Table 3.10 with scores for individual sites provided in Appendix B. As discussed in Section 3.2.3.1 the species is unlikely to occur, if at all, and large areas of habitat will be unoccupied.

[4] See Section 2.4 for a list of all REs within the SGP

Table 3.10. Summary of Habitat Quality Scores (out of 10) for Yakka Skink (*Egernia rugosa*)

Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.1	6	2.89	6.22	4.64	1.22
11.3.2	14	2.44	6.81	4.36	1.26
11.3.3	2	3.04	3.44	3.24	0.28
11.3.4	14	2.78	6.20	4.18	1.15
11.3.14	3	3.41	6.21	4.44	1.54
11.3.17	6	3.42	5.82	4.75	0.90
11.3.18	4	2.98	5.35	4.49	1.04
11.5.1	5	4.90	7.71	6.01	1.13
11.5.4	6	3.44	5.17	4.31	0.66
11.5.20	7	2.82	7.60	5.46	1.91
11.5.21	1	5.16	5.16	5.16	n/a
11.7.4	8	3.49	7.64	6.50	1.33
11.7.5	1	6.58	6.58	6.58	n/a
11.7.6	5	5.73	7.21	6.47	0.56
11.7.7	5	4.40	7.45	6.57	1.27

3.2.4 Dunmall's Snake (*Glyphodon dunmalli*)

3.2.4.1 Likely Occurrence

Dunmall's Snake (*Glyphodon dunmalli,* previously *Furina dunmalli*) is confined to the Brigalow Belt bioregion of south-eastern Queensland and north-eastern New South Wales, occurring north to Clermont and near Rockhampton. Most records are from the Dalby-Tara area of the Darling Downs (Hobson 2012). The SGP area is entirely contained within the species distribution. The species is very rarely encountered, even in areas of known habitat, and has been described as 'extremely secretive, rarely encountered, possibly genuinely scarce' (Wilson 2015).

The Dunmall's Snake has been recorded from a number of locations surrounding the SGP including two records approximately 6-7 km to the west. One of these is undated and likely very old while the second is dated as the year 2000. Three records fall within the SGP, two at Lake Broadwater (dated as 1984 and 1993) and a third recent record (post 2015) to the north (-26.425189, 150.182572). These three onsite records have been recorded from RE11.5.1 and regrowth RE11.5.20.

Limited information is available on habitat preferences of the Dunmall's Snake. It has been recorded from a wide range of habitats, including forests and woodlands dominated by brigalow (*Acacia harpophylla*) and other acacias (*A. burowii, A. deanii, A. leiocalyx*), cypress (*Callitris* sp.) or Bulloak (*Allocasuarina luehmannii*) on black alluvial cracking clay and clay loams (Covacevich *et al.* 1988; Stephenson and Schmida 2008; Brigalow Belt Reptiles Workshop 2010; Hobson 2012). It also occurs in spotted gum (*Corymbia citriodora*) and ironbark (*Eucalyptus crebra* and *E. melanophloia*) on sandstone derived soils and there is a record from the edge of dry vine scrub (Stephenson and Schmida 2008; Brigalow Belt Reptiles Workshop 2010). However, preferred habitat appears to be brigalow growing on cracking black clay and clay

loams (Cogger *et al.* 1993), with the majority of records from between 200 to 500 m elevation (Hobson 2012). The species can, on rare occasions, inexplicably appear in sub-optimal vegetation. Advanced regrowth habitat should not be discounted, particularly when adjacent or linking areas of suitable habitat.

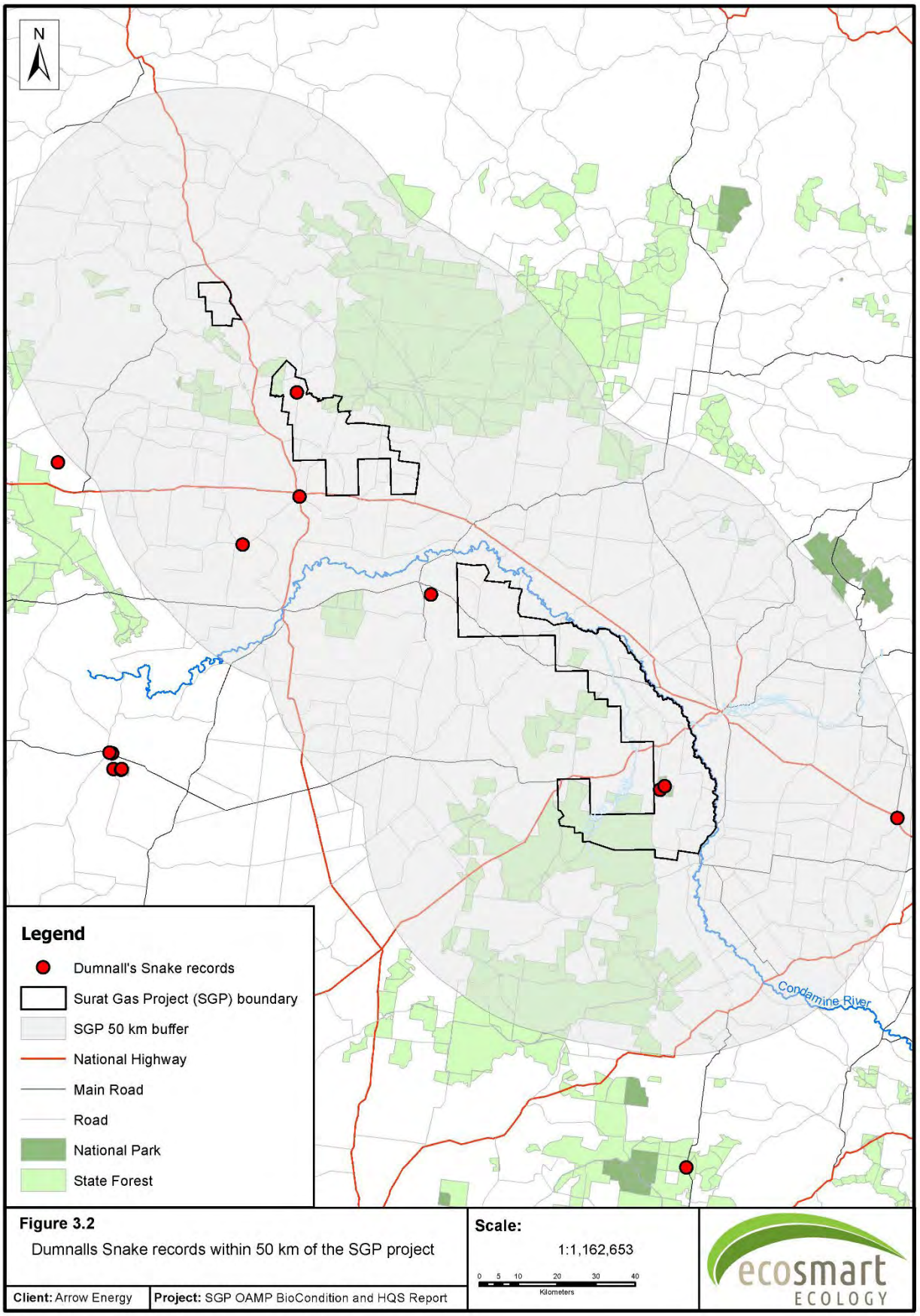
Modelling completed by Johnson *et al* (2017) failed to find any reliable attributes for predicting suitable habitat for this species. While the model had limited predictive ability, it showed that the Dunmall's Snake was associated with several Broad Vegetation Groups (BVG) within the southern Brigalow Belt (Table 3.11). All RE's listed in the table below have been identified as contributing to 'Core Habitat Possible' (EcoSmart Ecology 2017) except RE11.3.2 and RE11.3.26. These should be elevated from 'General Habitat' to 'Core Habitat Possible' for future assessments and mapping.

Table 3.11. Association of Dunmall's Snake records with 1:1M Broad Vegetation Groups (Modified from Johnson *et al* 2017; only BVGs/REs relevant to the SGP listed)

BVG	Description	RE's assessed within SGP
10a	Dry woodlands to open woodlands dominated by *Corymbia citriodora* (Spotted Gum). (land zones 10, 7, 12, 11).	11.7.6
12a	Dry woodlands to open woodlands dominated by ironbarks such as *Eucalyptus decorticans* (Gum-topped Ironbark), *E. fibrosa* subsp. *nubila* (Blue-leaved Ironbark), or *E. crebra* (Narrow-leaved Red Ironbark) and/or bloodwoods such as *Corymbia trachyphloia* (Yellow Bloodwood), *C. leichhardtii* (Rustyjacket), *C. watsoniana* (Watson's Yellow Bloodwood), *C. lamprophylla*, *C. peltata* (Yellowjacket). Occasionally *E. thozetiana* (Mountain Yapunyah), *E. cloeziana* (Gympie Messmate) or *E. mediocris* are dominant. Mostly on sub-coastal/inland hills with shallow soils. (land zones 7, 9, 10).	11.7.4, 11.7.7
13d	Woodlands dominated by *Eucalyptus moluccana* (Gum-topped Box or *E. microcarpa*, Inland Grey Box) on a range of substrates. (land zones 3, 5, 8, 9, 11, 12).	11.3.26, 11.5.20
17a	Woodlands dominated by *Eucalyptus populnea* (Poplar Box) (or *E. brownii*, Reid River Box) on alluvium, sand plains and footslopes of hills and ranges. (land zones 3, 4, 5, 9, 10, 11, 12).	11.3.2, 11.3.18, 11.9.7
18b	Woodlands dominated *Eucalyptus crebra* (*sens. lat.*) (Narrow-leaved Red Ironbark) frequently with *Corymbia* spp. or *Callitris* spp. on flat to undulating plains. (land zones 3, 5).	11.5.1, 11.5.4
25a	Open forests to woodlands dominated by *Acacia harpophylla* (Brigalow) sometimes with *Casuarina cristata* (Belah) on heavy clay soils. Includes areas co-dominated with *A. cambagei* (Gidgee) and/or emergent eucalypts. (land zones 3, 4, 7, 9, 11).	11.3.1, 11.3.17, 11.4.3, 11.4.10, 11.9.5, 11.9.10

3.2.4.2 Estimating Species Habitat Attributes

Habitat attribute scoring for the Dunmall's Snake is detailed below. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.


N
Legend
Dumnall's Snake records
Surat Gas Project (SGP) boundary
SGP 50 km buffer
National Highway
Main Road
Road
National Park
State Forest
Condamine River
Figure 3.2
Dumnalls Snake records within 50 km of the SGP project
Scale:
1:1,162,653
0 5 10 20 30 40
Kilometers
Client: Arrow Energy
Project: SGP OAMP BioCondition and HQS Report
ecosmart ECOLOGY

Quality of Foraging, Shelter and Breeding Habitat

The Dunmall's Snake diet is thought to consist of small terrestrial reptiles with abundant populations potentially providing better foraging habitat. Many of these reptiles shelter under fallen woody debris. In reality snakes have low metabolic rates and low energetic requirements (Heatwole and Taylor 1987) and prey abundance may not influence habitat selection. Further, terrestrial lizard abundance could be affected by other factors such as climatic conditions with anecdotal reports of small terrestrial lizard communities declining after severe long-term drought (M. Sanders *pers. obs.*). However, in the absence of a better measurable attribute, total fallen woody debris (metres/hectare) is probably the best factor to consider.

Where these snakes shelter largely remains a mystery but is presumed beneath fallen debris similar to other snakes. However few have been located when not active; one has been located under a log (S. Wilson *pers. comm.*) while a second approximately two metres off the ground under bark on a large dead tree (M. Summerville *pers. comm.*). The lack of sheltering observations have led some to believe they may be subterranean in habitat, possibly sheltering down deep soil cracks. At least three individuals, possibly the highest number at any one location, have been found at Erringibba National Park which is dominated by deep cracking clays (RE11.4.3/11.4.7). However they have been found at other locations where deep soil cracks are not abundant (including two recent records from Kroombit Tops National Park).

A similar lack of evidence and poor ecological understanding confound evaluating and scoring 'mobility' habitat.

A model based the on habitat at historic locations developed by Johnson et al (2017) was 'not useful for the purpose of identifying areas of potential habitat for the species but does indicate a very broad environmental envelop in which the species may possibly occur'.

To put it simply, there is no good way to assess shelter, breeding or mobility habitat amenity for these snakes. In the absence of any substantial evidence, total fallen woody debris (metres/hectare) will be used as the assessment attribute. How to score or rank the amount of woody debris is largely arbitrary.

Table 3.12. Criteria for scoring 'forage', 'shelter and breeding' and 'mobility' habitat amenity for Dunmall's Snake

Course woody debris (meters per hectare)*	< 100	100-200	<200-300	<300-400	<400-500	>500
Score*	0	5	10	15	20	25

* As estimated using the BioCondition Assessment Methodology. Score for 'shelter and breeding' and 'mobility' amenity to be manually adjusted (increased) as required to account for addition shelter provided by soil cracks.

Absence of Threats

Possible threats have been identified as (DAWE 2021c):

- Extensive clearing of habitat for development (mining and urban), agriculture or pasture improvement
- Extensive overgrazing of habitat by domestic stock
- Loss of fallen timber and ground litter, e.g. fuel reduction burns, firewood collection

- Invasion of habitat by predatory animals and introduced weeds
- Possible drainage of swamps.

As Dunmall's Snakes are extremely difficult to detect and much of their potential habitat is not specially protected by legislation, habitat loss remains a threat to the species within and around the SGP. Quantifying the extent of this loss is difficult to predict. Predicting the possible impact from weeds, intensive grazing and predation from feral predators is also difficult to predict with some areas likely to be more susceptible than others; however all these impacts are likely to occur across a broad areA. As all these impacts will be significantly influenced by land use and likely to vary from location to location, assessing impact on this species is problematic and even determining which threat factor possesses the greatest risk to be species in the SGP is difficult. Furthermore, it is almost impossible to assess how much suitable habitat might be frequented by the species within the SGP.

Impacts to this species within the next decade is estimated to possibly affect 40-59% (a medium scope) of habitat within the SGP and possibly degrade or reduce the species habitat by 5-10%. This results in an absence of threat score of 12 for the matter (SGP) area. It should be noted this will vary significantly between properties and land management practices, and due to the uncertainty around this species ecology there is low confidence of this estimate.

3.2.4.3 Habitat Quality Scores

Habitat quality scores for Dunmall's Snake have been evaluated at sites representing all suitable REs within the SGP except RE11.9.7 and 11.9.10. A summary of scores for each RE is provided in Table 3.13 with scores for individual sites provided in Appendix B.

Table 3.13. Summary of Habitat Quality Scores (out of 10) for Dunmall's Snake (*Glyphodon dumnalli*)

Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.1	6	2.69	6.82	4.91	1.59
11.3.2	14	2.04	7.01	4.25	1.57
11.3.14	3	3.61	7.01	4.77	1.93
11.3.17	6	2.62	6.42	4.95	1.52
11.3.18	4	2.58	5.15	4.14	1.10
11.4.3	1	5.34	5.34	5.34	n/a
11.5.1	5	4.10	8.11	6.09	1.69
11.5.4	6	3.29	4.91	4.11	0.70
11.5.20	7	2.75	8.60	5.91	2.34
11.5.21	1	4.96	4.96	4.96	n/a
11.7.2	4	6.14	8.30	7.42	0.91
11.7.4	8	3.69	8.24	6.58	1.47
11.7.6	5	6.33	8.21	6.99	0.75
11.7.7	5	4.40	7.96	7.01	1.53

3.2.5 Squatter Pigeon (Geophaps scripta scripta)

3.2.5.1 Likely Occurrence

The SGP occurs entirely within the distribution of the Squatter Pigeon. However Squatter Pigeons have been recorded on only six occasions within, or in proximity to (<20 km), the SGP and off-tenure areas since 2010. On average the species is recorded less than once a year, despite being a relatively easy species to observe. There are no repeat records from the same location or general area, not even Lake Broadwater which represents perhaps be the best Squatter Pigeon habitat within the eastern Condamine Catchment. As such Squatter Pigeons recorded from the SGP and surrounding area are suspected transient individuals and no resident or breeding populations are known to occur.

Based on the lack of frequent or repeated representation within or near Arrow tenements, or any evidence of resident/seasonal populations within the region, early assessments considered Squatter Pigeons to be a 'transient' species and no detailed habitat mapping has been undertaken. To comply with DoEE requirements new rules were developed in 2019 to allow predictive mapping of potential habitats. It should be noted mapped habitats within the SGP are unlikely to represent areas inhabited by a population that is important for the species' survival, though they may be of some value if the species was to undergo sudden expansion.

Considering the species is rarely recorded within the SGP and no known populations occur, it is unrealistic to expect evidence of this species in offset vegetation.

3.2.5.2 Estimating Species Habitat Attributes

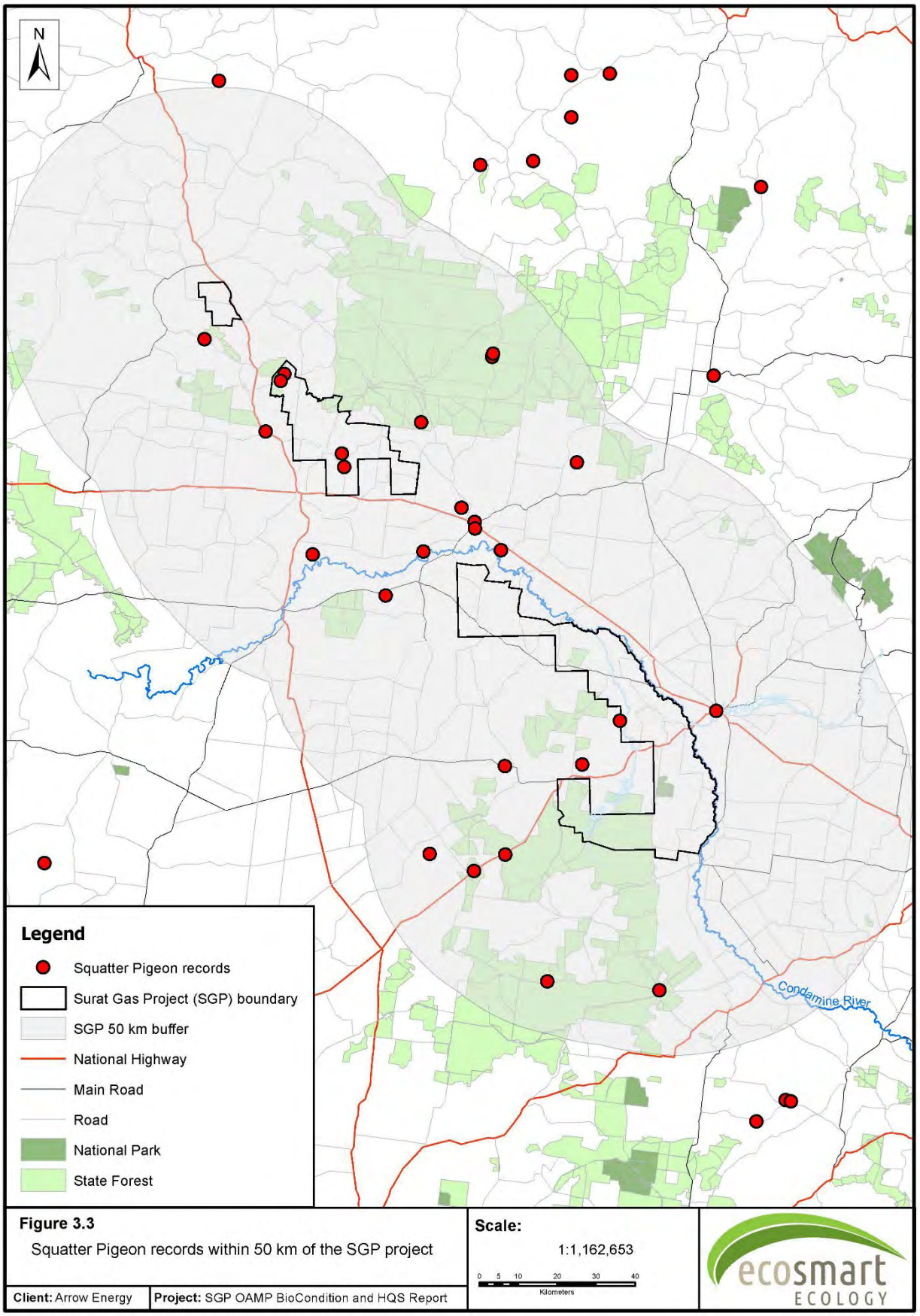
Habitat attribute scoring for the Squatter Pigeon is detailed below. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

Foraging, Shelter and Breeding, and Mobility Habitat

Squatter Pigeons spend most of their life-cycle in similar habitats for foraging, sheltering, breeding, and movement. They occur in open-forests to sparse open woodlands that are dominated by Eucalyptus and in close proximity (typically < 3 km) to permanent or semi-permanent water. This includes remnant and non-remnant habitats such as grazing lands. Sandy or gravel soils which have a sparse to patchy ground layer that rarely exceeds 33% are particularly favoured (DAWE 2021d). Individual birds may be sporadically observed in atypical habitats such as more heavily wooded vegetation, where they are usually observed along roadsides, tracks and other areas where there is a break in the canopy.

Nests are positioned on the ground with eggs laid in a slight depression lined with grasses and sheltered by tussock grass, shrubs, or debris (Frith 1982; Beruldsen 2003). They are likely to be capable of breeding in any month following suitable conditions, but their main breeding season is September to January (Cooper et al 2014).

Squatter Pigeons are not known to undertaken long-distance movements (1982), though there is evidence to suggest dispersal may be more widespread than currently recognised (Cooper *et al* 2014). They are highly mobile birds able to cover large distances quickly over a variety of remnant and non-remnant habitats.


N
Legend
Squatter Pigeon records
Surat Gas Project (SGP) boundary
SGP 50 km buffer
National Highway
Main Road
Road
National Park
State Forest
Condamine River
Figure 3.3
Squatter Pigeon records within 50 km of the SGP project
Scale:
1:1,162,653
0 5 10 20 30 40
Kilometers
Client: Arrow Energy
Project: SGP OAMP BioCondition and HQS Report
ecosmart ECOLOGY

Based on known habitat use three factors seem best to predict habitat amenity for this species: percentage canopy cover, ground cover, and distance to water. Canopy cover can be used for scoring 'shelter and breeding' habitat, ground cover for 'forage' habitat and distance to water for 'mobility' habitat.

Table 3.14. Criteria for scoring 'forage' habitat amenity for the Squatter Pigeon

Leaf/debris + bare ground (%)*	< 60	≥60-70	≥70
Score	0	15	25

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

Table 3.15. Criteria for scoring 'shelter and breeding' habitat amenity for the Squatter Pigeon

% canopy (T1+T2) cover*	0-30	>30-50	>50-60	>60-70	>70-80	>80
Score	25	20	15	10	5	0

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

Squatter Pigeons are able to use a variety of water resources, including minor features such as water troughs (M. Sanders *pers. obs*). These features are difficult to detect using aerial photography and as such the mobility score may not always accurately reflect on-ground conditions. Manual variation of these scores may be included if justified based on ground-verified results.

Table 3.16. Criteria for scoring 'mobility' habitat amenity for the Squatter Pigeon

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

Documented threats to the Squatter Pigeon include (DAWE 2021d):

- Loss and fragmentation of habitats
- Degradation of habitat by domesticated herbivores (e.g., sheep and cattle)
- Degradation of habitats by exotic weeds (e.g., Buffel Grass *Cenchrus ciliaris*)
- Predation from native and exotic (especially fox and cat) predators

An assessment of each threat across the SGP areas is provided in Table 3.17 below. The scope and severity of these impacts are difficult to evaluate without empirical data.

Table 3.17. An assessment of individual threats for Squatter Pigeon across the broad SGP

Threat	Scope	Severity	Score
Ongoing loss and fragmentation of habitats	Difficult to estimate, but likely < 20% of the SGP affected in next 10 years (score = 5)	No resident Squatter Pigeon populations are known from within the SGP. It is unlikely potentially cleared areas will be recolonised within the next decade, and as such less than 5% of known habitat likely affected (score = 5).	25
Increased degradation by	Most areas of retained habitat are contained within reserves	The level of damage from this threat is difficult to estimate and is likely to vary	8

Threat	Scope	Severity	Score
domesticated herbivores	(State Forest) or along waterways. Most of these areas will experience at least some grazing pressure in the next decade, likely more than 60% (score = 2).	between properties and management units. While grazing pressures may prevent habitat recovery, it is unlikely to lead to a significant increase in habitat degradation (score = 4).	
Degradation of habitats by exotic weeds	All areas of retained Squatter Pigeon habitat could be affected, in varying degrees, by exotic weeds within the next decade (score = 1).	Difficult to assess across the broader SGP with some areas more susceptible than others. Large areas of habitat already infested by weeds preventing habitat recovery, however future weed infestations unlikely to significantly reduce existing habitats in next 10 years (score = 5).	5
Predation from native and exotic predators	All areas of retained Squatter Pigeon habitat is, and could be, affected by predation within the next decade (score = 1).	Difficult to estimate across the broader SGP due to location-specific variation. Considering there is no existing population it seems unlikely this threat will significantly reduce the population future. It may however reduce the success of recovery (score = 5).	5

3.2.5.3 Habitat Quality Scores

Habitat quality scores for Squatter Pigeon have been evaluated at sites representing all suitable REs within the SGP except RE11.3.26, 11.9.2 and 11.9.7. A summary of scores for each RE is provided in Table 3.18 with scores for individual sites provided in Appendix B.

Table 3.18. Summary of Habitat Quality Scores (out of 10) for the Squatter Pigeon (*Geophaps scripta scripta*)

Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.2	14	2.11	4.63	3.41	0.80
11.3.3	2	2.66	2.86	2.76	0.14
11.3.4	14	2.85	4.92	3.58	0.67
11.3.14	3	1.83	4.18	3.23	1.23
11.3.17	6	2.69	4.19	3.40	0.60
11.3.18	4	2.57	4.84	3.67	1.18
11.3.25	6	3.55	5.18	4.49	0.61
11.3.27f	1	2.65	2.65	2.65	n/a
11.3.27i	4	3.14	4.46	3.72	0.55
11.5.20	7	2.66	5.91	4.42	1.48

3.2.6 Painted Honeyeater (*Grantiella picta*)

3.2.6.1 Likely Occurrence

The SGP area occurs entirely within the distribution of the Painted Honeyeater and the species has been frequently recorded within a 20 km buffer. With the exception of a single location identified in 2019, records within the SGP are restricted to the immediate vicinity of Lake Broadwater (Figure 3.4).

Painted Honeyeaters inhabit open dry woodlands and forests which have abundant Mistletoe (Higgins *et al* 2001). They prefer extensive stands of remnant woodlands with mature trees as these support more mistletoe, but will use narrow strips and small blocks if sufficient mistletoe fruit is available (DAWE 2020).

Within the southern Brigalow belt vegetation which supports abundant Needle-leaved (*Amyema cambagei*) and Grey Mistletoe (*A. quandang*) are particularly favoured. Needle-leaved Mistletoe is associated with *Casuarina cunninghamiana* and *Casuarina cristata*, while Grey Mistletoe is associated with larger *Acacia* species (especially *A. harpophylla*). Riparian woodlands (e.g., *E. camaldulensis* waterways) can also be utilised if mistletoe is abundant.

3.2.6.2 Estimating Species Habitat Attributes

Habitat attribute scoring for Painted Honeyeater is detailed below. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

Foraging, Shelter and Breeding Habitat

Painted Honeyeaters are mistletoe specialists and their diet is dominated by mistletoe fruit and, at certain times of the year, mistletoe nectar (Oliver *et al* 2003). Invertebrates can also be occasionally taken (Higgins *et al* 2001). Nests are located in the outer foliage of trees, especially eucalypts and casuarinas, and mistletoes which have pendulous foliage (Higgins *et al* 2001; Barea 2008). Studies have found that nest-site selection is primarily driven by mistletoe abundance and proximity to mistletoe clumps, although habitat structure also plays a role (Barea 2012).

Based on a study in northern NSW, Painted Honeyeaters inhabit sites where mistletoe density averages 260 mistletoe clumps per hectare, though mistletoe density may range from five to 1,505 clumps per hectare (Oliver *et al* 2003). Home range size is poorly documented, however nesting pairs can often be found in linear fragments and small patches of vegetation that are likely less than one hectare (M. Sanders *pers. obs.*).

As the life-cycle of the Painted Honeyeater is primarily driven by mistletoe phenology (Barea and Watson 2007), scoring foraging habitat and breeding habitat amenity should both reflect mistletoe density. No existing *BioCondition Methodology* attribute measures mistletoe abundance and, as such, all future offset surveys must measure mistletoe density as a new attribute. While the species is most often associated with *A. cambagei* and *A. quandang* in the southern Brigalow Belt, it remains unclear if this is a preference for these two species or reflects that these two species of mistletoe can often be found in high density populations. A precautionary approach is applied and all mistletoe is considered of equal value in the scoring below.

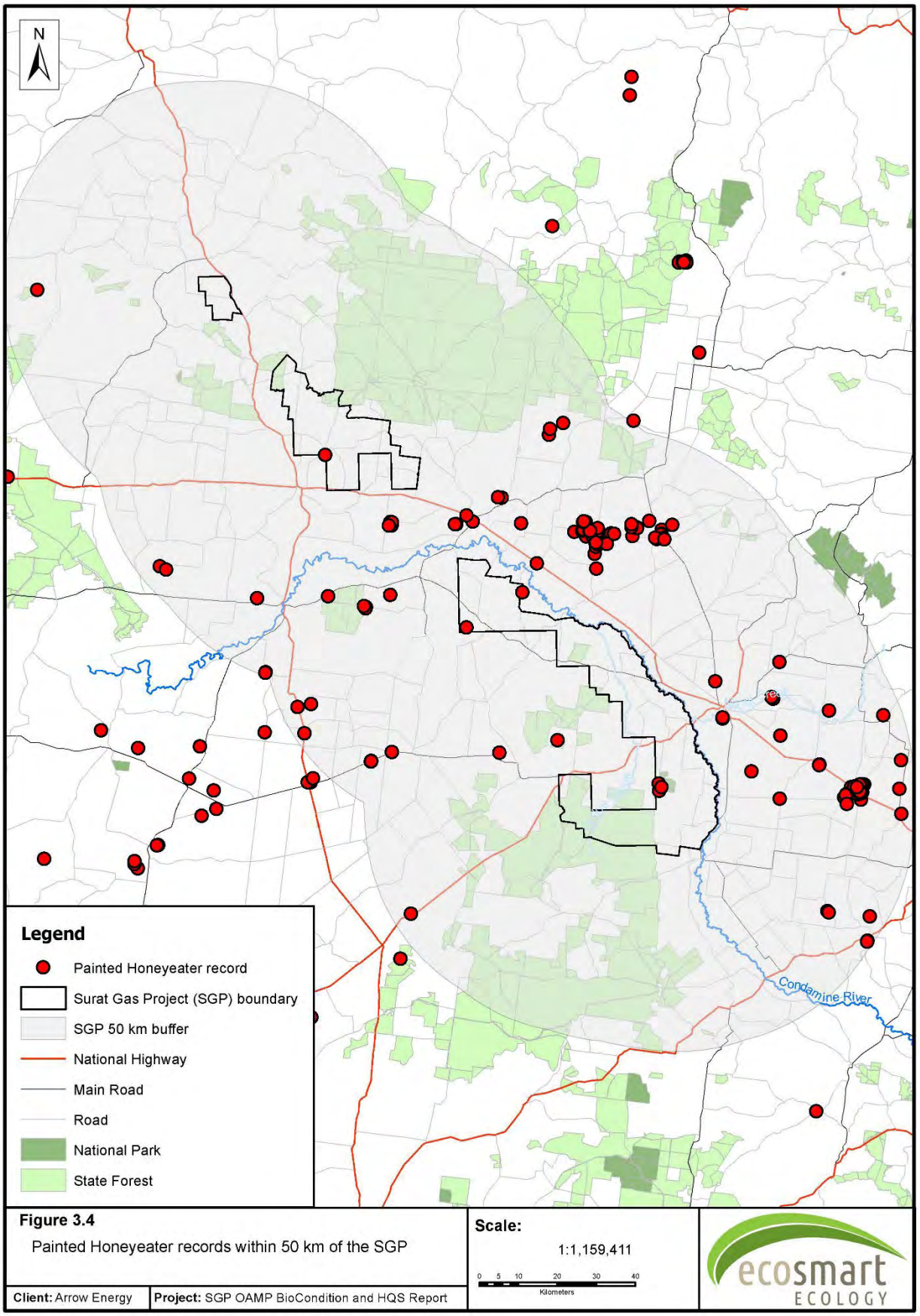

N
Legend
Painted Honeyeater record
Surat Gas Project (SGP) boundary
SGP 50 km buffer
National Highway
Main Road
Road
National Park
State Forest
Condamine River
Figure 3.4
Painted Honeyeater records within 50 km of the SGP
Scale:
1:1,159,411
0 5 10 20 30 40
Kilometers
Client: Arrow Energy
Project: SGP OAMP BioCondition and HQS Report
ecosmart ECOLOGY

Table 3.19. Criteria for scoring 'forage' and 'shelter and breeding' habitat for Painted Honeyeater

T1 & T2 mistletoe density (No./ha)	0-50	51-100	101-150	151-200	201-250	251+
Score	0	5	10	15	20	25

Quality of Habitat required for Mobility

Painted Honeyeater movements are not well understood though they are generally thought to have a north-south migration pattern. Non-breeding birds move north, typically to areas above 26°S, while spring-summer breeding typically occurs in habitats south of 26°S. At some locations they are considered seasonal visitors while in other areas they are described as irregular or nomadic (Higgins *et al* 2001).

Little information is available on habitat qualities which facilitate movement. However, these birds are highly mobile, can quickly move large distances, and often appear in relatively isolated patches. At some locations they can be irruptive in response to abundant mistletoe fruiting (Oliver *et al* 2003).

It is unlikely any particular habitat, except perhaps very large areas of cultivation or urbanisation, hinder the movement of Painted Honeyeaters. Rather, they are likely easily transit through all remnant habitat types. As such the mobility score for all remnant RE's should be fixed to 25.

Absence of Threats

Current threats to the Painted Honeyeater include (DAWE 2020):

- Habitat loss
- Habitat degradation
- Competition for resources with larger and/or more aggressive honeyeaters
- Climate variability and change increasing the risk of drought, fire and altered flowering or fruiting phenology.

Other threats include predation from invasive species, deliberate destruction of mistletoe in production forests, exacerbation of tree decline for pasture improvement, vehicle collision, and nest predation.

Within the SGP and surrounds Painted Honeyeater habitats are generally associated with abundant *C. cunninghamiana, C. cristata* and *A. harpophylla.* These vegetation types are considered as Endangered in Queensland and protected by legislation ensuring ongoing habitat loss is avoided, at least theoretically. The remaining patches are small in extent, often restricted to roadside reserves. This reduces the risk of wide-spread fire affecting large areas of habitat within a short time-frame but likely increases predation and competition with aggressive honeyeaters (Andrén 1992, Bayne and Hobson 1997, Ford 2011). Their small extent also makes them more susceptible to habitat degradation, particularly on private lands were grazing pressures remain. Increased drought duration and severity may also lead to tree and mistletoe loss, especially in trees already stressed by mistletoe infestations. It is therefore extremely difficult to assess the 'scope' and 'severity' of habitat degradation across the entire SGP with its varied landscape and climatic conditions. Habitats in the west may be more

susceptible and more likely to be affected by drought than those in the east, while habitats on private land more likely exposed to grazing and other agricultural pressures.

Generally, these impacts are not likely to not significantly increase over the coming ten years and the severity is therefore estimated as 'Low' (reducing the population by 6-10%). This is slightly less than historic trends which suggest the entire Painted Honeyeater population has declined by 20-29% over 17 years (DAWE 2020). For the purpose of this assessment the 'scope' has been estimated as 'High' (affecting 60-79% of the habitat/population within the matter area). Absence of threats is therefore evaluated as 8.

Due to the complex and interacting threats to remaining Painted Honeyeater habitat, this assessment may require further consideration on a property bases as required.

3.2.6.3 Habitat Quality Scores

Habitat quality scores for Painted Honeyeater have been evaluated at sites representing suitable REs within the SGP except RE11.9.5 and areas of RE11.3.27/11.5.20 around the immediate vicinity of Lake Broadwater. A summary of scores for each RE is provided in Table 3.20 with scores for individual sites provided in Appendix B.

Table 3.20. Summary of Habitat Quality Scores (out of 10) for Painted Honeyeater (*Grantiella picta*)

Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.1	6	3.31	4.66	3.95	0.51
11.3.17	6	3.46	4.86	4.09	0.60
11.4.3	1	4.38	4.38	4.38	n/a
Brig R (11.3.17)	4	2.93	3.27	3.06	0.15
Brig R (11.4.3)	1	5.06	5.06	5.06	n/a

3.2.7 Regent Honeyeater (*Anthochaera phrygia*)

3.2.7.1 Likely Occurrence

The Regent Honeyeater once occurred from Adelaide through south-eastern Australia into south-eastern QLD to about 100 km north of Brisbane. It is a seasonal visitor to the state, typically only present during the winter periods. Most historical records in Queensland are roughly east of Gore, Toowoomba and Maroochydore. Within Queensland it was historically known to breed near Warwick in the Gore-Karara region but is now very sporadically observed (National Environmental Science Program Threatened Species Research Hub 2019).

The species is extremely rare around Dalby with just two records from 2000 and 2002. Both were observed along Myall Creek in or near the town of Dalby, associated with flowering *E. tereticornis*. Several large Mugga Ironbark (*E. sideroxylon*) planted in nearby parks (M. Sanders *pers. obs.*) may have also provided foraging resources at the time. Further west there is an undated (likely decades old) and highly inaccurate (10,000 m) record from Chinchilla and some from the Bunya Mountains.

Available distribution modelling indicates the vast majority of the SGP is outside the species range with only the southern portion falling within an area of low predicted probability (Figure

3.5 and Figure 3.6). 'Maxent' modelling (Stojanovic *et al* in press) based on contemporary records (2000-2010) during the breeding season (July-January) found habitat suitability is influenced by annual rainfall. On balance the SGP falls outside the species main breeding range, though there is low potential in the south-east during extremely wet years (Ross Crates *pers. comm.*)[5].

Based on this evidence the species is highly unlikely to occur within the SGP and habitats within the SGP are unlikely to be critical for the species recovery. Offset requirements therefore seem unnecessarily and, if required, it would be unrealistic to require evidence of offset use by Regent Honeyeaters.

3.2.7.2 Estimating Species Habitat Attributes

This section outlines and justifies scoring attributes for Regent Honeyeater habitat amenity. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

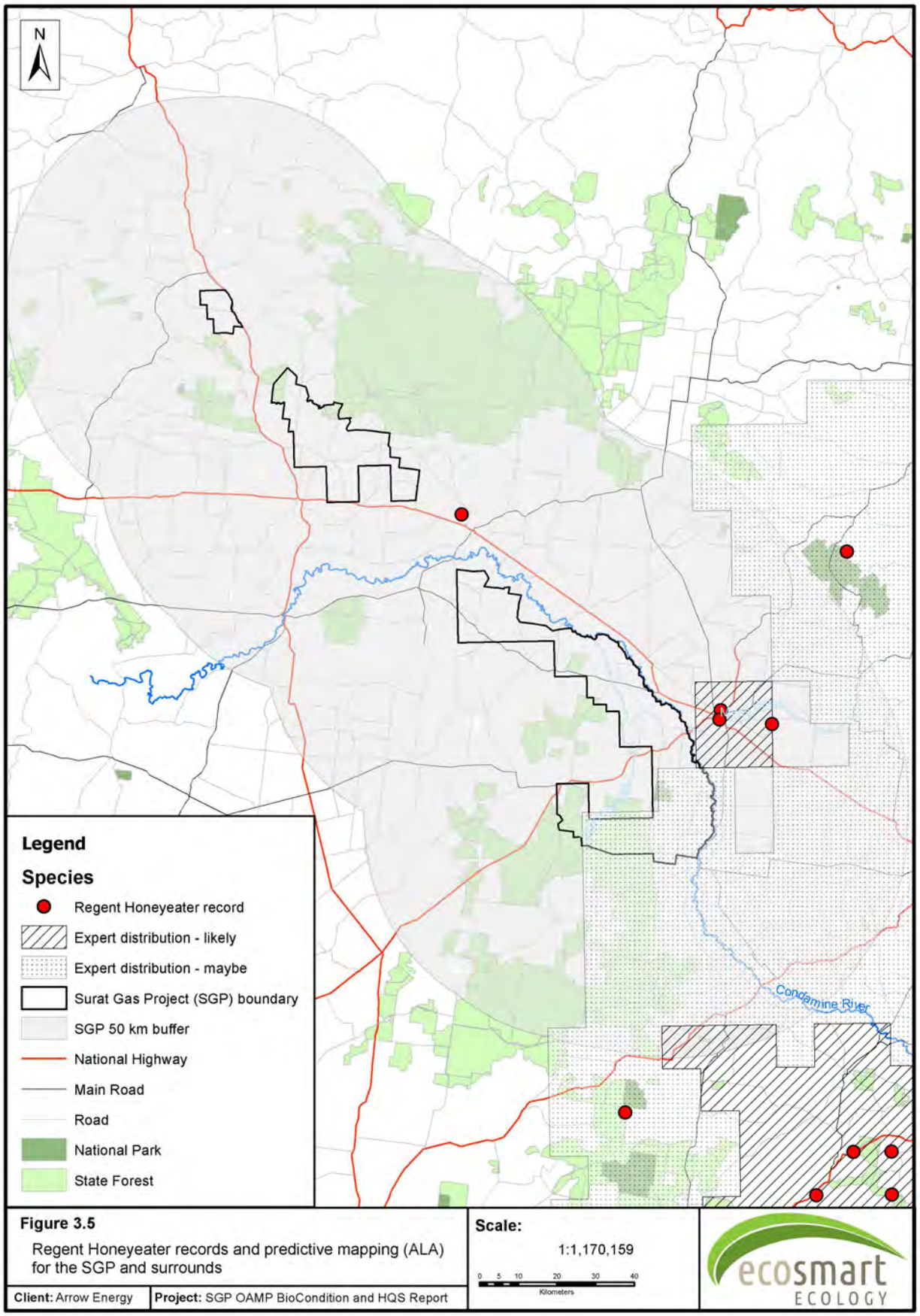
Foraging, Shelter and Breeding Habitat

The Regent Honeyeater inhabits woodland and open forests, especially box-ironbark woodland, but also riparian vegetation and lowland coastal woodland. It times it can be found in non-remnant vegetation, trees in farmland, roadside reserves and planted parks and gardens in semi-urban locations. They spent most of their time in the canopy where they feed on nectar and lerps, sometimes taking insects. Taller and larger trees, particularly when on fertile soils, are favoured for foraging as these typically produce more nectar (Menkhorst *et al* 1999; Oliver 2000; DoE 2016).

While there is regional and seasonal variation, several tree and mistletoe species are recognised as important for the Regent Honeyeater (DoE 2016): Mugga (Red) Ironbark (*E. sideroxylon*), Yellow Box (*E. melliodora*), White Box (*E. albens*), Yellow Gum (*E. leucoxylon*), Spotted Gum (*E. maculata*), Swamp Mahogany (*E. robusta*), Needle-leaved Mistletoe (*Amyema cambagei*) on River Sheoak (*C. cunninghamiana*), Box Misteltoe (*A. miquelii*) and Long-flower Mistletoe (*A. vitellina*). With the exception of *A. cambagei*, none of these species occur within the SGP.

Many records of Regent Honeyeater in south-east Queensland, including records at Dalby, are associated with riparian stands or large *E. camaldulensis* and *E. tereticornis* (especially the later). Similar RE's within the SGP are entire restricted to RE11.3.25 and 11.3.27 (sub-types d, f, and i only). Vegetation with abundant River Oak, which might support *A. cambagei*, are also restricted to RE11.3.25.

[5] Noting the SGP area and surrounds is traditionally under-surveyed/birded relative to other parts of the species potential range.


N
Legend
Species
Regent Honeyeater record
Expert distribution - likely
Expert distribution - maybe
Surat Gas Project (SGP) boundary
SGP 50 km buffer
National Highway
Main Road
Road
National Park
State Forest
Condamine River
Figure 3.5
Regent Honeyeater records and predictive mapping (ALA) for the SGP and surrounds
Scale:
1:1,170,159
0 5 10 20 30 40
Kilometers
Client: Arrow Energy
Project: SGP OAMP BioCondition and HQS Report
ecosmart ECOLOGY

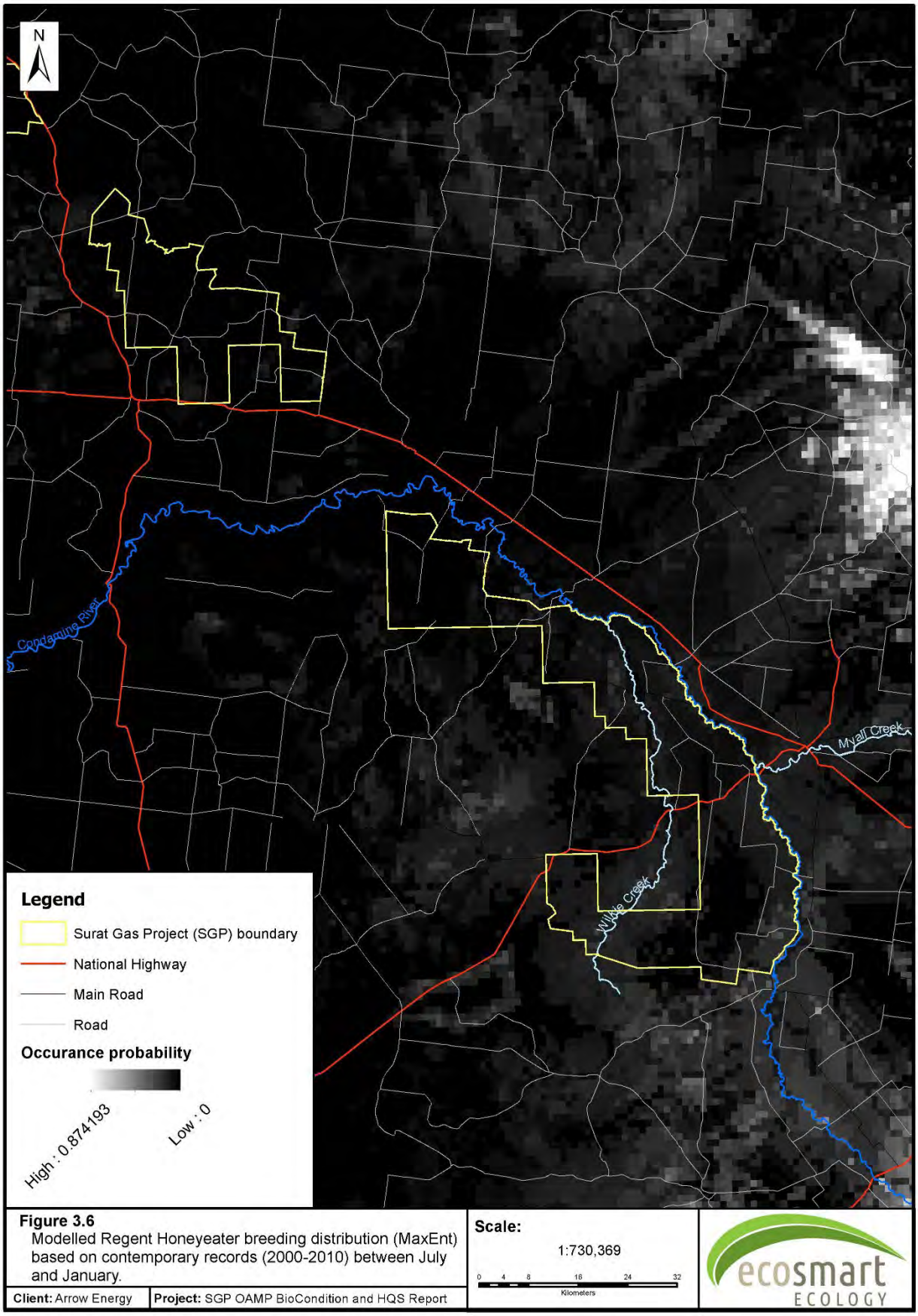


Figure 3.6
Modelled Regent Honeyeater breeding distribution (MaxEnt) based on contemporary records (2000-2010) between July and January.

Client: Arrow Energy | **Project:** SGP OAMP BioCondition and HQS Report

The Regent Honeyeater shelters and breeds in areas of high foraging amenity, no special habitat features distinguish 'foraging' from 'shelter and breeding' habitat. A similar score for both attributes can be achieved by converting the measured 'Number of large trees' (as per the *BioCondition Methodology*) into a score out of 25:

$$\left(\frac{Measured\ BioCondition\ 'No.\ large\ trees'\ score}{Maximum\ 'No.large\ trees'score\ (15)}\right) x\ 25$$

The SGP has is not within the known breeding range of this species and habitats, if present, should be restricted to the above two RE's within the species modelled 'maybe' distribution (i.e., only the south-eastern portion of the SGP area; Figure 3.5).

Mobility Habitat

Regent Honeyeaters undertake regular movements, but their timing and pattern varies between years with seasonal shifts relating to regional flowering phenology (Menkhorst 1997). In south-east Queensland birds are present predominantly in the cooler winter months to coincide with flowering *E. tereticornis* and *E. sideroxylon*. How Regent Honeyeaters use the landscape for movement/dispersal is not understood, though they are known to move large distances, often many hundreds of kilometres between years (DoE 2016). Furthermore, they can appear in semi-urban or urban landscapes and in minor stands or scattered trees in otherwise cleared (grazing) land). With such a mobile species there is no habitat attribute which reflect movement amenity. A fixed score of 25 is applied.

Absence of Threats

Documented threats for this species include (DoE 2016):

- Clearing resulting in loss of woodland habitat
- Small population size
- Habitat degradation
- Competition with aggressive rivals (e.g., Noisy Miner, etc).

Table 3.21 below assesses these threats across the SGP.

Table 3.21. An assessment of individual threats for Regent Honeyeater across the broad SGP

Threat	Scope	Severity	Score
Clearing resulting in loss of habitat	While not specially protected, clearing of riparian habitats is uncommon. Likely to affect less than 19% of the SGP area (score = 5).	No resident Regent Honeyeaters occur within the affected areas and none are expected to occur. Impacts on habitats and populations will be negligible (score = 5).	25
Small population size	N/A. This is not a threat that has a scope or severity relevant to this assessment.		N/A
Habitat degradation	All areas of possible Regent Honeyeater habitat within the modelled 'maybe' extent are within state forest or National park except	Based on historic trends habitats are unlikely to be significantly degraded over the next decade (score = 5).	25

	Long Swamp which represents < 20% of habitat extent (score = 5).		
Competition	All areas of potential habitat within the modelled extent are likely affected by competition (score = 1)	No populations are known or likely to inhabit the affected areas. The severity of impact is therefore negligible (score = 5).	5

3.2.7.3 Habitat Quality Scores

Habitat quality scores for Regent Honeyeater have been evaluated at sites representing suitable REs within the SGP. A summary of scores for each RE is provided in Table 3.22 with scores for individual sites provided in Appendix B.

Table 3.22. Summary of Habitat Quality Scores (out of 10) for Regent Honeyeater (*Anthochaera phrygia*)

Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.25	6	4.90	6.63	5.99	0.61
11.3.27f	1	3.65	3.65	3.65	n/a
11.3.27i	4	5.04	6.36	5.63	0.55

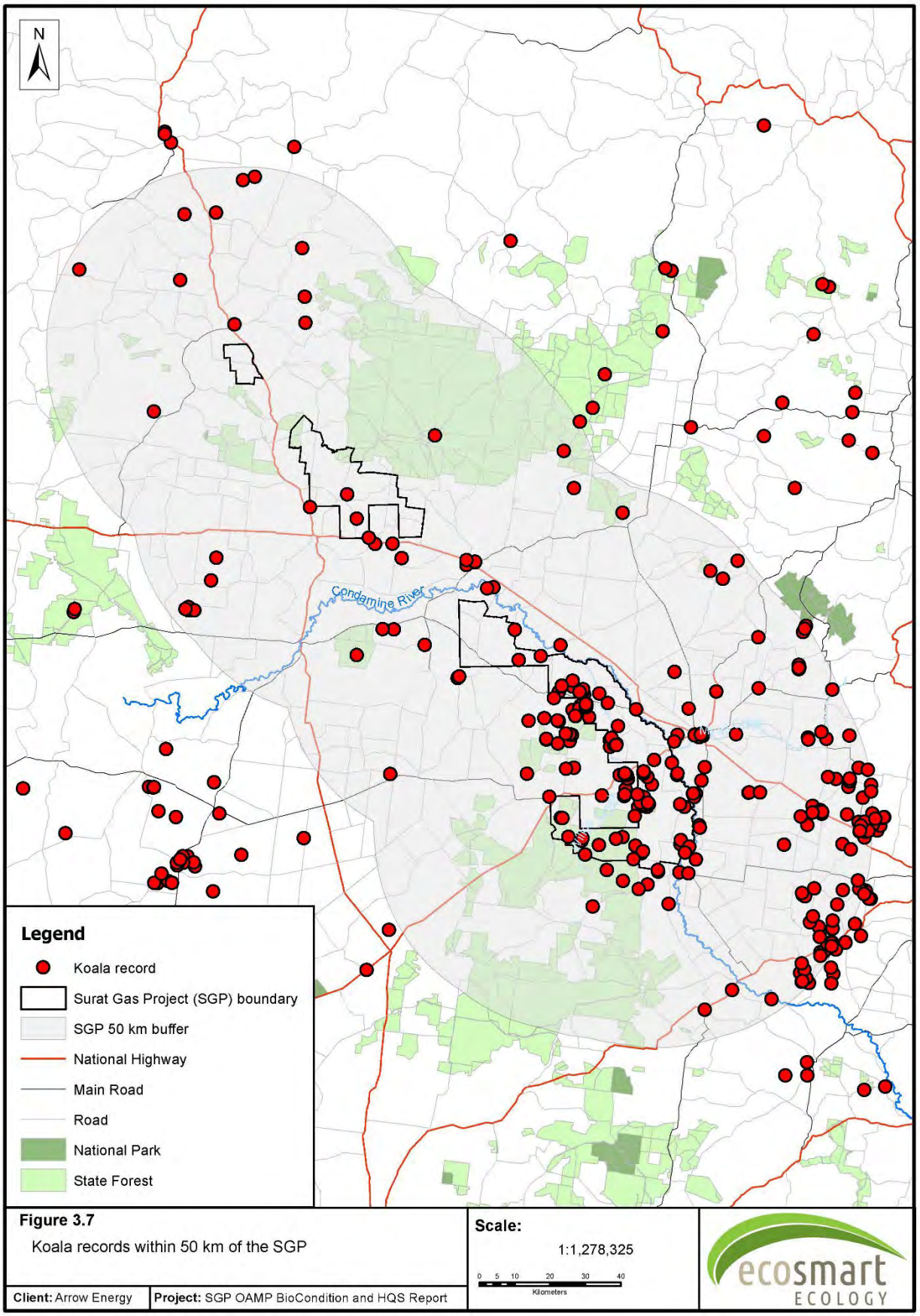
3.2.8 Koala (Phascolarctos cinereus)

3.2.8.1 Likely Occurrence

In Queensland Koalas can be found from Atherton Tableland west of Cairns south to the NSW/QLD border and inland to central and western Queensland. The assessment areas are contained entirely within the Koala distribution.

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 and Handasyde 1999; Martin et al. 2008). Koalas near the western edge of their range are often associated with watercourses though are not restricted to them (Melzer *et al.* 2000; Sullivan *et al.* 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 years. (DAWE 2021e)

The SGP appears to be uniquely positioned across a transition zone of Koala abundance and habitat use (Figure 3.7). In the east Koalas are comparatively common (especially in the Wilkie Creek and Condamine River catchments) and frequent both riparian and non-riparian habitats, while they are rarely encountered in the west where they are largely associated with riparian vegetation (EcoSmart Ecology 2019b).


N
Condamine River
Legend
Koala record
Surat Gas Project (SGP) boundary
SGP 50 km buffer
National Highway
Main Road
Road
National Park
State Forest
Figure 3.7
Koala records within 50 km of the SGP
Scale:
1:1,278,325
0 5 10 20 30 40
Kilometers
Client: Arrow Energy
Project: SGP OAMP BioCondition and HQS Report
ecosmart ECOLOGY

This improved understanding of Koala values within the SGP has resulted in a more conservative approach to the list of regional ecosystems that should be considered 'Core Habitat Possible' (Table 3.23).

Table 3.23. Regional Ecosystems used to calculate Koala 'Core Habitat Possible'.

	Core Habitat Possible	General Habitat
Previous mapping (3D Environmental 2019; EcoSmart Ecology 2017)	11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.25, 11.3.26, 11.3.27d and 11.3.27f	11.4.3, 11.4.3a, 11.5.1, 11.5.1a, 11.5.4, 11.5.20, 11.7.2, 11.7.4, 11.7.6, 11.7.7, 11.9.2 and 11.9.7
Refined (new) mapping (EcoSmart Ecology 2019a)	11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.14, 11.3.17, 11.3.18, 11.3.25, 11.3.26, 11.3.27, 11.4.3, 11.5.1, 11.5.4, 11.5.20, 11.7.4, 11.7.6, 11.9.2, 11.9.7, 11.9.10	11.5.21, 11.7.2, 11.7.7

3.2.8.2 Estimating Species Habitat Attributes

This section outlines and justifies scoring attributes for Koala habitat amenity. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

Foraging, Shelter and Breeding Habitat

Habitat requirements for Koala are well understood and not complex. They forage, shelter and breed 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. Within the SGP favoured tree species include *E. camaldulensis, E. tereticornis, E. coolabah, E. populnea, E. crebra* and *E. chloroclada. Eucalyptus thozetiana* may have local importance, especially in the central and western areas of the SGP (M. Sanders *unpub. data*). Scoring the value of habitat for 'foraging' and 'shelter and breeding' was evaluated using the criteria in Table 3.24 below.

Table 3.24. Criteria for scoring 'forage' and 'shelter and breeding' habitat for Koala.

Abundance eucalypt trees* in T1 and T2 (No./ha)	0	1-50	51-100	101-150	151-200	200+
Score	0	5	10	15	20	25

* Excludes *Corymbia* and *Angophora*

Mobility Habitat

Koala's are largely sedentary and tend to confine movements to a small number of nearby trees within a day. Home ranges in low amenity habitats are much larger than in those containing high quality vegetation. Male home ranges at Blair Athol were estimated at 135 ha while females had a home range of 101 ha. This probably represents a good approximate for Koala home range within the SGP as vegetation and conditions around Blair Athol are comparable.

Dispersing individuals, mostly young males, can cover large distances with studies finding movements from natal grounds can be as much as 9 km, 10 km, 11 km and 16 km (DAWE 2021e and references therein). This can include crossing several kilometres of land with little vegetation.

Koalas therefore, are not heavily reliant on particular habitat types or structures for movement. Passage is undoubtably improved through habitats which have abundant foraging resources and the scoring in Table 3.24 can also be applied for Koala mobility.

Absence of Threats

The main processes threating to Koala populations and habitats are ongoing habitat loss and habitat fragmentation, vehicle strike, and predation by domestic/feral dogs. Drought and extreme heat, which will become more frequent and intense due to climate change may also threaten the species (DAWE 2021e).

All these threats have the potential to affect existing Koala populations across the entire SGP and the scope of threats is therefore estimated as 'Very High' (i.e., affecting 80-100% of the species population or habitat within the matter area). Evaluating the severity of impact is more difficult but based on historic declines of 30-40% and without evidence these impacts will abate, similar declines could be expected in the future. Over a ten-year window declines of 15-20% might be anticipated resulting in a 'Medium' impact severity. Using these estimates the SGP matter area receives an 'Absence of threats' score of 3.

However, vegetation along riparian corridors are frequently used by Koala (Melzer *et al* 2000, Sullivan *et al* 2003) in the west of their range. This might be due to several factors including improved leaf moisture and nutrient levels and/or better thermal refugia during extreme heat events. Some threats in these habitats may be less, and importantly, these vegetation types may be more important for the long-term persistence of populations. Threatening processes to Koala in these habitats (REs on Landzone 3) have been awarded a higher score of 6.

While the above estimate is based on threats across the entire matter area (i.e., the SGP), threat scope and threat severity may vary at a local property or area scale. This variability must be considered and accounted for when evaluating potential offset sites. It may be necessary to recalculate the threats, or used a fixed score, for both the impact and offset properties/habitat. This may be particularly important for loss of Koala habitat in large contiguous patches of vegetation where threats are likely less than evaluated here.

3.2.8.3 Habitat Quality Scores

Habitat quality scores for the Koala have been evaluated at sites representing suitable REs within the SGP except RE11.3.26, 11.9.2, 11.9.7 and 11.9.10. A summary of scores for each RE is provided in Table 3.25 with scores for individual sites provided in Appendix B.

Table 3.25. Summary of Habitat Quality Scores (out of 10) for Koala (*Phascolarctos cinereus*)

Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.1	6	2.83	4.18	3.37	0.48
11.3.2	14	3.88	5.85	4.82	0.72
11.3.3	2	3.60	4.80	4.20	0.85
11.3.4	14	4.74	7.23	5.93	0.78
11.3.14	3	3.97	6.77	5.33	1.40
11.3.17	6	3.07	4.98	3.91	0.82
Brigalow Regrowth (11.3.17)	4	1.73	2.67	2.16	0.44
11.3.18	4	4.31	6.41	5.40	0.86
11.3.25	6	5.64	7.97	6.74	0.86
11.3.27f	1	5.49	5.49	5.49	n/a
11.3.27i	4	5.28	7.20	6.17	0.85
11.4.3	1	2.78	2.78	2.78	n/a
Brigalow Regrowth (11.4.3)	1	2.86	2.86	2.86	n/a
11.5.1	5	5.43	6.62	5.97	0.51
11.5.1 (regrowth)	2	2.76	2.90	2.83	0.09
11.5.4	6	3.53	5.75	4.85	0.87
11.5.20	7	2.93	5.93	4.61	1.35
11.7.4	8	3.33	7.04	5.92	1.14
11.7.6	5	3.57	5.63	5.07	0.86
11.7.6 (regrowth)	1	3.70	3.70	3.70	n/a

3.2.9 Greater Glider (Petauroides volans)

3.2.9.1 Likely Occurrence

The Greater Glider extends from the Windsor Tableland in north Queensland south to Wombat State Forest in central Victoria (Woinarski *et al* 2014). While the SGP and the associated areas entirely overlap with the distribution of the Greater Glider, they are located at the species western extremity. West of Toowoomba the species becomes increasingly patchy, often apparently absent from otherwise seemingly suitable habitat.

Greater Gliders are predominately restricted to eucalypt forests and woodlands, peaking in abundance in taller, montane, moist eucalypt forests with large old trees (Andrews *et al.* 1994; Kavanagh 2000; Eyre 2004; van der Ree *et al.* 2004; Vanderduys *et al.* 2012). In areas west of the Great Dividing Range, they are found in low woodlands (McKay 2008) but being hollow-roosting obligates require large hollows.

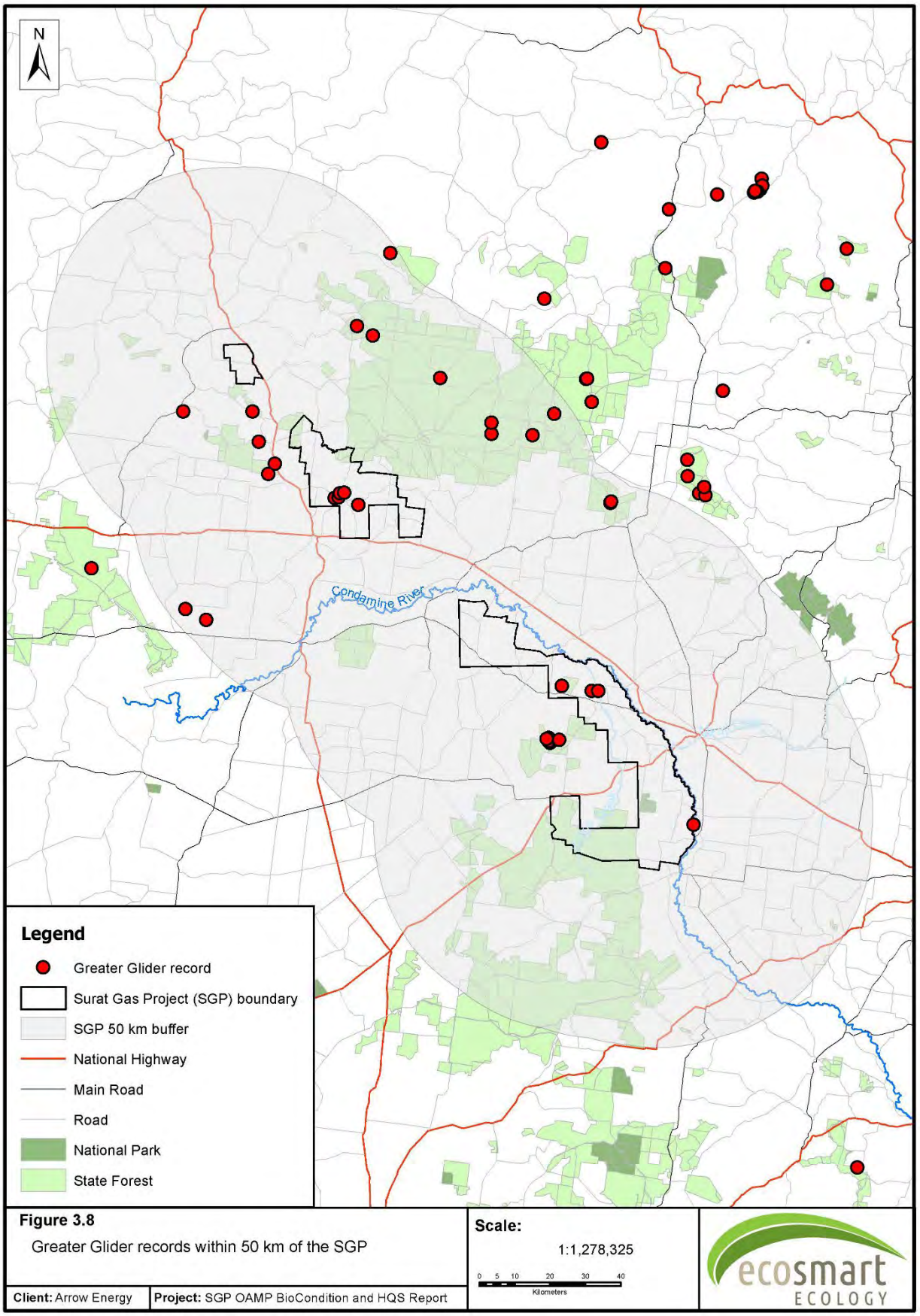


Figure 3.8
Greater Glider records within 50 km of the SGP

Based on experiential and documented knowledge of the species habitat requirements, mapping rules were defined to identify areas of 'core habitat' for the SGP (EcoSmart Ecology 2017). Regional Ecosystems 11.3.4, 11.3.25 and 11.3.27 (incorrectly listed as 11.3.26) were recognised as important habitats. Ongoing work and improved knowledge of the species within the SGP suggest an addition two REs should be recognised as 'core habitat possible': 11.7.6 and 11.7.7. However, habitat amenity will be influenced by hollow availability with some vegetation patches unlikely to support the species. This should be a particular consideration for 11.7.6 and 11.7.7 which often lacks old-growth hollow-bearing trees due to historic logging.

3.2.9.2 Estimating Species Habitat Attributes

This section outlines and justifies scoring attributes for Greater Glider habitat amenity. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

Quality of Foraging Habitat

Greater Gliders are described as having a strictly 'eucalyptus' diet but will also occasionally take flowers and rarely *Acacia* phyllodes and Mistletoe leaves (Lindenmeyer 2002; Kavanagh and Wheeler 2004; Woinarski *et al* 2014). Studies have found a preference for young leaves or select eucalypt species, with selection likely related to leaf nutrient concentration (Kavanagh and Lambert 1990; Lindenmeyer 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 *et al* 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). Arrow surveys have frequently located Greater Gliders in old-growth riparian stands of *E. tereticornis*, sometimes forest dominated by *C. citriodora*, less frequently *E. populnea* and rarely *E. moluccana* (M. Sanders *pers. obs.*). In contrast Comport *et al* (1996) 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.

Without a detailed understanding of leaf nutrient, toxicity and fibre content it is difficult to predict and score foraging amenity for Greater Glider within the SGP. Further, the SGP is located within a region where large hollows are in low abundance and this, rather than foraging resources, may be the limiting factor in determining habitat amenity for Greater Glider (Smith *et al* 2007).

Many studies have identified tree size as being important for Greater Gliders. Smith *et al.* (2007) found gliders only in trees with a DBH of > 20 cm and most in trees 30-70 cm in size; use of trees < 30 cm were less than expected based on tree availability. Other studies have also noted tree size (Kavanagh and Lambert 1990; Eyre 2006) or leaf biomass (Davey 1984; Comport *et al* 1996) as an important predictor of Greater Glider activity. Observations within and surrounding the SGP seem to support this correlation with many records from vegetation dominated by exceptionally large trees (M. Sanders *pers. comm.*) or associated with tree species such as *E. camaldulensis, E. tereticornis, E. fibrosa* and *C. citriodora* (Smith 2006; M. Sanders *pers. obs.*) which attain a greater size in the broader landscape. Considering these

factors forage habitat has been scored by comparing the abundance of large eucalypts against the benchmark for each RE as in Table 3.26. 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 *et al* 2007).

Table 3.26. Criteria for scoring 'forage' habitat for Greater Glider

Number of large Eucs compared to benchmark (as a percentage)^	≤10	>10-30	>30-50	>50-70	>70-90	≥90
Score	0	5	10	15	20	25

^as per the Biocondition Methodology; includes *Corymbia*, *Angophora* and *Eucalyptus*

Quality of Shelter and Breeding Habitat

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 likely around 18 cm (Goldingay 2011).

In south-east Queensland the Greater Glider is often absent from sites supporting less than six hollow-bearing trees per hectare (Lindenmayer 2002). Studies in Barakula, a state forest adjoining the SGP, 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 *et al* 2007). Males used slightly more hollow-bearing trees (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 > 30cm diameter.

Table 3.27. Criteria for scoring 'shelter and breeding' habitat for Greater Glider

Trees (incl. stags) containing hollows > 20cm in diameter (No./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 loose 'condition' quickly (Lindenmayer 2002). Rapid long-distant 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 *et al* 1996; Lindenmayer 2002). They are also much slower to move and more reluctant to glide than other Australian gliding mammals (Cunningham *et al* 2004; M. Sanders *pers. obs.*). Unlike arboreal 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 needed,

often exceeding 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. However dense regrowth forest is believed to impair the movement of Greater Gliders (Lindenmayer 2002).

The scoring below, which reflects canopy cover, is based on canopy intercept data collected as per the BioCondition Assessment Manual (Eyre *et al* 2015).

Table 3.28. Criteria for scoring 'Quality of habitat for mobility' for the Greater Glider

% Canopy Cover (T1+T2 intercept)*	0-39	40-49	50-59	60-69	70-79	80+
Score	0	5	10	15	20	25

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

Absence of Threats

Known threats to the Greater Glider include (Woinarski *et al* 2012; DOE 2015):

- Habitat loss and subsequent fragmentation
- Timber logging/production
- Inappropriate fire regime
- Timber production
- Barbed wire fencing entanglement
- Climate change

While the species is thought to have declined by 30% across its range over a 22-year period (DOE 2015), population trends in the southern Brigalow Belt are poorly documented or understood. Historical habitat loss, fragmentation and timber production are likely to have had a significant impact on large portions of Greater Glider habitat within the SGP and surrounding areas. With the federal listing of the species and greater vegetation clearing controls, these threats should abate, at least theoretically.

Greater Gliders are a 'cold-adapted' species that becomes heat-stressed at temperatures above 30°C. While animals salivate and moisten their fur to dissipate heat, these strategies to not appear effective over longer periods. Temperatures, and in particular prolonged periods of extreme heat, are predicted to increase due to climate change. This impact has the potential to significantly affect the entire population within the SGP and immediate surrounds.

Being sensitive to fragmentation, most Greater Glider records within and surrounding the SGP are located in large contiguous patches of forest (see Figure 3.8). These areas are more susceptible to wildfire, and historic fire mapping shows the frequency and extent of wildfires are increasing (Appendix C). This is consistent with climate change predictions and wildfires have the potential to severely affect all habitats throughout the SGP.

Of all the potential impacts climate change, and the associated change in fire regimes, is likely to pose the greatest future risk to populations and habitats within the SGP and surrounds. The scope of these impact is 'very high' with all areas likely affected. However, assessing the impact

severity is difficult. Based on the extent and severity of historic wildfire fires in the last two decades, it is possible impacts could affect up to 40% of the population; a moderate impact severity. These estimates result in a 'absence of threats' score of 3 across the SGP.

It should be noted that the above assessment considers the SGP in its entirety. Some patches may be more resilient to fire and provide some buffering to extreme heat conditions. The score may not reflect individual areas of habitat or populations.

Table 3.29. Criteria for scoring 'Quality of habitat for mobility' for the Greater Glider

% Cover (T2+S1 intercept)*	0-39	40-49	50-59	60-69	70-79	80+
Score	0	5	10	15	20	25

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

3.2.9.3 Habitat Quality Scores

Habitat quality scores for the Greater Glider have been evaluated at sites representing suitable REs within the SGP except RE11.3.26. A summary of scores for each RE is provided in Table 3.30 with scores for individual sites provided in Appendix B.

Table 3.30. Summary of Habitat Quality Scores (out of 10) for Greater Glider (*Petauroides volans*)

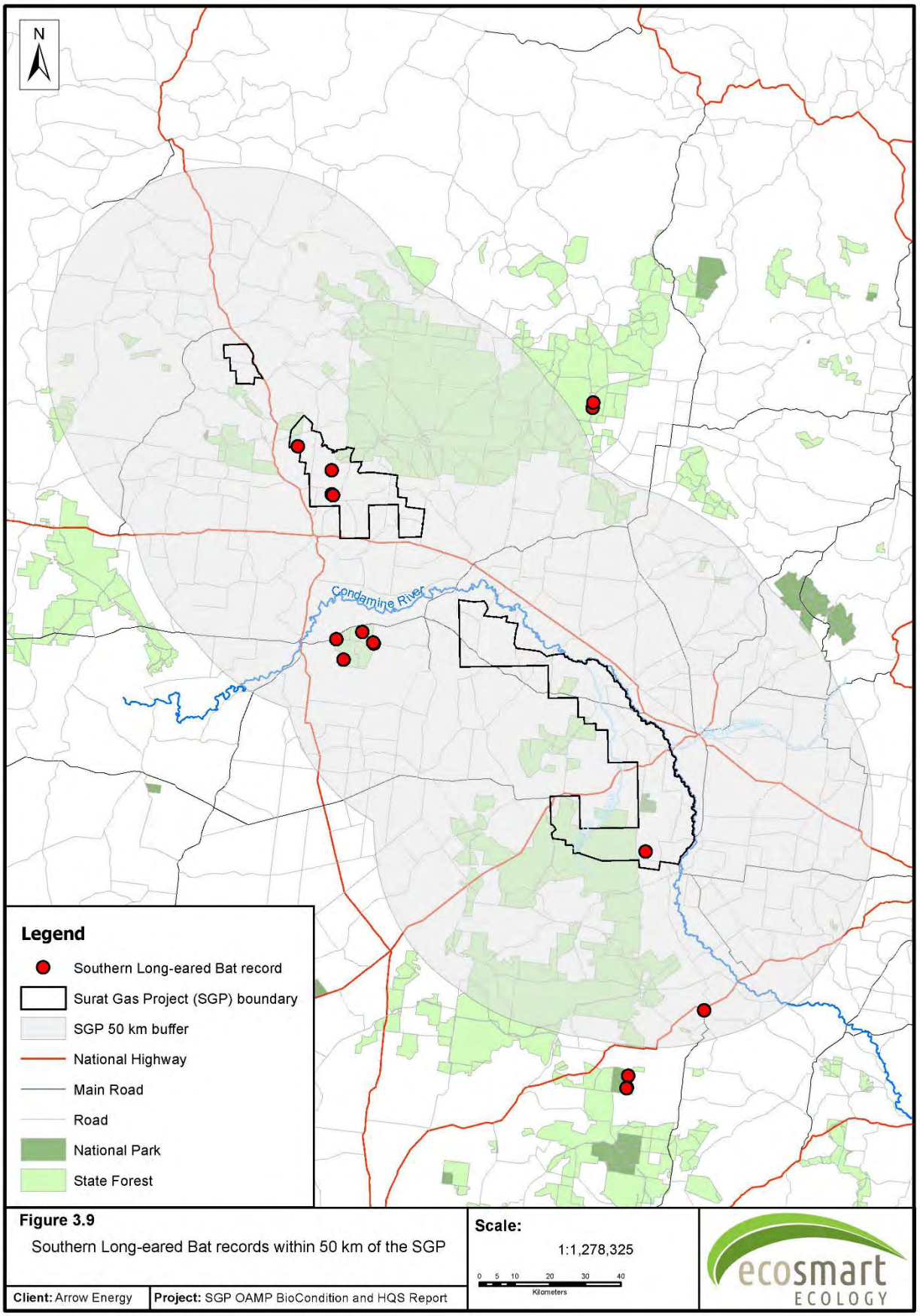
Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.4	14	2.57	6.04	3.87	1.09
11.3.25	6	3.92	6.85	5.76	1.08
11.3.27f	1	2.77	2.77	2.77	n/a
11.3.27i	4	4.36	5.28	4.70	0.40
11.7.6	5	3.57	5.63	4.91	0.79
11.7.7	5	0.00	6.78	4.54	2.68

3.2.10 Southern Long-eared Bat (*Nyctophilus corbeni*)

3.2.10.1 Likely Occurrence

Records of Southern Long-eared Bat occur to the north, south and west of the SGP (Figure 3.9). However the species is absent from open and modified habitats on the Condamine River flood plains which stretch along the central-east and south-east boundary of the SGP. Suitable habitat east of the SGP is only present in the very north (i.e, near Barakula State Forest). Therefore, while large areas of suitable habitat occur within the SGP, it is situated at the eastern distributional limit of the species.

Within its distribution the species tends to be absent from smaller remnants of vegetation and this may indicate a requirement for larger more continuous intact vegetation (Turnbill and Ellis 2006). The species rarely uses areas of post wild-fire regrowth or open habitats (Law *et al* 2016). In general, *N. corbeni* appears most abundant where the vegetation has a distinct canopy and a dense, cluttered understorey layer.


N
Condamine River
Legend
Southern Long-eared Bat record
Surat Gas Project (SGP) boundary
SGP 50 km buffer
National Highway
Main Road
Road
National Park
State Forest
Figure 3.9
Southern Long-eared Bat records within 50 km of the SGP
Scale:
1:1,278,325
0 5 10 20 30 40
Kilometers
Client: Arrow Energy
Project: SGP OAMP BioCondition and HQS Report
ecosmart ECOLOGY

Published research into the ecology of *N. corbeni* and updated records of the species in the SGP region suggest the existing habitat suitability rules are inadequate. Suitable habitat (i.e., 'Core Habitat Possible') should include the following REs when they are located within a contiguous patch of remnant vegetation (including accumulative area where patches are separated by less than 200 m) greater than 5,000 ha: 11.3.14, 11.3.18, 11.5.1, 11.5.4, 11.5.20, 11.5.21, 11.7.4, 11.7.6, 11.7.7 and 11.9.10. Regional Ecosystems 11.3.25 and 11.3.27 were previously considered 'Core Habitat Possible' but should be reassigned to 'General Habitat' unless they contribute to a larger continuous vegetation patch.

3.2.10.2 Estimating Species Habitat Attributes

This section outlines and justifies scoring attributes for *N. corbeni* habitat amenity. The scoring system is to be used for comparative purposes only and does not reflect likely occurrence.

Quality of 'Forage' Habitat

The diet of Southern Long-eared Bats is not well understood with some studies suggesting a diverse range of invertebrate prey but possible seasonal preferences (Law *et al* 2016) while others a predominantly Lepidopteran (moth) diet (Vestjens and Hall 1977). Direct measurement of prey abundance is a difficult ecological attribute to sample and score, however the species possesses specialised ecological traits which favouring slow, manoeuvrable flight and prey detection in dense vegetation (Denzinger and Schnitzler 2013; Law *et al* 2016). This provides ecological separation from many other echolocating bat species.

Measuring vegetation density can be achieved using data collected as part of the BioCondition Assessment methodology and should focus on the sub-canopy and shrub data.

Table 3.31. Criteria for scoring 'forage' habitat amenity for the Southern Long-eared Bat

% sub-Canopy Cover (T2+S1/S2 intercept)*	0-30	>30-40	>40-50	>50-60	>60-70	>70
Score	0	5	10	15	20	25

* As estimated using the BioCondition Assessment Methodology (Eyre *et al* 2015)

Quality of 'Shelter and Breeding" Habitat

Law *et al* (2016, 2018) found *Nyctophilus corbeni* roosts most frequently in dead eucalypts, followed by Bulloak (*Allocasuarina luehmannii*), dead cypress (*Callitris sp.*) and other unknown dead trees. Roost trees are more frequently located in comparatively dense vegetation, but roost preference seems to be influenced by hollow availability rather than a preference for any particular tree species (Law *et al* 2016). Most roost trees are < 40cm DBH and, despite being common in the landscape, hollows in larger trees (e.g., *E. camaldulensis*) are not utilised. Small hollows are the most utilised roost structure, though roosting in fissures or under bark is also common. Typically individuals do not use a roost location over sequential nights preferring to regularly move between roosts.

Sampling or estimating the direct abundance of possible roosts for *N. corbeni* is problematic as they are often small and inconspicuous. A possible surrogate variable is the abundance (per hectare) of dead trees between 10 and 40 cm DBH. These are recognised as important for predicting high value habitat (Law *et al* 2016, 2018). Sampling in NSW found dead tree density in occupied patches to average 91/ha (pregnant and lactating females) and 138/ha (males)

(Law *et al* 2016). No existing *BioCondition Methodology* attribute measures dead tree abundance and, as such, all future offset surveys must use this measure as a new attribute.

Table 3.32. Criteria for scoring 'shelter and breeding' habitat amenity for the Southern Long-eared Bat

No. dead trees (10-40cm DBH/ha)	<40	40-50	>50-60	>60-70	>70-80	>80
Score	0	5	10	15	20	25

Quality of Habitat required for Mobility

Southern Long-eared Bats typically forage up to about 4 km from their roost, though individuals have been rarely captured up to 7 km from roost. Average forage distance seems to be around 1 to 2 km (Law *et al* 2016).

Available evidence suggests the species is reluctant to move into open habitats including wild-fire regrowth (Law *et al* 2016, 2018). This may, in part, explain why most records are associated with larger continuous intact vegetation (Turnbill and Ellis 2006). Further, minor fragments and linear strips of native vegetation are vulnerable to understorey damage and loss of dead trees, especially where combined with grazing. Combining these two attributes (Table 3.33), connectivity and habitat structure, probably best describe the quality of habitat for movement.

Table 3.33. Criteria and matrix for scoring 'mobility' habitat amenity for Southern Long-eared Bats (*Nyctophilus corbeni*)

		Connectivity Score*			
		0	2	4	5
'Forage' and 'shelter/breeding' amenity (average)	<5	0	0	5	10
	5-10	0	5	10	15
	<10-15	5	5	10	15
	<15-20	5	10	15	20
	>20	10	15	20	25

* As assessed and scored using the *BioCondition Assessment Methodology*

Absence of Threats

The main threats the Southern long-eared bat are:

- Habitat loss and fragmentation from clearing (Reardon 2012)
- Degradation of habitat from grazing
- Habitat loss and vegetation thinning from silviculture activities (Law *et al* 2016)
- Habitat loss and degradation from wildfire (Turbill *et al* 2008)

Survey data suggest that large, intact remnants of suitable habitat are required to support populations (Turbill and Ellis 2006; Turbill *et al* 2008). With more than 75% of habitat cleared in some parts of its range, land clearing and fragmentation continue to threaten this species

(Duncan *et al* 1999). Increased competition for hollows is an example of a flow-on impact from fragmentation (Reardon 2012).

Being associated with large continuous intact patches of vegetation, *N. corbeni* habitat within the SGP is most likely associated with State Forests; much of the surrounding landscape on private land has been cleared or substantially modified. Some habitat loss from clearing continues in state forest associated with gas harvesting projects, while clearing is also possible on private lands for a variety of purposes. It is difficult to estimate the likely extent of clearing activities in the near future, but an estimate of < 19% seems reasonable. Grazing is uncommon in state forests and, when present, usually low intensity with minor impacts. Logging and in particular wildfire, have the greatest potential to affect broad areas of *N. corbeni* habitats. The possibility and extent of wildlife is particularly difficult to estimate but based on historic trends fires might affect 20-39% of habitat within the SGP. An estimate of each threat is provided in the table below, with a lowest score of 5 related to ongoing clearing activities.

Table 3.34. An assessment of individual threats for *Nyctophilus corbeni* across the broad SGP

Threat	Scope	Severity	Score
Ongoing loss and fragmentation of habitats	Difficult to estimate, but likely < 20% of the SGP affected in next 10 years (score = 5).	Within the scope area, all habitat and populations are likely lost (score = 1).	5
Degradation from grazing	Most retained habitats within State Forest where grazing is uncommon, some grazing possible in suitable habitat private lands. Possibly 20-39% of area affected (score = 4).	Retained habitats generally do not support high intensity grazing and impacts over next few decades on affected areas likely to be very low (score = 5).	20
Habitat loss and degradation from logging and vegetation thinning	Extent difficult to predict. Estimated as low (20-29%; score = 4).	Within affected areas this impact might reduce or degrade 11-39% of the species habitat/population within the next decade (score = 3).	12
Habitat loss and degradation from wildfire	Future extent of wildfires across the SGP difficult to predict. Based on existing trends likely to affect 20-39% of suitable habitat (score = 2).	Within wildfire areas it is likely 80-100% of the habitat or population would be detrimentally affected (score = 5).	10

3.2.10.3 Habitat Quality Scores

Habitat quality scores for the Southern Long-eared Bat have been evaluated at sites representing suitable REs within the SGP except RE11.9.10. A summary of scores for each RE is provided in Table 3.35 with scores for individual sites provided in Appendix B.

Table 3.35. Summary of Habitat Quality Scores (out of 10) for Southern Long-eared Bat (*Nyctophilus corbeni*)

Regional Ecosystem	N	Min	Max	Mean	Std Dev
11.3.14	3	1.53	4.83	3.49	1.74
11.3.18	4	2.30	5.89	3.76	1.70
11.5.1	5	4.31	6.63	5.49	0.96
11.5.4	6	3.21	4.63	3.76	0.62
11.5.20	7	2.41	6.81	4.49	1.93
11.5.21	1	6.08	6.08	6.08	n/a
11.7.4	8	3.61	7.52	5.87	1.07
11.7.6	5	3.05	6.11	5.19	1.22
11.7.7	5	5.37	7.28	6.01	0.79

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Appendix A:
HQS Data Gap Analysis

HQS site gap analysis

Ground verified ESU / Regional Ecosystem	Area (ha)	Total number of survey sites required (as supplied by Arrow)	Number of sites completed in previous works (existing data)#	Balance required
11.3.1 Remnant	175.23	4	2	2
11.3.14 Regrowth	98.43	3	0	3
11.3.14 Remnant	325.12	4	2	2
11.3.17 Regrowth	30.67	2	0	2
11.3.17 Remnant	128.64	4	0	4
11.3.18 Regrowth	43.52	2	0	2
11.3.18 Remnant	412.9	4	5	0
11.3.2 Disturbed	34.51	2	0	2
11.3.2 Regrowth	558.99	5	0	5
11.3.2 Remnant	463.75	4	0	4
11.3.25 Disturbed	4.78	2	0	2
11.3.25 Regrowth	0.35	2	0	2
11.3.25 Remnant	1413.39	6	9	0
11.3.26 Remnant	25.19	2	0	2
11.3.27 Remnant	678.7	5	4	1
11.3.3 Remnant	26.81	2	0	2
11.3.4 Disturbed	88.31	3	0	3
11.3.4 Regrowth	131.24	4	0	4
11.3.4 Remnant	1242.3	6	2	4
11.4.3 Regrowth	68.32	3	2	1
11.4.3a	15.059	2	0	2
11.4.3 Remnant	410.76	4	3	1
11.5.1 Disturbed	790.21	5	0	5
11.5.1 Regrowth	7762.68	6	6	0
11.5.1 Remnant	34442.22	6	10	0
11.5.20 Disturbed	26.38	2	0	2
11.5.20 Regrowth	175.34	4	2	2
11.5.20 Remnant	6292.43	6	4	2
11.5.21 Disturbed	1.02	2	0	2
11.5.21 Remnant	2217.39	6	1	5
11.5.4 Regrowth	0	0	2	0
11.5.4 Remnant	3470.04	6	6	0
11.7.2 Remnant	172.87	4	3	1
11.7.4 Disturbed	1.11	2	0	2
11.7.4 Regrowth	752.32	5	4	1
11.7.4 Remnant	13072.75	6	7	0
11.7.5 Remnant	460.63	4	1	3
11.7.6 Regrowth	0.97	2	2	0

Ground verified ESU / Regional Ecosystem	Area (ha)	Total number of survey sites required (as supplied by Arrow)	Number of sites completed in previous works (existing data)#	Balance required
11.7.6 Remnant	1255.62	6	4	2
11.7.7 Regrowth	10.62	2	0	2
11.7.7 Remnant	9502.91	6	6	0
Regrowth Brigalow (<15yrs)	41.71	2	0	2
Regrowth Brigalow (>15yrs)	298.75	4	0	4
Totals	**87,109.89**	**161**	**87**	**74**

Data from sites completed in 3D Environmental 2013, EcoSmart Ecology 2017, 2018 and 2019

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Appendix B: Habitat Quality Scores – Site Summary Data

Collared Delma (*Delma torquata*) HQS – Site Summary Data

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.2	S1	2.18	1.95	2.8	6.93
	S2	1.84	1.95	1.2	4.99
	S3	1.58	1.65	0.8	4.03
	S7	1.71	1.35	0.8	3.86
	S8	1.39	1.05	1.2	3.64
	CS10	1.99	0.30	2.8	5.09
	CS16	2.21	0.30	2.8	5.31
	RR1	1.76	0.60	0.8	3.16
	RR2	1.78	0.30	1.2	3.28
	RR4	0.96	0.60	0.8	2.36
	RR8	1.67	0.30	0.8	2.77
	CN1	2.29	0.30	1.6	4.19
	CN11	2.31	1.50	2.8	6.61
	CN12	2.23	1.50	0.8	4.53
11.7.2	AG253	1.91	2.55	2.8	7.26
	AG293	2.10	2.55	3	7.65
	AE68	2.42	2.40	3.4	8.22
	EPB48	2.29	2.55	3.2	8.04
11.7.4	CS8	2.01	0.00	2.4	4.41
	AE22	2.27	2.85	0.8	5.92
	AE41	1.95	2.85	3.8	8.60
	AE47	1.88	2.85	3.4	8.13
	AE 50	2.01	2.85	2.6	7.46
	AE66	2.06	2.70	3.8	8.56
	AE70	2.10	2.10	3.8	8.00
	GBS1	2.87	2.85	1.6	7.32

Yakka Skink (*Egernia rugosa*) HQS – Site Summary Data

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.1	CS2	1.46	1.35	2.88	5.69
	CN10	2.44	0.90	2.88	6.22
	RR10	2.12	0.30	2.48	4.90
	RR11	1.91	0.30	0.68	2.89
	RR12	1.99	0.00	2.28	4.27
	AE06	1.67	1.35	0.88	3.90
11.3.2	S1	2.18	1.95	2.68	6.81
	S2	1.84	1.95	1.68	5.47
	S3	1.58	1.65	1.48	4.71
	S7	1.71	1.35	1.08	4.14
	S8	1.39	1.05	1.88	4.32
	CS10	1.99	0.30	2.48	4.77
	CS16	2.21	0.30	2.48	4.99
	RR1	1.76	0.60	0.68	3.04
	RR2	1.78	0.30	1.28	3.36
	RR4	0.96	0.60	0.88	2.44
	RR8	1.67	0.30	0.68	2.65
	CN1	2.29	0.30	1.28	3.87
	CN11	2.31	1.50	2.28	6.09
	CN12	2.23	1.50	0.68	4.41
11.3.3	CS19	1.56	0.60	1.28	3.44
	CS21	1.56	0.60	0.88	3.04
11.3.4	CN2	1.73	1.73	1.68	5.13
	CN3	1.28	1.43	0.88	3.58
	CN4	1.33	1.43	2.68	5.44
	CN5	1.52	1.43	0.88	3.82
	CN15	1.59	2.40	1.28	5.27
	CN16	1.80	2.40	1.28	5.48
	RR3	1.41	0.90	0.48	2.79
	CS12	1.65	0.60	0.88	3.13
	CS13	1.97	0.60	1.88	4.45
	CS14	1.50	0.60	0.68	2.78
	CS17	2.14	0.60	0.48	3.22
	CS20	2.25	0.30	0.48	3.03
	GBS42	1.71	1.65	0.88	4.24
	GBS47	1.52	3.00	1.68	6.20
11.3.14	CS4	1.73	1.80	2.68	6.21
	CS9	1.33	0.00	2.08	3.41
	AE17	1.43	1.80	0.48	3.71
11.3.17	CS1	2.19	1.35	2.28	5.82
	CS3	2.10	1.35	0.48	3.93
	RR5	2.36	0.30	2.48	5.14
	RR6	2.29	0.30	2.68	5.27
	RR7	1.93	0.30	2.68	4.91
	RR9	1.84	0.30	1.28	3.42

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.18	CN6	1.97	0.30	3.08	5.35
	AE26	1.82	1.95	0.88	4.65
	AE32	1.20	0.90	0.88	2.98
	AE42	1.24	2.85	0.88	4.97
11.5.1	CN13	2.46	1.35	1.68	5.49
	AE20	1.85	2.85	0.68	5.38
	AE24	1.67	1.95	1.28	4.90
	AE46	1.78	2.85	3.08	7.71
	AE73	2.01	2.10	2.48	6.59
11.5.4	AE02	1.91	0.90	1.08	3.89
	AE03	2.19	2.10	0.88	5.17
	AE10	1.91	1.05	0.48	3.44
	AE11	2.25	1.05	0.68	3.98
	AE12	2.33	2.10	0.48	4.91
	AE55	1.89	0.90	1.68	4.47
11.5.20	CS5	1.67	0.60	0.88	3.15
	CS6	1.93	2.85	2.08	6.86
	CS7	1.74	0.60	0.48	2.82
	CN7	1.91	0.30	2.48	4.69
	AE58	2.36	2.85	1.08	6.29
	AE59	1.84	2.85	2.08	6.77
	AE60	2.27	2.85	2.48	7.60
11.5.21	GBS15	1.78	2.70	0.68	5.16
11.7.4	CS8	2.01	0.00	1.48	3.49
	AE22	2.27	2.85	0.88	6.00
	AE41	1.95	2.85	2.08	6.88
	AE47	1.88	2.85	2.88	7.61
	AE 50	2.01	2.85	1.68	6.54
	AE66	2.06	2.70	2.88	7.64
	AE70	2.10	2.10	2.68	6.88
	GBS1	2.87	2.85	1.28	7.00
11.7.5	GBS12	2.40	2.70	1.48	6.58
11.7.6	AE28	2.04	2.40	1.88	6.32
	AE36	1.65	1.20	2.88	5.73
	EPB47	1.84	3.00	1.48	6.32
	EPB51	1.91	3.00	1.88	6.79
	EPB58	1.73	3.00	2.48	7.21
11.7.7	N3	2.27	2.10	3.08	7.45
	AE21	1.97	1.95	0.48	4.40
	AE38	2.38	2.70	2.08	7.16
	AE62	2.23	2.40	1.88	6.51
	AE69	2.36	2.70	2.28	7.34

Dunmall's Snake (*Glyphodon dumnalli*) HQS – Site Summary Data

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.1	CS2	1.46	1.35	3.48	6.29
	CN10	2.44	0.90	3.48	6.82
	RR10	2.12	0.30	2.88	5.30
	RR11	1.91	0.30	0.48	2.69
	RR12	1.99	0.00	2.88	4.87
	AE06	1.67	1.35	0.48	3.50
11.3.2	S1	2.18	1.95	2.88	7.01
	S2	1.84	1.95	1.08	4.87
	S3	1.58	1.65	0.48	3.71
	S7	1.71	1.35	0.48	3.54
	S8	1.39	1.05	1.08	3.52
	CS10	1.99	0.30	3.48	5.77
	CS16	2.21	0.30	3.48	5.99
	RR1	1.76	0.60	0.48	2.84
	RR2	1.78	0.30	1.08	3.16
	RR4	0.96	0.60	0.48	2.04
	RR8	1.67	0.30	0.48	2.45
	CN1	2.29	0.30	1.08	3.67
	CN11	2.31	1.50	2.88	6.69
	CN12	2.23	1.50	0.48	4.21
11.3.14	CS4	1.73	1.80	3.48	7.01
	CS9	1.33	0.00	2.28	3.61
	AE17	1.43	1.80	0.48	3.71
11.3.17	CS1	2.19	1.35	2.88	6.42
	CS3	2.10	1.35	0.48	3.93
	RR5	2.36	0.30	3.48	6.14
	RR6	2.29	0.30	3.48	6.07
	RR7	1.93	0.30	2.28	4.51
	RR9	1.84	0.30	0.48	2.62
11.3.18	CN6	1.97	0.30	2.88	5.15
	AE26	1.82	1.95	0.48	4.25
	AE32	1.20	0.90	0.48	2.58
	AE42	1.24	2.85	0.48	4.57
11.4.3	S6	2.06	0.60	2.68	5.34
	AE01	2.42	2.10	2.88	7.40
	AE45	2.16	0.90	3.48	6.54
	AE74	1.54	0.30	1.28	3.12

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.5.1	CN13	2.46	1.35	1.68	5.49
	AE20	1.85	2.85	0.48	5.18
	AE24	1.67	1.95	0.48	4.10
	AE46	1.78	2.85	3.48	8.11
	AE73	2.01	2.10	3.48	7.59
11.5.4	AE02	1.91	0.90	0.48	3.29
	AE03	2.19	2.10	0.48	4.77
	AE10	1.91	1.05	0.48	3.44
	AE11	2.25	1.05	0.48	3.78
	AE12	2.33	2.10	0.48	4.91
	AE55	1.89	0.90	1.68	4.47
11.5.20	CS5	1.67	0.60	0.48	2.75
	CS6	1.93	2.85	2.88	7.66
	CS7	1.74	0.60	0.48	2.82
	CN7	1.91	0.30	3.48	5.69
	AE58	2.36	2.85	1.08	6.29
	AE59	1.84	2.85	2.88	7.57
	AE60	2.27	2.85	3.48	8.60
11.5.21	GBS15	1.78	2.70	0.48	4.96
11.7.2	AG253	1.91	2.55	1.68	6.14
	AG293	2.10	2.55	2.88	7.53
	AE68	2.42	2.40	3.48	8.30
	EPB48	2.29	2.55	2.88	7.72
11.7.4	CS8	2.01	0.00	1.68	3.69
	AE22	2.27	2.85	0.48	5.60
	AE41	1.95	2.85	2.28	7.08
	AE47	1.88	2.85	3.48	8.21
	AE 50	2.01	2.85	1.68	6.54
	AE66	2.06	2.70	3.48	8.24
	AE70	2.10	2.10	2.28	6.48
	GBS1	2.87	2.85	1.08	6.80
11.7.6	AE28	2.04	2.40	2.28	6.72
	AE36	1.65	1.20	3.48	6.33
	EPB47	1.84	3.00	1.68	6.52
	EPB51	1.91	3.00	2.28	7.19
	EPB58	1.73	3.00	3.48	8.21
11.7.7	N3	2.27	2.10	3.48	7.85
	AE21	1.97	1.95	0.48	4.40
	AE38	2.38	2.70	2.88	7.96
	AE62	2.23	2.40	2.28	6.91
	AE69	2.36	2.70	2.88	7.94

Squatter Pigeon (*Geophaps scripta scripta*) HQS – Site Summary Data

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.2	S1	2.18	1.95	0.50	4.63
	S2	1.84	1.95	0.55	4.34
	S3	1.58	1.65	0.55	3.78
	S7	1.71	1.35	0.55	3.61
	S8	1.39	1.05	0.75	3.19
	CS10	1.99	0.30	0.55	2.84
	CS16	2.21	0.30	0.70	3.21
	RR1	1.76	0.60	0.50	2.86
	RR2	1.78	0.30	0.55	2.63
	RR4	0.96	0.60	0.55	2.11
	RR8	1.67	0.30	0.50	2.47
	CN1	2.29	0.30	0.75	3.34
	CN11	2.31	1.50	0.70	4.51
	CN12	2.23	1.50	0.50	4.23
11.3.3	CS19	1.56	0.60	0.50	2.66
	CS21	1.56	0.60	0.70	2.86
11.3.4	CN2	1.73	1.73	0.45	3.90
	CN3	1.28	1.43	0.75	3.45
	CN4	1.33	1.43	0.65	3.41
	CN5	1.52	1.43	0.55	3.49
	CN15	1.59	2.40	0.35	4.34
	CN16	1.80	2.40	0.45	4.65
	RR3	1.41	0.90	0.55	2.86
	CS12	1.65	0.60	0.75	3.00
	CS13	1.97	0.60	0.50	3.07
	CS14	1.50	0.60	0.75	2.85
	CS17	2.14	0.60	0.50	3.24
	CS20	2.25	0.30	0.50	3.05
	GBS42	1.71	1.65	0.50	3.86
	GBS47	1.52	3.00	0.40	4.92
11.3.14	CS4	1.73	1.80	0.65	4.18
	CS9	1.33	0.00	0.50	1.83
	AE17	1.43	1.80	0.45	3.68
11.3.17	CS1	2.19	1.35	0.65	4.19
	CS3	2.10	1.35	0.60	4.05
	RR5	2.36	0.30	0.60	3.26
	RR6	2.29	0.30	0.65	3.24
	RR7	1.93	0.30	0.75	2.98
	RR9	1.84	0.30	0.55	2.69

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.18	CN6	1.97	0.30	0.30	2.57
	AE26	1.82	1.95	0.75	4.52
	AE32	1.20	0.90	0.65	2.75
	AE42	1.24	2.85	0.75	4.84
11.3.25	AE25	2.06	1.95	0.35	4.36
	AE31	1.80	1.20	0.55	3.55
	AE34	1.84	2.10	0.65	4.59
	AE44	1.69	2.85	0.55	5.09
	AE56	2.33	2.40	0.45	5.18
	AE76	2.16	1.65	0.35	4.16
11.3.27	S4	2.25	0.00	0.40	2.65
	AE04	1.89	0.75	0.50	3.14
	AE07	2.33	0.75	0.50	3.58
	AE08	2.51	0.75	0.45	3.71
	AE14	2.16	1.80	0.50	4.46
11.5.20	CS5	1.67	0.60	0.55	2.82
	CS6	1.93	2.85	0.50	5.28
	CS7	1.74	0.60	0.75	3.09
	CN7	1.91	0.30	0.45	2.66
	AE58	2.36	2.85	0.70	5.91
	AE59	1.84	2.85	0.75	5.44
	AE60	2.27	2.85	0.60	5.72

Painted Honeyeater (*Grantiella picta*) HQS – Site Summary Data

Regional Ecosystem	Site	Condition	Context	SPP Hab Ind	Total
11.3.1	CS2	1.46	1.35	1.32	4.13
	CN10	2.44	0.90	1.32	4.66
	RR10	2.12	0.30	1.32	3.74
	RR11	1.91	0.30	1.32	3.53
	RR12	1.99	0.00	1.32	3.31
	AE06	1.67	1.35	1.32	4.34
11.3.17	CS1	2.19	1.35	1.32	4.86
	CS3	2.10	1.35	1.32	4.77
	RR5	2.36	0.30	1.32	3.98
	RR6	2.29	0.30	1.32	3.91
	RR7	1.93	0.30	1.32	3.55
	RR9	1.84	0.30	1.32	3.46
11.4.3	S6	2.06	0.60	1.72	4.38
	AE01	2.42	2.10	1.32	5.84
	AE45	2.16	0.90	1.72	4.78
	AE74	1.54	0.30	1.32	3.16
Brigalow Regrowth (11.3.17)	CS11	1.31	0.30	1.32	2.93
	CS15	1.65	0.00	1.32	2.97
	CN8	1.44	0.30	1.32	3.06
	CN9	1.95	0.00	1.32	3.27
	CN14	2.14	0.00	2.92	5.06

Regent Honeyeater (*Anthochaera phrygia*) HQS – Site Summary Data

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.25	AE25	2.06	1.95	1.90	5.91
	AE31	1.80	1.20	1.90	4.90
	AE34	1.84	2.10	1.90	5.84
	AE44	1.69	2.85	1.90	6.44
	AE56	2.33	2.40	1.90	6.63
	AE76	2.16	1.65	2.40	6.21
11.3.27f	S4	2.25	0.00	1.40	3.65
11.3.27i	AE04	1.89	0.75	2.40	5.04
	AE07	2.33	0.75	2.40	5.48
	AE08	2.51	0.75	2.40	5.66
	AE14	2.16	1.80	2.40	6.36

Koala (*Phascolarctos cinereus*) HQS – Site Summary Data

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.1	CS2	1.46	1.35	0.84	3.65
	CN10	2.44	0.90	0.84	4.18
	RR10	2.12	0.30	0.84	3.26
	RR11	1.91	0.30	0.84	3.05
	RR12	1.99	0.00	0.84	2.83
	AE06	1.67	1.35	0.24	3.26
11.3.2	S1	2.18	1.95	1.44	5.57
	S2	1.84	1.95	2.04	5.83
	S3	1.58	1.65	1.44	4.67
	S7	1.71	1.35	1.44	4.50
	S8	1.39	1.05	1.44	3.88
	CS10	1.99	0.30	2.04	4.33
	CS16	2.21	0.30	2.64	5.15
	RR1	1.76	0.60	2.04	4.40
	RR2	1.78	0.30	2.04	4.12
	RR4	0.96	0.60	2.64	4.20
	RR8	1.67	0.30	3.24	5.21
	CN1	2.29	0.30	1.44	4.03
	CN11	2.31	1.50	2.04	5.85
	CN12	2.23	1.50	2.04	5.77
11.3.3	CS19	1.56	0.60	1.44	3.60
	CS21	1.56	0.60	2.64	4.80
11.3.4	CN2	1.73	1.73	3.24	6.69
	CN3	1.28	1.43	2.04	4.74
	CN4	1.33	1.43	2.64	5.40
	CN5	1.52	1.43	2.04	4.98
	CN15	1.59	2.40	3.24	7.23
	CN16	1.80	2.40	2.64	6.84
	RR3	1.41	0.90	3.24	5.55
	CS12	1.65	0.60	3.24	5.49
	CS13	1.97	0.60	3.24	5.81
	CS14	1.50	0.60	3.24	5.34
	CS17	2.14	0.60	3.24	5.98
	CS20	2.25	0.30	3.24	5.79
	GBS42	1.71	1.65	2.64	6.00
	GBS47	1.52	3.00	2.64	7.16
11.3.14	CS4	1.73	1.80	3.24	6.77
	CS9	1.33	0.00	2.64	3.97
	AE17	1.43	1.80	2.04	5.27
11.3.17	CS1	2.19	1.35	1.44	4.98
	CS3	2.10	1.35	1.44	4.89
	RR5	2.36	0.30	0.84	3.50
	RR6	2.29	0.30	0.84	3.43
	RR7	1.93	0.30	0.84	3.07
	RR9	1.84	0.30	1.44	3.58

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.18	CN6	1.97	0.30	2.04	4.31
	AE26	1.82	1.95	2.64	6.41
	AE32	1.20	0.90	3.24	5.34
	AE42	1.24	2.85	1.44	5.53
11.3.25	AE25	2.06	1.95	3.24	7.25
	AE31	1.80	1.20	2.64	5.64
	AE34	1.84	2.10	2.64	6.58
	AE44	1.69	2.85	1.44	5.98
	AE56	2.33	2.40	3.24	7.97
	AE76	2.16	1.65	3.24	7.05
11.3.27	S4	2.25	0.00	3.24	5.49
	AE04	1.89	0.75	2.64	5.28
	AE07	2.33	0.75	2.64	5.72
	AE08	2.51	0.75	3.24	6.50
	AE14	2.16	1.80	3.24	7.20
11.4.3	S6	2.06	0.60	0.12	2.78
	AE01	2.42	2.10	0.72	5.24
	AE45	2.16	0.90	0.12	3.18
	AE74	1.54	0.30	0.12	1.96
11.5.1	CN13	2.46	1.35	2.52	6.33
	AE20	1.85	2.85	1.92	6.62
	AE24	1.67	1.95	1.92	5.54
	AE46	1.78	2.85	1.32	5.95
	AE73	2.01	2.10	1.32	5.43
11.5.1 (regrowth)	AE19	1.14	0.90	0.72	2.76
	AE49	0.98	1.20	0.72	2.90
11.5.4	AE02	1.91	0.90	0.72	3.53
	AE03	2.19	2.10	1.32	5.61
	AE10	1.91	1.05	1.92	4.88
	AE11	2.25	1.05	1.92	5.22
	AE12	2.33	2.10	1.32	5.75
	AE55	1.89	0.90	1.32	4.11
11.5.20	CS5	1.67	0.60	1.32	3.59
	CS6	1.93	2.85	0.72	5.50
	CS7	1.74	0.60	0.72	3.06
	CN7	1.91	0.30	0.72	2.93
	AE58	2.36	2.85	0.72	5.93
	AE59	1.84	2.85	0.72	5.41
	AE60	2.27	2.85	0.72	5.84

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.7.4	CS8	2.01	0.00	1.32	3.33
	AE22	2.27	2.85	1.32	6.44
	AE41	1.95	2.85	1.32	6.12
	AE47	1.88	2.85	1.32	6.05
	AE 50	2.01	2.85	0.72	5.58
	AE66	2.06	2.70	1.32	6.08
	AE70	2.10	2.10	2.52	6.72
	GBS1	2.87	2.85	1.32	7.04
11.7.6	AE28	2.04	2.40	0.72	5.16
	AE36	1.65	1.20	0.72	3.57
	EPB47	1.84	3.00	0.72	5.56
	EPB51	1.91	3.00	0.72	5.63
	EPB58	1.73	3.00	0.72	5.45
11.7.6 (regrowth)	CS18	1.93	1.05	0.72	3.70
Brigalow regrowth (11.3.17)	CS11	1.31	0.30	0.12	1.73
	CS15	1.65	0.00	0.72	2.37
	CN8	1.44	0.30	0.12	1.86
	CN9	1.95	0.00	0.72	2.67
Brigalow regrowth (11.4.3)	CN14	2.14	0.00	0.72	2.86

Greater Glider (*Petauroides volans*) HQS – Site Summary Data

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.4	CN2	1.73	1.73	0.52	3.97
	CN3	1.28	1.43	0.52	3.22
	CN4	1.33	1.43	0.32	3.08
	CN5	1.52	1.43	0.32	3.26
	CN15	1.59	2.40	1.32	5.31
	CN16	1.80	2.40	1.32	5.52
	RR3	1.41	0.90	1.52	3.83
	CS12	1.65	0.60	0.32	2.57
	CS13	1.97	0.60	0.32	2.89
	CS14	1.50	0.60	0.92	3.02
	CS17	2.14	0.60	1.12	3.86
	CS20	2.25	0.30	0.52	3.07
	GBS42	1.71	1.65	1.12	4.48
	GBS47	1.52	3.00	1.52	6.04
11.3.25	AE25	2.06	1.95	2.12	6.13
	AE31	1.80	1.20	0.92	3.92
	AE34	1.84	2.10	1.12	5.06
	AE44	1.69	2.85	1.52	6.06
	AE56	2.33	2.40	2.12	6.85
	AE76	2.16	1.65	2.72	6.53
11.3.27f	S4	2.25	0.00	0.52	2.77
11.3.27f	AE04	1.89	0.75	1.72	4.36
	AE07	2.33	0.75	1.52	4.60
	AE08	2.51	0.75	1.32	4.58
	AE14	2.16	1.80	1.32	5.28
11.7.6	AE28	2.04	2.40	0.52	4.96
	AE36	1.65	1.20	0.72	3.57
	EPB47	1.84	3.00	0.32	5.16
	EPB51	1.91	3.00	0.72	5.63
	EPB58	1.73	3.00	0.52	5.25
11.7.7	N3	2.27	2.10	1.12	5.49
	AE21	1.97	1.95	0.52	4.44
	AE38	2.38	2.70	0.92	6.00
	AE62	2.23	2.40	0.92	5.55
	AE69	2.36	2.70	1.72	6.78

Southern Long-eared Bat (*Nyctophilus corbeni*) HQS – Site Summary Data

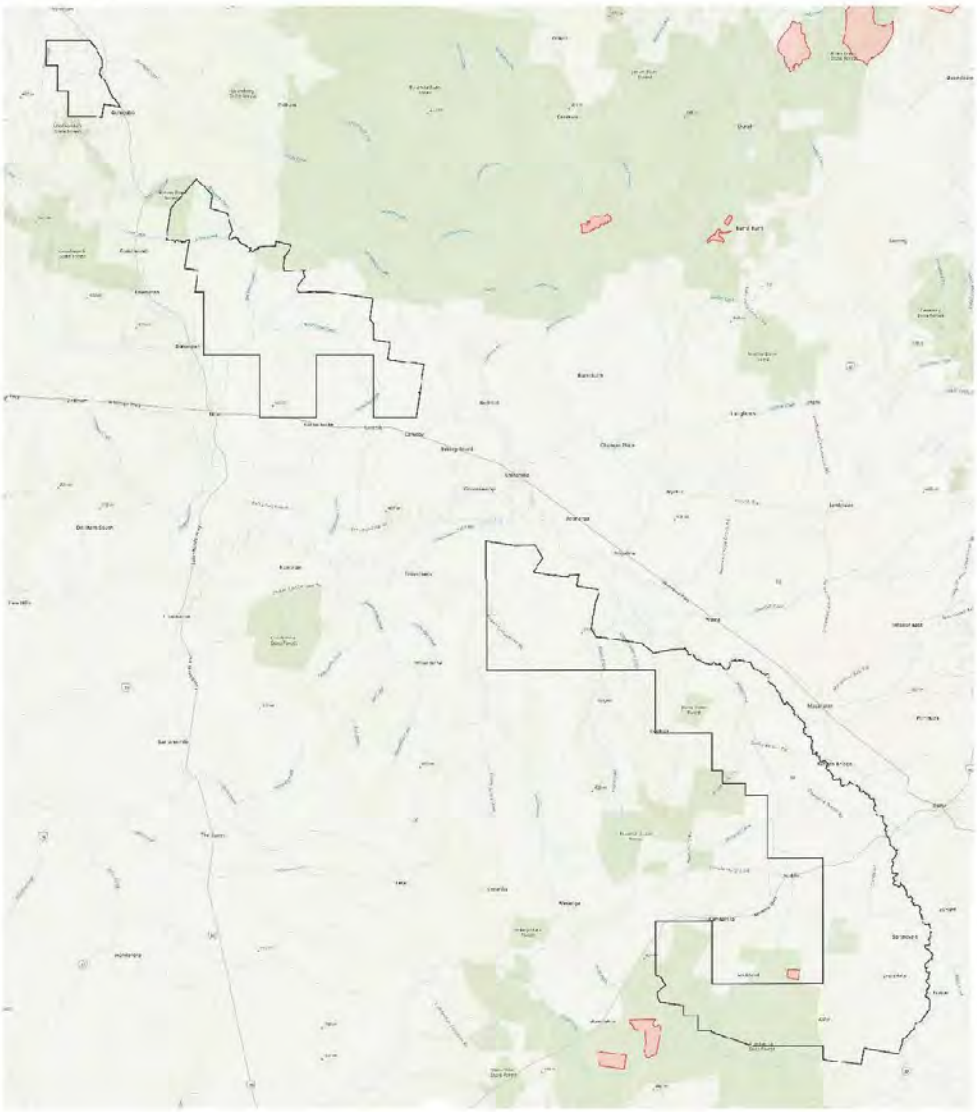
Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.3.14	CS4	1.73	1.80	0.60	4.13
	CS9	1.33	0.00	0.20	1.53
	AE17	1.43	1.80	1.60	4.83
11.3.18	CN6	1.97	0.30	0.20	2.47
	AE26	1.82	1.95	0.60	4.37
	AE32	1.20	0.90	0.20	2.30
	AE42	1.24	2.85	1.80	5.89
11..5.1	CN13	2.46	1.35	1.40	5.21
	AE20	1.85	2.85	1.60	6.30
	AE24	1.67	1.95	1.40	5.02
	AE46	1.78	2.85	2.00	6.63
	AE73	2.01	2.10	0.20	4.31
11.5.4	AE02	1.91	0.90	0.40	3.21
	AE03	2.19	2.10	0.20	4.49
	AE10	1.91	1.05	0.40	3.36
	AE11	2.25	1.05	0.20	3.50
	AE12	2.33	2.10	0.20	4.63
	AE55	1.89	0.90	0.60	3.39
11.5.20	CS5	1.67	0.60	0.20	2.47
	CS6	1.93	2.85	0.60	5.38
	CS7	1.74	0.60	0.20	2.54
	CN7	1.91	0.30	0.20	2.41
	AE58	2.36	2.85	1.60	6.81
	AE59	1.84	2.85	1.40	6.09
	AE60	2.27	2.85	0.60	5.72
11.5.21	GBS15	1.78	2.70	1.60	6.08
11.7.4	CS8	2.01	0.00	1.60	3.61
	AE22	2.27	2.85	0.80	5.92
	AE41	1.95	2.85	1.40	6.20
	AE47	1.88	2.85	1.40	6.13
	AE 50	2.01	2.85	1.20	6.06
	AE66	2.06	2.70	1.00	5.76
	AE70	2.10	2.10	1.60	5.80
	GBS1	2.87	2.85	1.80	7.52
11.7.6	AE28	2.04	2.40	1.20	5.64
	AE36	1.65	1.20	0.20	3.05
	EPB47	1.84	3.00	0.80	5.64
	EPB51	1.91	3.00	1.20	6.11
	EPB58	1.73	3.00	0.80	5.53

Regional Ecosystem	Site	Condition	Context	Spp Hab Ind	Total
11.7.7	N3	2.27	2.10	1.00	5.37
	AE21	1.97	1.95	1.60	5.52
	AE38	2.38	2.70	2.20	7.28
	AE62	2.23	2.40	1.00	5.63
	AE69	2.36	2.70	1.20	6.26

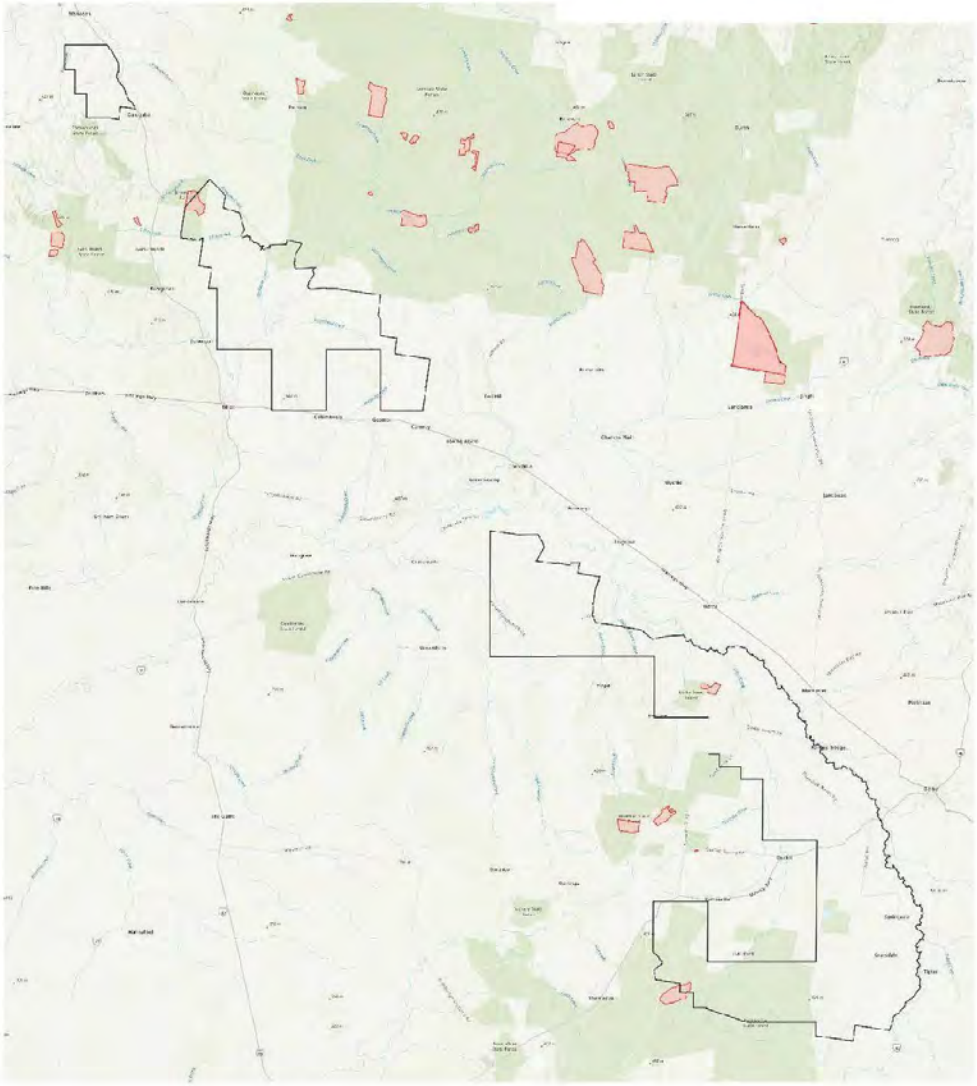
Appendix C: Historic Wildfire Maps

The following wildfire maps are based on 'Queensland Parks Fire History' data (Department of Environment and Science 2020, available from: https://www.arcgis.com/home/item.html?id=a0c6ac4bfb32471ba576bc2db0814abe). The dataset illustrates planned burns (not indicated on maps provide here) and wildfire which occurs within or affects Queensland protected estate. It does not represent a complete overview of fire history.

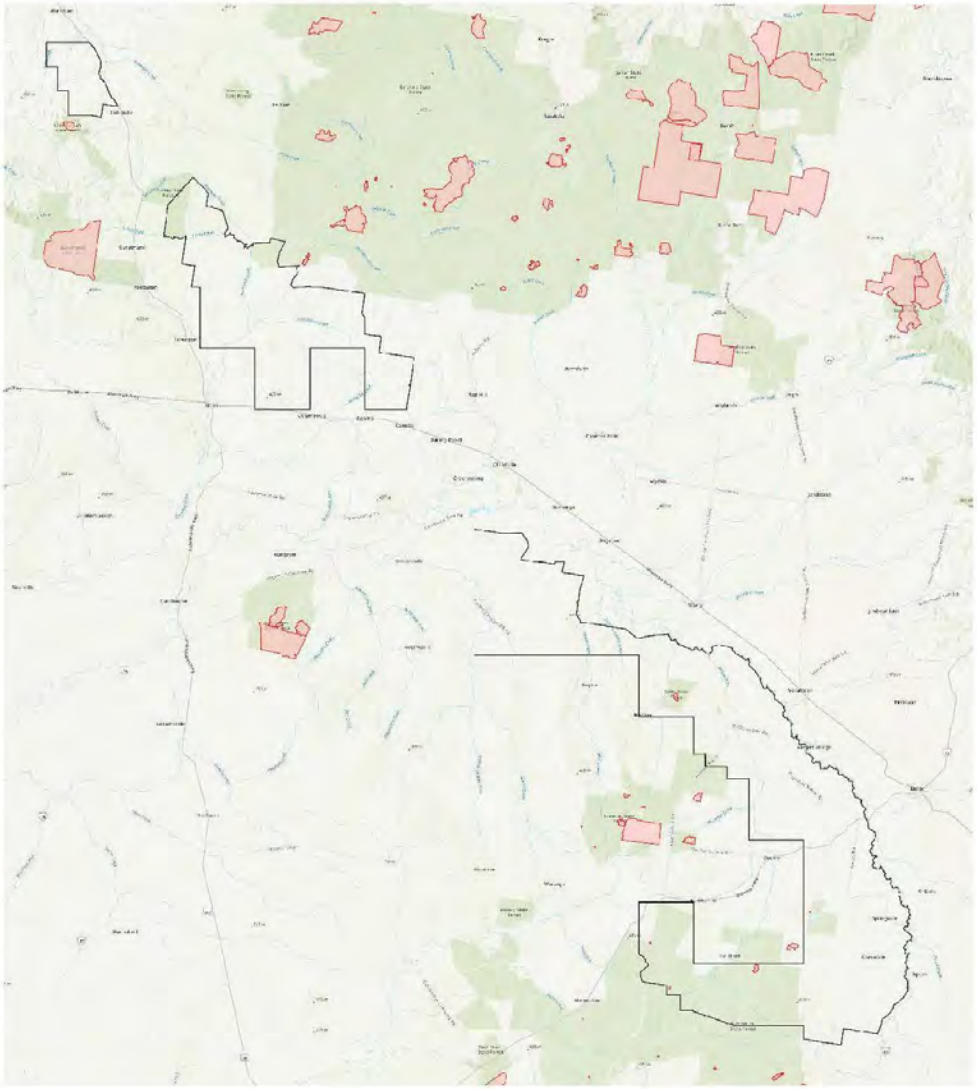
1980-1990



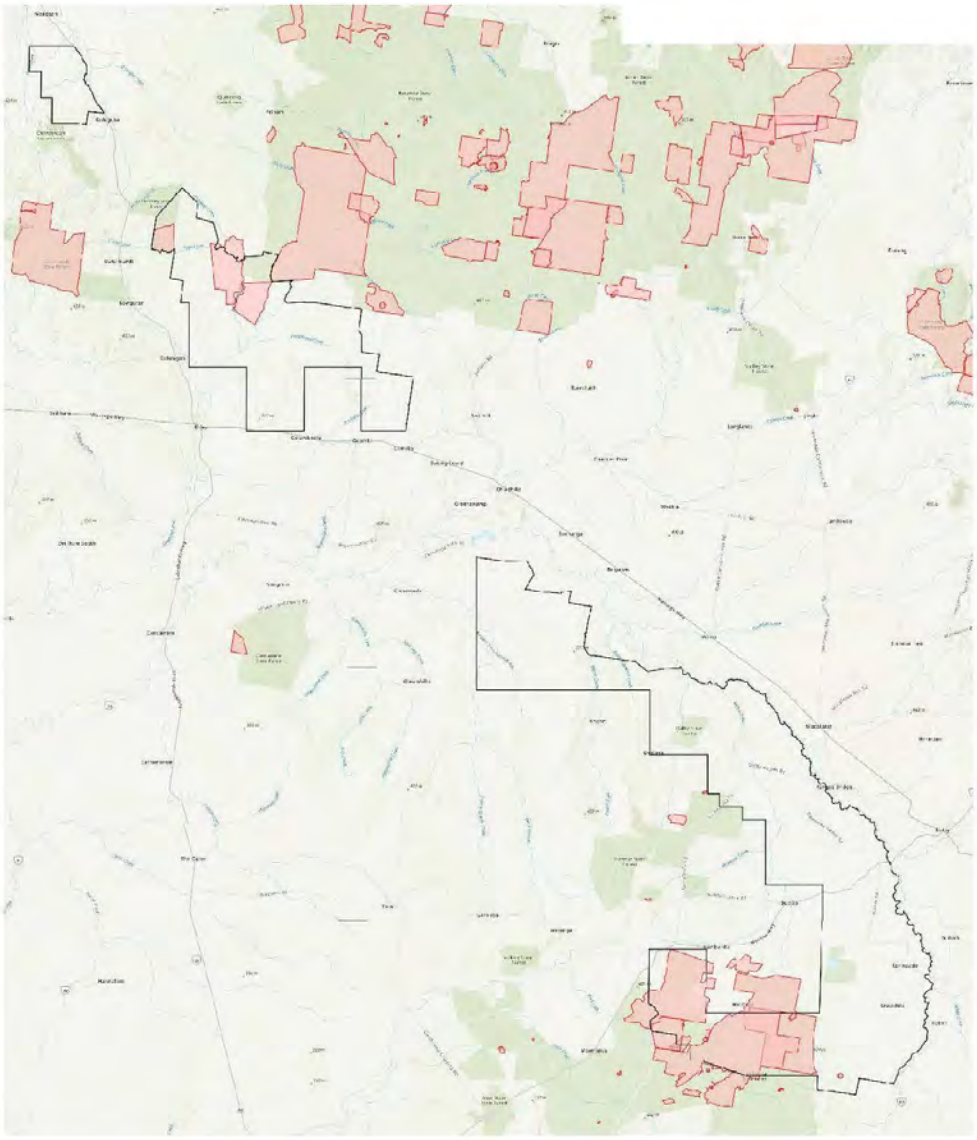
1991-2000



2001-2010



2011+



Attachment 3 - Description of mitigation measures and commitments (Tables 3.1 and 4.1 from the approved SIMP)

SGP Stage 2 – Offset Area Management Plan
EPBC Approval 2010/5344

Description of mitigation measures / commitments

Mitigation	Commitment	Intended outcome	Responsible manager/s
Pre-construction clearance surveys / minimize clearing	• Minimize the disturbance footprint and vegetation clearing; • Use existing roads and tracks, where practicable; • Avoid unnecessary impervious surface coverings and reduce land footprint and vegetation clearing when designing facilities; • Reduce the width of construction ROW within areas of sensitivity to the greatest extent practicable without compromising the safety of workers; • Conduct preconstruction clearance surveys to identify any additional areas that may need to be avoided; and • Conduct preconstruction clearance surveys and include as a minimum: Vegetation mapping at a scale suitable for site- specific planning; Identification of habitats and listed species; and Identification of site-specific sensitive areas that require avoidance or buffer areas.	To identify opportunities where the residual impacts to MNES matters can be further reduced	SGP Pre-execution (i.e. Planning) Manager (Arrow)
Construction activities as per plan (no-go areas)	• Ensure construction activities do not extend beyond the work site boundaries; • Mark site boundaries clearly for site-specific sensitive areas that require avoidance; • Demarcate buffers and inform workers and machinery operators of buffer locations when working within the vicinity of national- and state-listed species, communities and areas identified for avoidance; • When clearing vegetation, seek to avoid creating gaps in stands or patches and to avoid isolating parcels of remnant vegetation from more continuous tracts;	To ensure that no unplanned impacts occur on MNES as a result of construction activities	SGP Construction Manager (Arrow)

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Mitigation	Commitment	Intended outcome	Responsible manager/s
Clear Communication	• Inform relevant workers, including contract plant and machinery operators of the location of significant remnant vegetation and buffers and use qualified personnel to guide clearing activities; and • Prohibit disturbance or harassment of wildlife and the unauthorized collection of flora and forest products	To ensure that no unplanned impacts occur on MNES because of construction activities	SGP Construction Managers (Arrow and Third-Party Contractor)
Fauna spotter catcher	• Assess trees prior to felling for potential nesting hollows. If identified, fell trees in the presence of a qualified fauna spotter-catcher (FSC) and roll them so that the hollows are facing upwards, allowing fauna to escape; • Identify key koala trees (Eucalyptus tereticornis and Eucalyptus populnea), and visually inspect prior to clearing to ensure that they are free of koalas. If koalas are located, the tree should be retained until the animals have moved on, typically overnight; • Use appropriately trained personnel or a FSC to capture injured wildlife, where possible. If further action is required, consult with a qualified vet to determine appropriate action; • The FSC will be present during clearing. The FSC will be suitably qualified as per the definition provided in EPBC 2010/5344. The number of FSCs on site at the time of clearing will depend on the number of machines being used at any given time; • Checks for identified EPBC Act fauna species breeding places will be undertaken immediately prior to commencing vegetation clearing; and • Potential breeding places will be clearly marked in the field with spray paint, coloured flagging tape (unless not permitted by landowners, e.g. some cattle properties), or by other suitable methods	To ensure that no unplanned impacts occur on the Koala, Dunmall's Snake, Greater Glider, South-eastern Long-eared Bat, Regent Honeyeater, Painted Honeyeater or Squatter Pigeon	SGP Construction Managers (Arrow and Third-Party Contractor)

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Mitigation	Commitment	Intended outcome	Responsible manager/s
Appropriate rehabilitation	• Retain woody debris, logs and rocks for use in rehabilitation, spreading them over part or all of the corridor or, as a minimum, piled along the edge of the cleared corridor to provide refuge for crossing fauna; • Translocate or propagate significant species where it is deemed necessary for use during rehabilitation or in offsets in accordance with relevant legislation; • Fell trees away from existing stands where practicable. Where trees unavoidably fall into a stand, leave trees in situ to emulate natural tree fall and provide habitat for ground-dwelling species, where practicable; and • Fell trees away from existing stands where practicable. Where trees unavoidably fall into a stand, leave trees in situ to emulate natural tree fall and provide habitat for ground-dwelling species, where practicable.	To ensure that no unplanned impacts occur on MNES as a result of construction activities	·SGP Construction Managers (Arrow and Third-Party Contractor)
Reduce light spill	• Reduce light spill resulting from project activities to reduce disturbance to nocturnal fauna	To ensure that no unplanned impacts occur on the Koala, Dunmall's Snake, Greater Glider or South-eastern Long-eared Bat	SGP Construction Managers (Arrow and Third-Party Contractor)
Reduce project traffic speed	• Implement speed limits on project-controlled roads to reduce the potential for vehicle collisions with wildlife; and • Confine project traffic to designated roads and access tracks, where practicable;	To ensure that no unplanned impacts occur on the Koala, Dunmall's Snake, Collared, Delma or Yakka Skink	SGP Construction Managers (Arrow and Third-Party Contractor)

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Mitigation	Commitment	Intended outcome	Responsible manager/s
Weed control	• Inspect work sites and access routes for notifiable weeds and pest plants and animals prior to accessing the site; • Wash down vehicles and equipment that have potentially been in contact with weeds before entering new work sites; • Advise all relevant personnel of the location and extent of weed infestations in the vicinity of the work areas and the risks involved in moving from one site or property to another; and • Identify declared weeds [as per the Land Access Code 2016] during the preconstruction clearance survey.	To avoid degradation of the Brigalow, Coolibah-Black Box or Weeping Myall TEC; and To avoid reduction in the condition of listed threatened species habitat	SGP Construction Managers (Arrow and Third-Party Contractor)
Documentation	• Develop management procedures, inclusive of buffers where required, for threatened communities and species as and when project activities are identified as likely to have an impact on these values; • Develop and implement a compensation framework to 'add value' rather than just compensating for impacts; • Where avoidance is not possible, and significant residual impacts remain to threatened species and communities, implement an offset strategy approved by a relevant; and • Government agency and comply with reporting conditions of an offset plan.	To ensure that the planned (and actual) impacts to MNES are accurately documented and offset	Environment Manager (Arrow)

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Description of additional mitigation measures / commitments

Mitigation	Commitment	Intended outcome	Responsible manager/s
Construction - clearing	• See Description of mitigation measures / commitments		
Construction - Open trench management	• Trenches will be inspected and monitored as per the APIA Code of Environmental Practice (B159) and will be checked within two hours of sunrise and trapped fauna released. Additional monitoring will be undertaken following rainfall events; • The time the trench is left open will be minimized. Fauna exit points will be incorporated when construction is within 1 km of native vegetation, using appropriate material. Fauna refuges, such as sawdust-filled bags, will be provided regularly through areas of high fauna activity. • As soon as practical following pipe laying, the trench will be backfilled with excavated material, compacted and topsoil replaced and erosion controls implemented	To ensure that no unplanned impacts occur on Dunmall's Snake, Koala, Collared Delma or Yakka Skink	SGP Construction Managers (Arrow and Third-Party Contractor)
Construction - Reduce light spill	• Lighting will be designed in a manner that limits disruption of landscape character, views and visual amenities and lighting will be directed into the infrastructure sitting rather than dispersed into native vegetation when sites are adjacent to intact habitat	To ensure that no unplanned impacts occur on the Koala, South-eastern Long-eared Bat and Greater Glider	SGP Construction Managers (Arrow and Third-Party Contractor)
Construction - Reduce project traffic speed	• Speed limits on Project controlled roads will be developed with due consideration to reduce the potential for vehicle collisions with wildlife	To ensure that no unplanned impacts occur on Dunmall's Snake, Squatter Pigeon, Koala or Yakka Skink	SGP Construction Managers (Arrow and Third-Party Contractor)

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Mitigation	Commitment	Intended outcome	Responsible manager/s
Construction - Bushfire	• Fire management plans will be developed for production facilities; • Radiation exclusion zones around flares will be designed according to API standard; Enclosed spaces where flammable gas may accumulate will be minimised; • Fire-fighting equipment will be installed, inspected and serviced in accordance with risk assessments and relevant legislation and standards; • Gathering lines will be buried at a minimum depth of 600 mm. Where gathering lines are present above the ground (at wellheads and at vents or drains), a clear area will be maintained. The size of the cleared area will be determined on a site-by-site basis with consideration of the site-specific risk of bushfire; • Fire-safety equipment will be commissioned in the early phase of the construction period; • All buildings and production facilities will be fitted with smoke or fire alarms; • Fire and gas detection systems will be installed to shutdown compressors; • Protocols will be developed for the control of operational activities during extreme fire danger periods, e.g., flaring or shutdowns; • Regular patrols and inspections of pipeline easements will be conducted, including status of signposting subsidence and of fire breaks; • Vegetation surrounding production facilities and wellheads will be maintained in a manner that limits the amount of combustible material in the area. The size of the cleared area will be determined on a site-by-site basis with consideration of the site-specific risk of bushfire; • Access tracks to well sites will be kept clear of dry grass and combustible material wherever practicable and where	To avoid degradation of TECs	SGP Construction Managers (Arrow and Third-Party Contractor)

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Mitigation	Commitment	Intended outcome	Responsible manager/s
	there is a higher risk of bushfire (to minimise the risk of dry grass being ignited by hot components of vehicles accessing the sites); and • Daily operations will be managed with consideration of the fire danger current at that time.		
Construction / Operation / Decommissioning	• A detailed pest management plan will be developed to mitigate and manage the potential spread of pest flora and fauna species (B152). This plan will include requirements for machinery washdown procedures to be followed during all clearing activities	To avoid degradation of TECs	SGP Managers (Arrow and Third-Party Contractor)
Weed control	• Weed monitoring and targeted weed control measures will be undertaken within sensitive EVNT habitats (particularly threatened communities such as Brigalow and native grasslands) (B158); • Weed control methods within EVNT habitats will be selected on the basis of minimising the risk of adverse impacts on EVNT species or communities; • In accordance with the Pest Management Plan regular inspections for pest flora and evidence of pest fauna will be undertaken within Project disturbed areas; • Washdown facilities will be designed to ensure that runoff is contained on site and does not transfer weed seeds, spores or infected soils to adjacent areas; declaration form will be requested from the supplier where there is possible risk of contamination in products.	To avoid reduction in the condition of listed threatened species habitat; Successful implementation of Arrow's Vehicle and Machinery Hygiene Procedure (ORG-ARW-HSM-PRO-00138) and Weed Management Procedure (ORG-ARW-HSM-PRO-00139)	SGP Managers (Arrow and Third-Party Contractor)
Construction / Operation / Decommissioning – Pest control	• Arrow will manage food, waste and other project activities to prevent or minimize the potential for these to transport or attract pest animals which may then impact MNES	Successful implementation of Arrow's Pest Management Procedure (ORG-ARW-HSM-PRO-00096)	SGP Managers (Arrow and Third-Party Contractor)

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Mitigation	Commitment	Intended outcome	Responsible manager/s
Operation - Grazing	• Grazing activities will be excluded from all Arrow gas and water processing and well head infrastructure sites	To avoid degradation of TECs; To avoid reduction in the condition of listed; and To avoid reduction in the condition of listed threatened species habitat	SGP Operations Managers (Arrow)
Operation / decommissioning	• The cleared areas and stockpiles will be progressively rehabilitated through revegetation and/or mulching	To ensure that no unplanned impacts occur on MNES as a result of construction activities	SGP Managers (Arrow and Third-Party Contractor)
Appropriate rehabilitation	• Areas will be cleared progressively and rehabilitation implemented as soon as practicable following construction and decommissioning activities; • Rehabilitation timeframes will be compliant with applicable Environmental Authority conditions and consider any landholder requirements/expectations; • Rehabilitation plans will be developed addressing ground preparation requirements, natural and constructed drainage patterns, soil erodibility, contamination, slope steepness and length, vegetation cover, land use and landowner requirements. Partial rehabilitation of gathering lines and other linear infrastructure will be undertaken to reduce edge effects (including weed invasion) and maintain movement rates; • Rehabilitation of available areas will be undertaken that is consistent with pre-clearance habitats, to increase the rate of recovery; • Woody debris, logs and rocks will be retained for use in rehabilitation. Where practical, these will be piled along the edge of the cleared corridor. Where possible these features will be spread over all or part of the corridor to provide refugia for crossing fauna. Systematic removal of surface debris will be avoided and cleared timber will never be burnt; • Data collection, particularly of EVNT species identified during pre-clearance surveys, during trench checking or in	To return the area to pre-disturbed conditions (or better) as agreed with the landholder and as required by DES in order to grant progressive rehabilitation certification and EA surrender	SGP Managers (Arrow and Third-Party Contractor)

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Mitigation	Commitment	Intended outcome	Responsible manager/s
	other Project related activities, will be ongoing until rehabilitation is complete; • Site planning, preparation and management requirements will be implemented in accordance with a decommissioning and rehabilitation plan; • After decommissioning, rehabilitation areas will be inspected for regrowth similar to the surrounding environment; Regular monitoring of rehabilitation success will be carried out; • During rehabilitation works, care will be taken when moving stockpiled logs and vegetation to avoid fauna mortality; • Excavations, particularly pipeline trenches and drilling sumps, will be backfilled and rehabilitated. Backfilling will be conducted in a manner that will promote successful rehabilitation, including capping of exposed subsoil with topsoil and replacement of the land surface to preconstruction levels to reduce trench subsidence and concentration of flow. Soils will be mounded where required to allow for settling. However, in laser-levelled paddocks, this may not be practicable, and backfilling will be carried out in consultation with the landowner; • A rehabilitation management plan for decommissioning will be developed and implemented which includes monitoring and maintenance of rehabilitated areas until rehabilitation sign off criteria are met; • Monitoring of the rehabilitated areas will be undertaken to identify whether the general objectives of the rehabilitation strategy are being met, and whether a sustainable and stable landform has been achieved. • Monitoring will be conducted by suitably skilled and qualified persons at representative locations. Annual reviews of monitoring data will be conducted during		

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Mitigation	Commitment	Intended outcome	Responsible manager/s
	operations, and post closure, to assess trends and performance; • A final rehabilitation report and a decommissioning plan, including a contaminated land assessment where required, landowner commitments and agreements, and rehabilitation; • Status, will be prepared and submitted to the appropriate authorities for approval where required; • The area disturbed within the pipeline corridor during the laying of the pipelines will be progressively rehabilitated as soon as practicable after completion of the pipeline installation. Fences, roads and tracks and other existing infrastructure impacted during construction of the pipeline will be repaired and/or replaced as required; • At decommissioning, a suitable vegetation cover will be re-established to enable natural vegetation progression and minimal weed invasion; and • Final ground conditions will be rehabilitated to a state that is conducive to support further natural regeneration at project closure.		
Construction / Operation / Decommissioning	• A Water Management Plan, Erosion and Sediment Control Plan, and Waste Management Plan will be designed to avoid or minimize the potential impacts of Project	To ensure that the planned (and actual) impacts to MNES are accurately documented and offset	Environment Manager (Arrow)

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Mitigation	Commitment	Intended outcome	Responsible manager/s
- Documentation	• Corrective actions will be undertaken in accordance with the outcomes of incident investigations, audits, monitoring results or advice given by the relevant regulatory authority; • Arrow will develop emergency response plans in consultation with emergency services organizations that include a list of required equipment, training and other resources, and foreseeable emergency and crisis situations. The plans will include safe evacuation procedures, communication protocols (internal and to emergency services, including the Petroleum and Gas Inspectorate), accounting for personnel and visitors, roles and responsibilities, and requirements for training developed and implemented to add value rather than just compensating for impact'	To ensure that the planned (and actual) impacts to MNES are accurately documented and offset	Environment Manager (Arrow)
Construction / Operation / Decommissioning	• Appropriate international, Australian and industry standards and codes of practice will be applied for the handling and storage of hazardous materials, such as chemicals, fuels and lubricants	To avoid degradation of TECs	SGP Managers (Arrow and Third-Party Contractor)
Hazardous materials management	• Appropriate spill response equipment including containment and recovery equipment will be available onsite; Staff will be trained on appropriate handling, storage and containment practices for chemical, fuels and other potential chemicals as relevant.	To avoid reduction in the condition of listed threatened species habitat	SGP Managers (Arrow and Third-Party Contractor)

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Attachment 4 – Land Manager's Monitoring Guide – Ground Cover Indicator

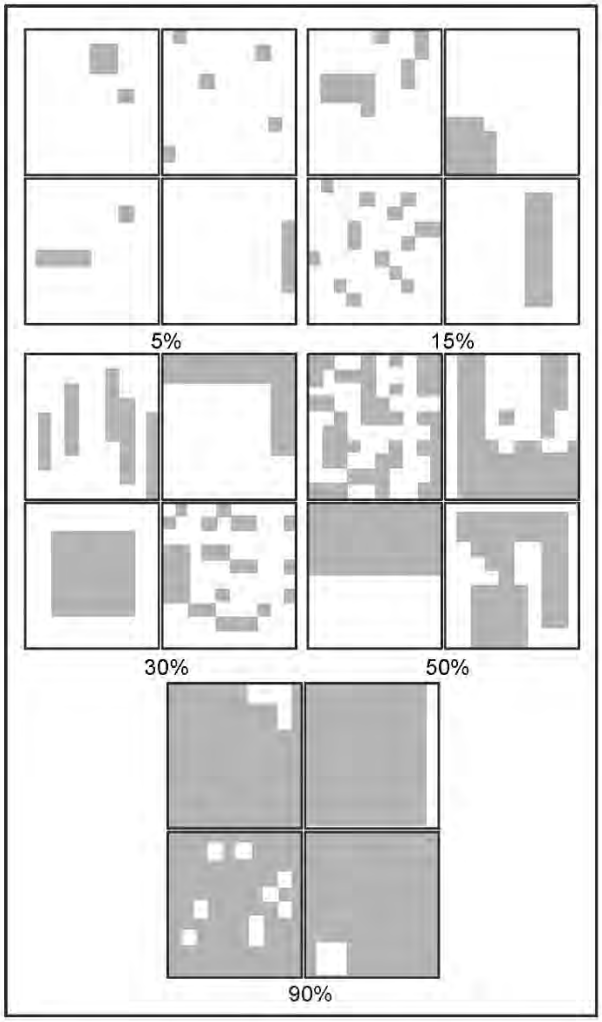


Figure 2: Examples of ground cover patterns as they appear in a quadrat for 5%, 15%, 30%, 50% and 90% cover (Department of Natural Resources 1997)

Land Manager's Monitoring guide – Ground cover indicator

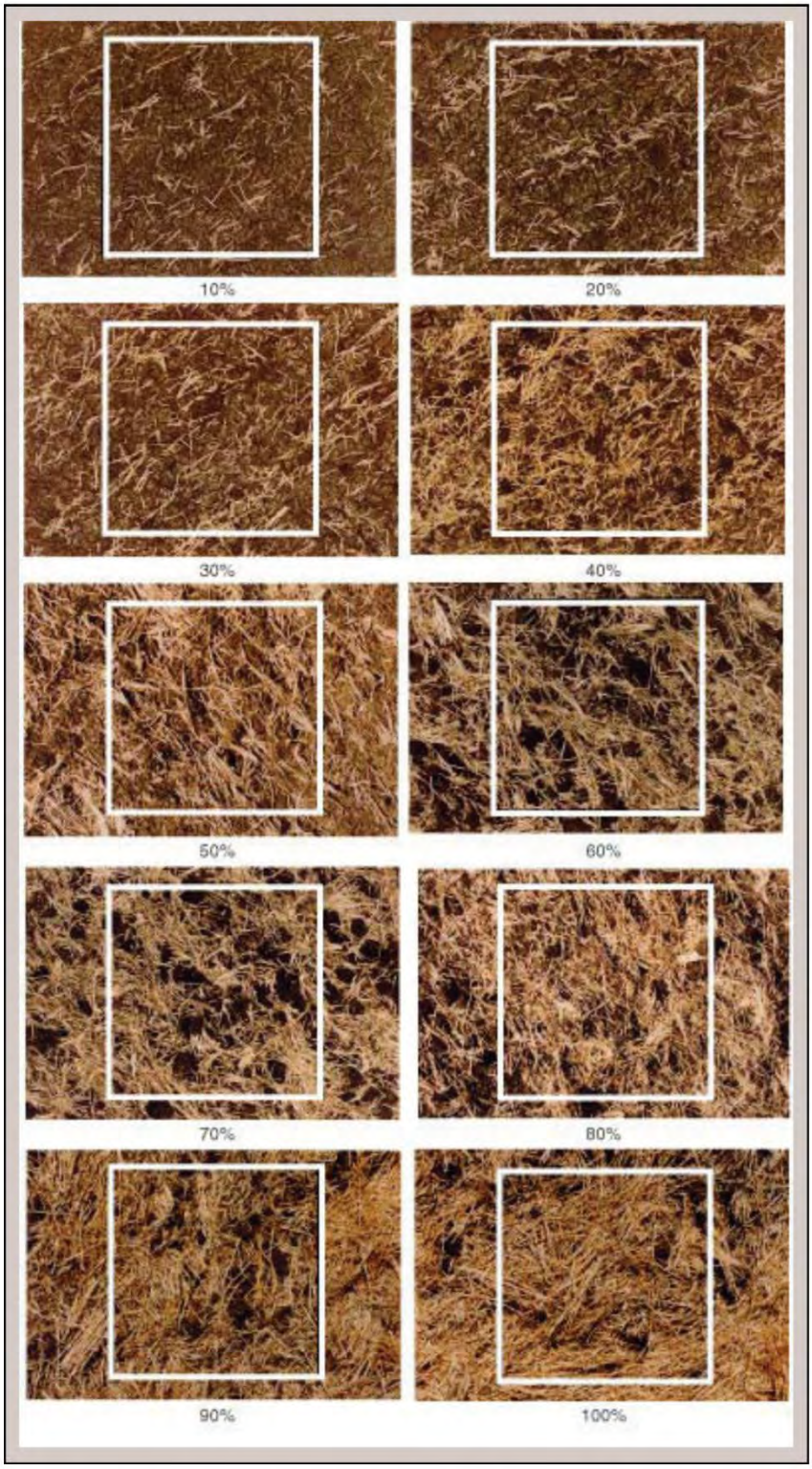


Figure 3: Photographs of wheat stubble cover levels in 10% increments (Molloy 1988)

Attachment 5 – Toondoon Habitat Quality Assessment (Queensland) and Modified Habitat Quality Assessment (Federal)

ecosmart ECOLOGY

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Technical Note/Memo

To: Paul Finn, Arrow Energy

From: Mark Sanders, EcoSmart Ecology

Date: 01 May 2026

Re: 'Toondoon' Habitat Quality Assessment (Queensland) and Modified Habitat Quality Assessment (Federal)

BACKGROUND

EcoSmart Ecology (ESE) has been engaged by Arrow Energy (Arrow) to calculate Habitat Quality Scores (HQS) for Queensland and Federal Government approvals for Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES) (collectively referred to as 'matters') that may occur on the proposed offset property 'Toondoon'. The offset is required to support the Arrow Surat Gas Project (SGP). EcoSmart has been asked to (i) assess the likelihood of MNES and MSES matters occurring within the offset property, and (ii) calculateHQS for those matters known or having the potential to occur.

This memo has been prepared to accompany the HQS data package. It is not intended to provide detailed documentation of methods and results, but rather to offer an interpretive overview that highlights key considerations and limitations which Arrow should be aware of when using and documenting the HQS results.

METHODS

Likelihood assessment

A list of MNES and MSES matters which potentially require offset was provided by Arrow. Each matter was assessed for its likely occurrence within Toondoon via a desktop assessment including a search of record databases (Atlas of Living Australia, WildNet), interrogation of expert-modelled species distributions, and comparing each matter's ecological requirements to vegetation and conditions recorded within the property. The likely occurrence assessment did not include site-based inspection by EcoSmart Ecology and refinement might be needed

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Page 1

by Arrow to account for site-specific habitat features. Subsequent HQS calculations were only undertaken for matters considered possible, likely or known to occur.

Mapping and Habitat suitability

Ground-truthed Regional Ecosystem (RE) mapping for the property was provided by Arrow, with Assessment Units (AUs) defined and delineated by Arrow. Regional Ecosystems and AUs present at Toondoon were assigned as suitable habitat for each matter using rules previously developed for the Surat Gas Project (SGP; EcoSmart Ecology 2023).

For the Queensland HQS, regrowth communities were assigned suitability consistent with their equivalent remnant REs, recognising that while they may not currently provide suitable habitat, they have the potential to develop such habitat over time. Federal scoring was presented separately for restoration habitat (currently unsuitable), potentially suitable habitat, and the combined dataset (reported across two tabs with a consolidated summary table).

For matters or REs not considered in EcoSmart Ecology (2023), suitability was evaluated by comparing each matter's known ecological requirements against the RE description (Queensland Herbarium 2024) and comparison with the supplied site-specific data and/or photos. The assessment of habitat suitability did not include site-based inspection by EcoSmart Ecology and refinement might be needed by Arrow to account for site-specific habitat features.

Habitat quality scoring (HQS)

Queensland Habitat quality scoring

For each RE assessed as suitable for a given matter, habitat quality scores (HQS) were calculated using methods similar to those prescribed within the *Guide to determining terrestrial habitat quality v1.3* (DES 2020). Scores are calculated by summing scores for Site Condition, Site Context and Species Habitat Index. This assessment applies the 3/3/4 scoring framework (total score out of 10) as detailed in (EcoSmart Ecology 2024), rather than the 4/1/5 method prescribed by DES (2020). Using this scoring framework ensures scoring between the impact area (SGP) and potential offset properties are directly comparable.

The 3/3/4 scoring system must be used in future assessments to demonstrate habitat improvement.

Federal Habitat Quality Scoring

Under the federal offset quality scoring framework - the Modified Habitat Quality Assessment (MHQA) - HQS are derived from the same underlying field data and benchmark comparisons used in the Queensland methodology, but are calculated within a modified structure aligned to the EPBC Environmental Offsets Policy. While both approaches assess Site Condition and Site Context, the federal approach introduces an additional Species Stocking Rate (SSR) component for threatened species, capturing presence, usage, density and population importance. Component weightings also differ from the Queensland 4/1/5 framework (or project-specific variants), with the MHQA typically applying a 3/3/4 weighting for Site

Condition, Site Context and SSR respectively (for fauna). These modifications enable alignment with Commonwealth offset requirements and allow direct application within the EPBC Offset Assessment Guide.

The MHQA is required for the Brigalow Threatened Ecological Community (TEC), Dunmall's Snake, and the South-eastern Long-eared Bat (if present on the offset). Under Arrow's EPBC approval conditions, offsets are not required for other MNES which may occur within the offset areas, as these were listed after the approval was granted.

BioCondition and Site Context data

BioCondition field data were collected at 44 sites across Toondoon by Arrow Energy in accordance with DES (2020) and EcoSmart Ecology (2024). Site Context scores were also calculated and supplied by Arrow Energy.

Although more recent benchmark data are available, BioCondition scores were derived using RE Benchmark data v3.1 (circa 2020) to maintain comparability with the SGP impact assessments undertaken at that time. If future HQS surveys aim to demonstrate ecological uplift (i.e., improvement in the HQS), this same Benchmark must be used for consistency.

Benchmark data for RE 11.9.5a and 11.11.3c are not available in v3.1. Accordingly, 11.11.3c was assessed using the parent RE (11.11.3), while benchmark data for 11.9.5a were sourced from v3.6.

Habitat Attribute Scores

For Queensland, fauna habitat attributes were assessed in the field by Arrow Energy during BioCondition surveys and scored in accordance with the criteria defined in (EcoSmart Ecology 2024). All MNES and MSES taxa with the potential to occur at Toondoon have been considered in EcoSmart Ecology (2024); therefore, no additional habitat attribute scoring criteria was required for the present assessment.

For the MHQA, fauna attributes (e.g. mobility, foraging resources and shelter availability) were not directly assessed in the field by ESE. Instead, these attributes were inferred from Arrow ecologists' field data, RE descriptions, supported by photographic records from BioCondition sites and, where available, supplemented by data collected under the Queensland assessment framework.

Absence of threats

For the Queensland assessment, absence of threats was evaluated for the matter using the structured, criteria-based approach outlined in DES (2020) whereby threat levels are inferred from defined scoring thresholds (scope and severity). In contrast, the federal assessment adopted the MHQA framework which applies a more holistic, species-specific assessment of threats. It relies on expert judgement to consider the overall influence of multiple threatening processes on population viability, rather than using defined criteria (e.g. extent and severity) or defaulting to the most limiting threat.

For both, threats were assessed using desktop information, photographic material for each BioCondition site and liaison with Arrow ecologists who completed the site assessments. Field inspections for evidence of threats such as predator signs, grazing pressure and weed infestations have not been completed by EcoSmart Ecology staff.

Species Stocking Rates (Federal)

The SSR component was not informed by targeted field surveys. In accordance with MHQA guidance, SSR was instead derived from available desktop information, including species records, habitat context and indirect evidence from BioCondition data (were possible). In the absence of survey data, conservative assumptions were applied and SSR scores were assigned with a precautionary bias to avoid overestimating species presence, usage or density. Resulting scores should be considered indicative only and reflect a reduced level of confidence.

RESULTS

Likelihood assessment

Thirteen MNES/MSES were considered possible, likely or known to occur within Toondoon. The complete likelihood assessment is presented in Table 1.

Table 1. Likelihood assessment of MNES and MSES within Toondoon

Species	Status		Likelihood	Justification
	EPBC	NCA		
FLORA				
THREATENED ECOLOGICAL COMMUNITIES (TECs)				
Brigalow TEC	End	-	Known	Regrowth 11.9.5a on property
FAUNA				
INVERTEBRATES				
Brigalow Woodland Snail *Adclarkia cameroni*	End	Vul	Will not occur	Outside of species' modelled distribution.
Dulacca Woodland Snail *Adclarkia dulacca*	End	End	Will not occur	Outside of species' modelled distribution.
Pale Imperial Hairstreak *Jalmenus eubulus*	-	Vul	Possible (future)	Species is a Brigalow specialist, requiring the presence of old-growth *Acacia harpophylla* for its life cycle. No old-growth Brigalow present within offset property, but future potential due to regrowth.
REPTILES				
Five-clawed Worm-skink *Anomalopus mackayi*	Vul	Vul	Will not occur	Outside of species' modelled distribution.
Condamine Earless Dragon *Tympanocryptis condaminensis*	End	End	Will not occur	Outside of species' modelled distribution.
Common Death Adder *Acanthophis antarcticus*	-	Vul	Possible	There are no contemporary records of Death Adders in proximity to the site, although older records indicate the species has historically occurred throughout the local area. The species is often associated with large, contiguous tracts of remnant vegetation, and the offset property adjoins Allies Creek SF, suggesting it may occur.

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Species	Status		Likelihood	Justification
	EPBC	NCA		
Dunmall's Snake *Glyphodon dunmalli*	Vul	Vul	Possible	There are no contemporary records of Dunmall's Snake in proximity to the site, although older records indicate the species has historically occurred throughout the local area. An enigmatic species that can occur in a wide range of moderate to large tracts of remnant vegetation, its presence remains possible given that the offset property adjoins Allies Creek SF.
Ornamental Snake *Denisonia maculata*	Vul	Vul	Will not occur	Outside of species' modelled distribution.
Grey Snake *Hemiaspis damelii*	End	End	Possible	Recorded ~5km south (1985) and ~62km south-east (1992), but no records to the north for several hundred kilometres, suggesting a possible disjunct distribution. However, the offset property lies within the species' modelled range. Habitats on landzone 3 (e.g. RE 11.3.4 and 11.3.25), while not optimal, are considered suitable for the species. Accordingly, the likelihood of the species occurring on the property is considered very low and additional survey effort may be required to confirm if this species is present.
BIRDS				
Southern Whiteface *Aphelocephala leucopsis*	Vul	Vul	Unlikely	Outside of expert-modelled species distribution and no nearby contemporary records.
Australian Painted Snipe *Rostratula australis*	End	End	Unlikely	No suitable habitat
Latham's Snipe *Gallinago hardwickii*	Vul	Vul	Unlikely	No suitable habitat
Glossy Black-cockatoo *Calyptorhynchus lathami lathami*	Vul	Vul	Possible	At least seven local records (<50 km) have been documented within the past 50 years, including several from Barakula and Allies SF, which is connected to the offset property by contiguous remnant vegetation. RE 11.7.4 and 11.11.3 may provide foraging resources, although this is location specific. Available data for the offset property indicate *Allocasuarina* is not common, suggesting the species is unlikely to occur, though its presence cannot be ruled out. Additional survey effort may be required to confirm whether the species is present.
Red Goshawk *Erythrotriorchis radiatus*	End	End	Unlikely	No local records for >25 years. The species' distribution is considered to have drastically contracted northward in recent decades and is likely locally extinct. Any occurrence of this species within the offset property should at best be considered transient.
Squatter Pigeon *Geophaps scripta scripta*	Vul	Vul	Possible	Scattered recent (1999+) surround the property and habitats are suitable. Could possibly occur, likely as transient individuals, though establishment of a permanent or breeding population is less certain.
Painted Honeyeater *Grantiella picta*	Vul	Vul	Unlikely	Species is a mistletoe specialist, dependent on mistletoe for all aspects of its life cycle. Limited mistletoe observed across offset property during surveys.

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Species	Status		Likelihood	Justification
	EPBC	NCA		
Diamond Firetail *Stagonopleura guttata*	Vul	Vul	Possible	Infrequently recorded in the local area since 1975, with two records from Barakula SF, though both >50 km from the offset. Suitable habitat occurs within the property. The species has a low likelihood of occurring on site, and the property lies within the potential recovery range of the species. If present, individuals are likely transient and establishment of a breeding or regularly occurring population is doubtful.
MAMMALS				
Short-beaked Echidna *Tachyglossus aculeatus*	-	SLC	Likely	A widespread species capable of occurring in a broad range of habitats, including all RE's present on the property.
Spotted-tailed Quoll *Dasyurus maculatus maculatus*	End	End	Unlikely	Offset property is at the northern extent of the species' range and is not captured by expert-modelled distributions. Limited local records, the nearest ~25km to the NE in 1990.
Corben's Long-eared Bat *Nyctophilus corbeni*	Vul	Vul	Possible	Two records ~58 km to the south within the connected Barrakula SF; property within species modelled distribution. Some suitable habitats with dense understory present on the property. A species often associated with larger contiguous patches of vegetation.
Greater Glider *Petauroides volans*	End	End	Possible	At least nine records since 1975 within 50 km of the property, including within connected vegetation; within species modelled distribution. Suitable habitat present on property.
Yellow-bellied Glider *Petaurus australis australis*	Vul	Vul	Possible	Scattered local records including one (2002) ~25 km to the south; within species modelled range. Broadly suitable habitat present but possibly limited by large hollow abundance. Surveys may be required to confirm presence.
Koala *Phascolarctos cinereus*	End	End	Known	Highly mobile species, even in disturbed habitat. Broad coverage of remnant and regrowth eucalypt REs providing suitable forage and shelter within the offset property. Scats located by Arrow field staff and historical observations by landholders.

This assessment indicates Toondoon could be considered to have suitable or possible offset potential for Common Death Adder, Dunmall's Snake, Grey Snake (low potential), Glossy Black Cockatoo (low potential), Squatter Pigeon, Diamond Firetail (low potential), Short-beaked Echidna, Corben's Long-eared Bat, Greater Glider, Yellow-bellied Glider (low potential) and Koala.

Habitat Suitability

Habitat suitability for Squatter Pigeon, which had not been previously assessed in EcoSmart Ecology (2023), was determined based on benchmark perennial native grass scores falling within the range of 20-75% cover. This is broadly consistent with recent work by Lloyd *et al.* (2025) which found Squatter Pigeons inhabited vegetation with ground cover ranging between 24% and 73%.

The following RE's have not been assessed in previous Arrow projects (that is, not included in EcoSmart Ecology 2023): 11.9.5a, 11.11.3 11.11.3c, 11.11.15 and 11.12.1. An assessment

of the suitability of these REs for the matters identified above as possibly occurring is provided in Table 2 below. Regrowth communities were assigned suitability consistent with their remnant equivalents, recognising their potential to provide future habitat despite possibly being unsuitable in their current condition.

Assessing habitat suitability for Dunmall's Snake is challenging due to the species being poorly recorded, its cryptic nature, and limited understanding of its ecology. It is broadly described as occurring in woodland habitats, meaning much of the vegetation at Toondoon could theoretically be considered suitable. However, a review of known records by Johnson *et al.* (2017) identified a limited number of Broad Vegetation Groups (BVGs) in which the species has been recorded. Of these, BVG 10a and 12a, represented by RE 11.7.4 and 11.7.6, occur within the offset area. While all REs were assessed in this study, only these two BVGs have a demonstrated association with the species. The presence of several confirmed REs nonetheless suggests the property represents a good offset candidate for Dunmall's Snake.

Table 2. Habitat suitability for previously unassessed REs

Scientific Name	Common Name	Regional Ecosystem				
		11.9.5a	11.11.3	11.11.3c	11.11.15	11.12.1
Jalmenus eubulus	Pale Imperial Hairstreak	X				
Acanthophis antarcticus	Common Death Adder	X	X	X	X	X
Glyphodon dunmalli	Dunmall's Snake	X	X	X	X	X
Hemiaspis daemeli	Grey Snake	X				
Calyptorhynchus lathami lathami	Glossy Black Cockatoo	X	X	X		
Geophaps scripta scripta	Squatter Pigeon	X	X	X	X	X
Stagonopleura guttata	Diamond Firetail	X	X	X	X	X
Tachyglossus aculeatus	Short-beaked Echidna	X	X	X	X	X
Nyctophilus corbeni	Corben's Long-eared Bat	X				
Petauroides volans (sensu lato)	Greater Glider		X	X	X	X
Petaurus australis australis	Yellow-bellied Glider		X	X	X	X
Phascolarctos cinereus	Koala		X	X	X	X

It should also be noted that Dunmall's Snake habitat mapping for the SGP does not include RE 11.3.25 or 11.3.4, although both have been included in the calculations for this assessment. Accordingly, the scoring presented here aims to maximise the theoretical extent of potentially suitable habitat rather than comparison with the SGP.

Queensland Absence of threat Assessment

Table 3 shows the outcome of the 'absence of threats' assessment under the Queensland HQS framework (v1.3). Fire scar mapping from 2006 to 2025 showed extensive fires have occurred across Toondoon over the past 20 years, with ~50% of the property subject to fire each decade. This allowed the scope for fire to be estimated as 3.

Historic aerial imagery for the property is limited. However, available imagery indicates some clearing occurred between 2016 and 2018, and EcoSmart Ecology has been advised broadscale land clearing has occurred within the last three years. Further clearing is therefore a distinct likelihood, and the scope for additional clearing is assessed as 3.

Table 3. 'Absence of threats' assessment contributing to habitat quality score (HQS) for MNES and MSES considered Possible, Likely or Known to occur within Toondoon. The lowest score (i.e. most threatening) for each matter is used for the 'absence of threats' score across the entire offset property. See DES 2020 for a detailed explanation of 'Scope' and 'Severity' scoring.

MNES/MSES	Threat	Scope	Severity	Score
Pale Imperial Hairstreak	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	4	12
	Habitat degradation of habitat and disruption to ant associations from hoofed livestock	2	2	4
Common Death Adder	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat degradation from hoofed livestock	2	3	6
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Habitat degradation from invasive weeds	3	4	12
	Predation by feral carnivores	1	4	4
	Death from cane toad ingestion	2	3	6
Dunmall's Snake	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat degradation from hoofed livestock	2	3	6
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Habitat degradation from invasive weeds	3	4	12
	Predation by feral carnivores	1	4	4
Grey Snake	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat degradation from hoofed livestock	2	3	6
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Habitat degradation from invasive weeds	3	4	12
	Predation by feral carnivores	1	4	4
Glossy Black Cockatoo	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Nest hollow competition	1	5	5
	Firewood collection	4	4	16
	Nest predation	1	5	5
Diamond Firetail	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat degradation from hoofed livestock	2	3	6
	Habitat degradation from invasive weeds	3	3	9
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Predation by feral carnivores	1	4	4
Squatter Pigeon	Habitat loss from land clearing and fragmentation	3	2	6
	Habitat degradation from hoofed livestock	2	4	8
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Predation by feral carnivores	1	4	4
Short-beaked Echidna	Habitat loss from land clearing and fragmentation	3	2	6
	Vehicle strike/road mortality	5	5	25
	Predation by feral carnivores	1	4	4
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	4	12
South-eastern Long-eared Bat	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat degradation from hoofed livestock	2	4	8
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9

MNES/MSES	Threat	Scope	Severity	Score
Greater Glider	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Drought and extreme heat impacts exacerbated by climate change	1	4	4
	Barbed wire fence entanglement	5	5	25
Yellow-bellied Glider	Habitat loss from land clearing and fragmentation	3	1	3
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Barbed wire fence entanglement	5	5	25
Koala	Habitat loss from land clearing and fragmentation	3	1	3
	Vehicle strike/road mortality	5	5	25
	Predation by feral carnivores	1	4	4
	Habitat loss from inappropriate fire regimes exacerbated by climate change	3	3	9
	Drought and extreme heat impacts exacerbated by climate change	1	4	4

Queensland Habitat Quality Scores

The overall HQS for vegetation on Toondoon was 7.65, representing a site in average condition. Lowest BioCondition scores were recorded in AU13 (regrowth RE 11.9.5a) and highest scores for AU10 (remnant 11.7.4). See Table 4 for a summary of the HQS scores for each AU. The Queensland HQS for Brigalow (11.9.5a) is 2.96.

Habitat Quality Scores for individual MNES/MSES ranged from 3.43 (Grey Snake) to 7.79 (Short-beaked Echidna). A summary of HQS for each matter is presented in Table 4.

Federal Habitat Quality Scores (MHQA)

The Federal Habitat Quality Score (MHQA) for Brigalow TEC (regrowth 11.9.5a), combining BioCondition and context values (70/30%), was 3.2 out of ten.

Federal MHQA scores derived from combining area-weighted scores of all suitable habitat for relevant fauna MNES species is provided in Table 5.

A summary of the Modified Habitat Quality Scores for fauna species, separated into areas of current habitat and restoration habitat, are provided in Table 5. Federal area-weighted Modified Habitat Quality Assessment (MHQA) scores for each fauna MNES considered Possible, Likely or Known to occur within Toondoon.

Assessment Unit	RE	Condition	Dunmall's Snake	South-east Long-ear Bat
AU01	11.11.15	Adv Regrowth	0.09	
AU02	11.11.15	Regrowth	0.01	
AU03	11.11.3c	Regrowth	0.02	
AU04	11.11.3	Regrowth	0.00	
AU05	11.11.3	Remnant	0.01	
AU06	11.12.1	Regrowth	0.01	
AU07	11.3.25	Remnant	0.04	
AU08	11.3.4	Remnant	0.00	
AU09	11.5.20	Regrowth	0.04	
AU10	11.7.4	Remnant	2.98	6.31

AU11	11.7.6	Regrowth	0.37	
AU12	11.7.6	Remnant	2.13	
AU13	11.9.5a	Regrowth	0.04	0.08
Extent (ha)			6,615.26	3,136.62
TOTAL			5.74	6.39

Table 6. Scores for remnant habitats currently capable of supporting the species were 6.33 for Dunmall's Snake and 6.55 for the South-eastern Long-eared Bat. As expected, scores for restoration habitats, which are currently unsuitable but have future potential based on parental RE, were lower at 2.81 for Dunmall's Snake and 2.13 for the South-eastern Long-eared Bat. Restoration areas present the greatest opportunity for long-term habitat improvement and, if recolonisation occurs, are expected to deliver the largest gains in offset habitat value.

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Table 4. Queensland habitat quality scores for each vegetation assessment unit and area-weighted HQS for MNES/MSES considered Possible, Likely or Known to occur within Toondoon.

Assessment Unit	Regional Ecosystem	Vegetation Status	Extent (ha)	Average Vegetation HQS (/10)	Area-weighted Vegetation HQS	Area-weighted HQS (MNES/MSES)											
						Pale Imperial Hairstreak	Common Death Adder	Dunmall's Snake	Grey Snake	Glossy Black Cockatoo	Squatter Pigeon	Diamond Firetail	Short-beaked Echidna	Corben's Long-eared Bat	Greater Glider	Yellow-bellied Glider	Koala
AU01	11.11.15	Adv Regrowth	113.49	7.19	0.12		0.10	0.10			0.18	0.09	0.11		0.08	0.09	0.09
AU02	11.11.15	Regrowth	29.05	3.97	0.02		0.02	0.02			0.03	0.02	0.02		0.02	0.01	0.01
AU03	11.11.3c	Regrowth	40.12	5.41	0.03		0.03	0.04			0.04	0.03	0.04		0.02	0.02	0.02
AU04	11.11.3	Regrowth	9.26	6.06	0.01		0.01	0.01		0.01	0.01	0.01	0.01		0.01	0.01	0.01
AU05	11.11.3	Remnant	10.63	8.34	0.01		0.01	0.01		0.02	0.02	0.01	0.01		0.01	0.01	0.01
AU06	11.12.1	Regrowth	13.98	6.94	0.01		0.01	0.01			0.02	0.01	0.01		0.01	0.01	0.01
AU07	11.3.25	Remnant	49.34	6.92	0.05		0.05	0.05	1.88		0.09	0.04	0.05		0.04	0.04	0.03
AU08	11.3.4	Remnant	3.69	8.63	0.00		0.00	0.00	0.11		0.01	0.00	0.00		0.00	0.00	0.00
AU09	11.5.20	Regrowth	95.92	5.10	0.07		0.08	0.08			0.11	0.07	0.08		0.05	0.05	0.05
AU10	11.7.4	Remnant	3,021.81	8.78	4.01		3.76	3.61		6.59		2.92	3.84	6.67	3.28	3.67	3.78
AU11	11.7.6	Regrowth	845.91	5.01	0.64		0.78	0.74			1.43	0.60	0.78		0.54	0.62	0.64
AU12	11.7.6	Remnant	2,267.27	7.62	2.61		2.77	2.77			4.93	1.99	2.79		2.22	2.54	2.66
AU13	11.9.5a	Regrowth	114.81	2.96	0.05	3.81	0.05	0.04	1.44	0.11	0.11	0.06	0.05	0.08			
Total extent (ha)			6,615.26	NA	NA	114.81	6,615.26	6,615.26	167.84	3,156.50	3,593.46	6,615.26	6,615.26	3,136.62	6,500.45	6,500.45	6,500.45
Final area-weighted Score					7.65	3.81	7.69	7.48	3.43	6.74	6.98	5.83	7.79	6.76	6.27	7.06	7.32

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Table 5. Federal area-weighted Modified Habitat Quality Assessment (MHQA) scores for each fauna MNES considered Possible, Likely or Known to occur within Toondoon.

Assessment Unit	RE	Condition	Dunmall's Snake	South-east Long-ear Bat
AU01	11.11.15	Adv Regrowth	0.09	
AU02	11.11.15	Regrowth	0.01	
AU03	11.11.3c	Regrowth	0.02	
AU04	11.11.3	Regrowth	0.00	
AU05	11.11.3	Remnant	0.01	
AU06	11.12.1	Regrowth	0.01	
AU07	11.3.25	Remnant	0.04	
AU08	11.3.4	Remnant	0.00	
AU09	11.5.20	Regrowth	0.04	
AU10	11.7.4	Remnant	2.98	6.31
AU11	11.7.6	Regrowth	0.37	
AU12	11.7.6	Remnant	2.13	
AU13	11.9.5a	Regrowth	0.04	0.08
Extent (ha)			6,615.26	3,136.62
TOTAL			5.74	6.39

Table 6. Federal area-weighted Modified Habitat Quality Assessment (MHQA) scores for each MNES considered Possible, Likely or Known to occur within Toondoon.

Assessment Unit	RE	Condition	Dunmall's Snake		South-east Long-eared Bat	
			Suitable	Restoration	Suitable	Restoration
AU01	11.11.15	Adv Regrowth	0.11			
AU02	11.11.15	Regrowth		0.06		
AU03	11.11.3c	Regrowth		0.10		
AU04	11.11.3	Regrowth		0.02		
AU05	11.11.3	Remnant	0.01			
AU06	11.12.1	Regrowth	0.01			
AU07	11.3.25	Remnant	0.05			
AU08	11.3.4	Remnant	0.00			
AU09	11.5.20	Regrowth		0.23		
AU10	11.7.4	Remnant	3.59		6.55	
AU11	11.7.6	Regrowth		2.19		
AU12	11.7.6	Remnant	2.57			
AU13	11.9.5a	Regrowth		0.22		2.13
Extent (ha)			5,480.20	1,135.07	3,021.81	114.81
TOTAL			6.35	2.81	6.55	2.13

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Attachment 6 – Mark Sanders – Technical specialist - Fauna ecologist undertook field assessments

MARK SANDERS

Position: Director/Principal Ecologist, EcoSmart Ecology Pty Ltd
Qualifications: Bachelor of Advanced Science (Zoology) (First Class Honours)

Areas of Expertise

- Environmental planning and constraints analysis
- Vertebrate fauna survey and identification
- Rapid assessment of terrestrial habitats
- Design and implementation of research projects, particularly monitoring programs
- Threatened species survey and assessment
- Wildlife management
- Biodiversity planning and offset management
- Scientific communication

Overview

Mark Sanders is a highly respected and well known ecologist with over 20 years field expertise and first-hand knowledge of more than 1600 of Australia's terrestrial vertebrate species. His enthusiasm for natural history has led to surveys in every state and territory within the Australian continent from across a vast range of habitats.

Mark combines his ecological knowledge and experience with strong industry understanding and management skills. His project-related experience has included linear infrastructure (roadways, rail corridors, transmission lines etc), mining (inc metalliferous and coal), oil and gas, energy and transport projects, and small and large scale infrastructure (town development, master plan projects, airports etc). He has also prepared management plans for threatened species and offset areas, and provided detailed assessment for regulatory review. His broad industry experience enables him to evaluate ecological resources and make effective strategy recommendations based on scientific understanding and industry knowledge.

Marks recent work has included a large-scale airport development located on the Sunshine Coast of Queensland. The work involved rapid ecological assessment to identify potential ecological constraints, targeted long-term (12+ months) research on high conservation taxa, and baseline (inventory) surveys. Multidisciplinary understanding has been fundamental in developing environmentally sustainable solutions, which has included evaluation and identification of offset priorities and targets. Due to the sensitive location and nature of the works, Mark has been required to regularly liaise with government bodies, research institutions and community groups, often requiring the communication of complex ecological issues.

Mark has extensive experience in remote area work, four-wheel drive training and maintenance skills and has worked with traditional land owners. His photography skills are renown, and his highly sort after images have been used in a variety of publications.

Professional History

2009 - present Director/Principal Ecologist
EcoSmart Ecology Pty Ltd

2008 Principal Ecologist
Matrixplus Consulting Pty Ltd

2005 - 2008 Senior Ecologist
BAAM Pty Ltd

2001 – 2005 Senior Ecologist
Australasian Resource Consultants Pty Ltd, Brisbane Qld.

2000 Environmental Scientist
Blue Mountains Wilderness Trust, Sydney NSW.

Selected Project Experience

- Baseline (seasonal) inventory survey of terrestrial fauna at MMG Century, located near Lawn Hill National Park in north-west QLD, 2013-14,
- Fauna assessment and community fauna awareness project within the Mandingalby Yidinji IPA, Yarrabah, Cairns. Surveys involved teaching survey methods and sharing information with local Traditional Owners, 2013-14.
- Baseline (seasonal) inventory survey for terrestrial fauna on Curtis Island for Arrow Energy CSG, 2012/13. Works included the survey of mangrove communities, intertidal communities, headlands and coastal dune vegetation (e.g., littoral rainforest),
- Baseline terrestrial fauna survey at Pisolite Hills, north of Weipa, QLD, 2012-2013
- Baseline vertebrate assessment of the Red Mud Dam area, Boyne Island for QAL (2005). Works included coastal dune complex with littoral rainforest.
- Team leader for the (fauna) assessment of Arrow Energies Surat basin CSG tenements. Works included high-level assessment to establish areas of primary conservation value, and the development of a risk-based approach to infrastructure planning. 2010 to present
- Fauna survey for South Murrin Murrin mining operations, WA. 2012.
- Pest Management Action Plan – Feral Pig and Red Fox. Action Plan prepared for Redland Shire Council. June 2005.
- Team Leader for two successive flora and fauna surveys (2001 and 2003) for the North Curragh Coal Project, Central Queensland. The project included assessing and managing impacts on three Nationally Vulnerable species along a proposed transport corridor.
- A 6 day (5 night) survey in a remote area for Matrix Metals near Kajabbi in far north-west Queensland. The survey found several threatened species and added small range extensions for several common species.
- Project Manager and Team Leader for a comprehensive survey and assessment of environmental values of Tarong State Forest in south-eastern Queensland.
- Flora and fauna assessment of coastal vegetation in north-eastern NSW. The survey located eight threatened fauna species.
- Survey of flora and fauna species on a 400ha site near Mt Glorious, south-east Queensland. Habitats surveyed include rainforest, wet sclerophyll forest and dry sclerophyll forest.
- Team Leader for an intensive 10-day survey of an area north of Clermont, Central Queensland. Confirmed the presence of several Endangered Regional Ecosystems and Threatened species.
- An extensive 8 day baseline survey study for Selwyn Mines in the Selwyn Ranges. During the study, *Pseudantechinus mimulus* was discovered. This species has been seen on the mainland of Australia only five times since its description in 1906.

Targeted Surveys

- Ground Parrot Research (2012-2014 and 2017) at the Sunshine Coast Airport. Monthly works to establish habitat use and population size,
- Targeted Purple-necked Rock-wallaby research and monitoring; MMG Dugald River. Ongoing works,
- Targeted survey, including trapping and active searches, for the vulnerable Water Mouse (*Xeromys myoides*) around Port Curtis (Gladstone) including Curtis Island (2012). The works located a number of nesting holes and increased local knowledge/distribution of the species.
- Targeted survey and assessment of the distribution of the Brigalow Scalyfoot on Boyne Island (for Queensland Alumina) (2006).
- Targeted survey and management plan for the federally Vulnerable Black-breasted Button-quail, Boyne Island Gladstone (QAL, 2006). This work was commissioned following baseline surveys which rediscovered the species within littoral rainforest on coastal dunes. Prior to the discovery the species had only been known in the local area from records in the early 1900's.

- Team leader for the survey of threatened wallum frogs (particularly Wallum Sedgefrog) near Caloundra, south-east Queensland (2012 – ongoing). Work included sampling tadpoles and water parameters to evaluate breeding success across a variety of pools located in a variegated and disturbed landscape.
- Assistant to field ecologist on a study into the population, distribution and abundance of Plains Wanderers (*Pedionomus torquatus*) in grasslands of southern central NSW.
- Field Team Leader in the assessment of the presence and extent of Black-breasted Button-quails (*Turnix melanogaster*) in Tarong State Forest, south-east Queensland.
- Microchiropteran bat fauna of Clermont Coal Project north of Emerald. The survey was designed to determine the presence/absence and distribution of the Little Pied Bat (*Chalinolobus picatus*) and Greater Long-eared Bat (*Nyctophilus timoriensis*).
- Team Leader for an assessment of the presence/absence of the Threatened *Delma torquata* in south-east Queensland.

Research and Monitoring

- Carpentarian Pseudantechinus (*Pseudantechinus mimulus*) research to establish best survey methods and evaluate their distribution. Co-supervisory role with the University of Sunshine Coast.
- Team leader for the twelve month monitoring to determine area of occupancy and habitat preference of the vulnerable Ground Parrot, Sunshine Coast Airport, Marcoola.
- Research into the methods of habitat utilisation and differentiation between four sympatric species of low-foliage gleaning bird species (White-browed Scrubwren, Superb and Variegated Fairy Wren and the Southern Emu-wren).
- Leader of the team that developed a biannual monitoring program for Pacific Coal's Kestrel Project in central Queensland. The aims of the program are to determine the affect of cattle grazing and subsidence on biodiversity values of natural grasslands and riparian ecosystems. The program was specifically designed so that later publication of results would be possible.
- Design and implementation of biannual monitoring program to document the success of rehabilitation strategies at Peak Downs Coal Mine.
- Comprehensive 8 day fauna study for the Ernest Henry Copper/Gold Mine as part of their yearly monitoring program. Aims of the program are to statistically show the effect of rehabilitation techniques on facilitating recolonisation by fauna.
- Heavy metal accumulation in aquatic macro invertebrates at Ernest Henry Copper/Gold Mine.
- Development of a monitoring program of the Vulnerable Ornamental Snake (*Denisonia maculata*) including population estimates (micro-chips) and radio-tracking. In particular, the program was designed to determine the effect of a road through a known population and if specifically designed underpasses facilitated movement and flow within the population. The program was accepted by the Department of Environment and Heritage.
- Research into shelter site characteristics of the Purple-necked Rock-wallaby (*Petrogale purpureicollis*) during summer.

Selected Technical Papers

McNab, A., and **Sanders, M.G.** (2014). Consumption of exotic grass seeds (Poaceae: Cynodon dactylon by the Eastern Ground Parrot (*Pezoporus wallicus*). *The Queensland Naturalist* Vol 52, 82-84.

McNab, A., **Sanders, M.G.**, and Vanderduys, E. (2014). New records of blind snakes resembling the Robust Blind Snake Anilios ligatus (Peters 1879), on Cape York Peninsula, *Memoirs of the Queensland Museum*. 59, 8.

McNab, A., and **Sanders, M.G.** (2014). An occasional carnivore, Diadem Leaf-nosed Bat (*Hipposideros diadema reginae*). *The Australasian Bat Society Newsletter*.

Lloyd, P., **Sanders, M. G.,** Reis, T. and Abbott, A. (2013). Targeted trapping surveys shed new light on the distribution and habitat requirements of the Carpentarian Pseudantechinus (*Pseudantechinus mimulus*), a threatened dasyurid marsupial. *Australian Mammology*. **35**: 220-223.

Sanders, M. G., Filewood, L. W. and Fox, B. J. (2005). Differential use of habitat aids local coexistence of three species of wrens (Maluridae) and the White-browed Scurbwren *Sericornis frontalis*: Pardalotidae in Myall Lakes National Park. *The Australian Zoologist.* **33**: 223-232

Sanders, M.G. (2004). Notes on a mass aggregation of *Illyria burkei* (Goding & Froggatt) (Hemiptera: Cicadidae) in central Queensland. *The Australian Entomologist.* 31 (2):79-80

Sanders, M.G., and Slater, L. (2004) New habitat and distributional data for the Vulnerable *Pseudantechinus mimulus*. *Memoirs of the Queensland Museum* **49**: 740.

Macey P. C., McKiernan, C. and **Sanders M. G**. (2002). Is there any science in the Environmental Protection and Biodiversity Conservation Act 1999? A review of the Migratory Species List. Presentation for the 4th Environmental Engineering Conference, May 2002, Brisbane.

A full CV can be provided upon request.

Attachment 7 – David Stanton – Technical specialist - Flora ecologist undertook field assessments

3D Environmental
vegetation analysis and mapping specialists

Curriculum Vitae- David James Stanton

Date of Birth: 10/ 04/ 1970

Business Address:
44 Henzell Terrace, Greenslopes, Qld, 4120.
Mob: 044 7822119
Email: davidstanton@3denvironmental.com.au

CURRENT POSITION

Principal Landscape Ecologist - 3D Environmental

ACADEMIC QUALIFICATIONS

BSc Hons: Geology / Biology/ Geomorphology (Hons Class 1-Geology) completed at James Cook University, 1993.

PROFESSIONAL CERTIFICATIONS

MEIANZ: Certified Environmental Practitioner – Ecology Specialist (Certification Number: 0906E)

PROFESSIONAL AWARDS

Planning Institute of Australia, Queensland Division (2005) '***Award of Excellence***' for the Caboolture Shire Councils Bushfire and Hazard Assessment Study. The award was given in the categories of Disaster Mitigation and Biodiversity Conservation and Planning in recognition of work completed in the Caboolture Shire Vegetation Mapping Project, 2004.

Planning Institute of Australia, National Division (2006) '***National Award of Excellence***' for the Caboolture Shire Councils Vegetation Mapping Project. National winner in the category of 'Biodiversity and Conservation Planning'

ACADEMIC AWARDS

Geological Society of Australia Gold Medallion (1993) for outstanding academic achievement in studies of earth science.

PROFESSIONAL SUMMARY

David has a professional career that spans 24 years, which including 3 years' working as regional exploration geologist in the Louisade Archipelago of PNG. He has extensive experience in the disciplines of resource mapping (geology and geomorphology), floristic assessment, groundwater and dependent ecosystems, conservation planning and impact and ecological risk assessment. His expertise has been utilised across several industry sectors which include mining, infrastructure as well as a consultant to government and indigenous organisations throughout Queensland, the Northern Territory, north-Western Australia and Papua New Guinea. David has particular expertise in landscape scale ecology and ecological processes including the relationships between vegetation geology, geomorphology, hydrology and hydrogeology. David has published vegetation mapping for the Wet Tropics World Heritage area and the Torres Strait Island's on behalf of the Australian Government and has worked extensively on the management of terrestrial biodiversity in northern Australia, co-authoring a number of technical papers on issues relating to landscape ecology and fire management.

PROJECT SUMMARY

ENVIRONMENTAL IMPACT ASSESSMENT FOR LINEAR INFRASTRUCTURE AND WATER

- Northern **Australia – Northern Territory**
  - **PNG to Queensland Gas Pipeline Project, Weipa to Gove Pipeline Lateral Biophysical Assessment:** Preparation of floristic mapping (1:25 000 scale), landform and geomorphic analysis and threatened flora assessment of the proposed Weipa (Qld) to Gove (NT) Lateral sections of the proposed pipeline. Included assessment of several pipeline landfall options in the Gove Peninsula / Nhulunbuy region of the Northern Territory. Enesar 2006.

3D Environmental

- **AGL Petronas Corporation –PNG to Queensland Gas Pipeline Project:** Provision of botanical and landform assessments along sections of the proposed pipeline easement. Large sections were completed using helicopter survey with foot survey at selected localities. The subsequent reports for these sections provided the information necessary for incorporation into a broader environmental impact assessment. Enesar, 2005, 2006. Sections investigated included:
  - Landfall on Cape York to the Jardine River
  - Charters Towers to Muttaburra.
  - Stonehenge to Windorah
  - South-west of Windorah to Cameron's Corner on the QLD/ SA / NT junction.
- **TRIP Weir Project, Flinders River:** Floristic surveys over the 200 km² TRIP Weir Project inundation area and associated pipelines. Flinders River in the Gulf Plains Bioregional Area. Studies included assessment of potential threatened flora, review of RE Mapping and general floristic survey for the purpose of Environmental Impact Assessment. Stanbroke Holdings Ltd, November 2014 to May 2015.
- **Copperstring EIS:** Comprehensive floristic mapping (regional ecosystems and threatened ecological communities) at 1:40 000 scale of a 150 km² section of the Copperstring Powerline in the Mt Isa, Cloncurry and Selwyn Ranges sections of the proposed 1km wide study easement. Survey also included a flora and mapping survey of the Charters Towers, Pentland, Hughendon and Cloncurry sections of the proposed powerline alignment.

- **Wet Tropics – North-east Queensland**
  - **Ella Bay Integrated Resort Development:** Floristic baseline assessment of the proposed Ella Bay Integrated Resort development site within the Wet Tropics World Heritage Area.
  - **False Cape Development:** A detailed aerial photographic interpretation and classification of vegetation communities and regional ecosystems, including rare and threatened species search on the False Cape development site to the east of Cairns. HLA Envirosciences Pty Ltd, 2004.
  - **Powerlink –Cardstone Powerline Easement Study:** In conjunction with Peter Stanton, carried out an ecological and botanical assessment of the Cardstone – Kareeya powerline easement to determine the environmental impact of a proposed powerline upgrade. The study included a detailed aerial photographic interpretation and map at 1:25 000 scale. This formed part of a broader impact assessment commissioned by Powerlink through C&B Consultants. 2003.
  - **Main Roads Southern Access Planning:** Alongside Peter Stanton, mapped in detail the vegetation communities within the proposed access corridor south of Cairns using 1:7500 scale aerial photographs. The project assessed the presence of rare and threatened plant species and vegetation communities. Sub-contracted to Sinclair Knight Merz, 1997, 1998.
  - **Chevron Asiatic Gas Pipeline Project:** An aerial photographic interpretation of the botany of the Northern Cape York region. The project assisted in the location of a route for a proposed gas pipeline. Sub contracted to NSR consulting group through Peter Stanton. NSR Consulting Pty Ltd, 1997.
- **Central Queensland**
  - **Queensland Nitrates Pipeline Project:** Floristic survey along the 18 km length of the proposed Queensland Nitrates Gas Pipeline near Moura, southern Bowen Basin. Survey focused specifically on assessment of EPBC Act significance of vegetation communities encountered along the pipeline route as well as intensive searches for Protected Plants (following Protected Plants Survey Guidelines) within the project impact area. Contracted to Queensland Nitrates Pty Ltd (September 2014).
  - **Connors River Dam and Pipelines Environmental Impact Assessment:** Provision 1:20 000 scale vegetation mapping, baseline floristic assessment and environmental impact assessment of the proposed Connors River Dam inundation area and proposed pipelines. Brigalow Belt North Bioregion. Contracted to Sunwater, 2009-2012.
- **South-east Queensland**
  - **Gateway Motorway Assets and Expansion Project:** Floristic mapping and assessment of habitats potentially impacted by the Gateway Expansion Project, Brisbane, over a 12 km stretch of road alignment (September 2014).
  - **Traveston Crossing Dam –Terrestrial Flora Survey:** Provision of baseline floristic assessment and supplementary 1:10 000 scale vegetation mapping for the purpose of assessment of environmental impact. Queensland Water, 2006-2009.
  - **Wyaralong Dam –Terrestrial Flora Survey:** Provision of baseline floristic assessment and supplementary 1:10 000 scale vegetation mapping for the purpose of assessment of environmental impact. Sub-contracted to BAAM Pty Ltd on behalf of Queensland Water, 2006-2009.
  - **Emu Swamp Dam and Pipelines – Terrestrial Flora Survey:** Terrestrial floristic assessment of the proposed inundation area and pipeline routes. Emu Swamp on the Severne River, Stanthorpe.

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ENVIRONMENTAL IMPACT ASSESSMENT AND CONSTRAINTS PLANNING FOR MINING

- Northern Australia / Northern Territory
  - **Ergon Energy – Mua Island Floristic Analysis:** Preparation of dossiers for 18 threatened flora species recorded on Mua Island (Torres Strait) to assist infrastructure planning and facilitate protected plant surveys. The report required comprehensive review of databases, compilation of ecological information and species photographs (contracted to Ergon Energy, 2016).
  - **MMG Century – Phantom Hills Prospect Floristic Baseline Survey**: Baseline floristic survey and vegetation mapping over the 150 km² Phantom Hills Prospect. North-west Highlands Bioregion (2014 Ongoing), 50 km east of the Queensland / Northern Territory border. Prepared for MMG Century.

- Brigalow Belt
  - **Arrow Surat Basin Advanced Exploration Project – Ecological Surveys**: Intensive floristic and vegetation mapping surveys over Arrow Energy's advanced project tenements in the region between Miles and Cecil Plains. Assessments were undertaken over a 2500 km² assessment area (contracted to Arrow Energy, 2016 – 2017).
  - **Arrow Bowen Basin Advanced Development Project – Ecological Surveys**: Intensive floristic and vegetation mapping surveys over Arrow Energy's advanced project tenements to the north of Moranbah. Detailed surveys were completed over a 450 km study area including the Roy's Hill and Lancewood gasfield development areas which are contiguous with the North Goonyella Mine ML boundary. Survey included comprehensive desktop assessments as well as the provision of both dry season and wet season survey reports. Contracted to Aecom Pty Ltd and GHD Pty Ltd on behalf of Arrow Energy (November 2014 to June 2015).
  - **Arrow Energy – Daandine Lease (PL230)**: An assessment of EPBC values as they relate to flora and threatened ecological communities for Arrow's Daandine Lease (PL230) in the Surat Basin. Sub-contracted to Ecosmart Ecology 2014.
  - **Arrow –Surat Gas Project Supplementary EIS Study**: Preparation of a supplementary terrestrial ecology study including bio-condition assessments at selected sites and habitat mapping for the 80 flora and fauna species listed under state and federal legislation. Habitat mapping was undertaken for the purpose of biodiversity offset planning. Prepared for Coffey Environments, June 2013.
  - **Supplementary EIS Assessment of Arrow Energy's LNG Facility Site, Curtis Island (SEQ)**: Review of EIS chapter and terrestrial ecology assessment of the proposed site facility to inform requests for supplementary information. Included assessment of terrestrial flora and fauna on mainland and island portions of the project. Prepared for Coffey Environments, June 2013.
  - **Acacia Coal / EPC1230**: Floristic baseline survey, preparation of 1:50 000 scale regional ecosystem and EIS assessment of the EPC 890 Resource Area to the south of Blackwater. Mapping was undertaken to accurately identify the distribution of regional ecosystems across the EPC to inform requirements for ecological offset (October 2013).
  - **Coffey Environments / Moultrie ESA Mapping:** Preparation of 1:50 000 scale regional ecosystem mapping over the Hillalong Resource Area, north-west of Nebo. Mapping was undertaken to accurately identify the distribution of Environmentally Sensitive Areas over the Mineral Development Lease (Coal) Revised mapping facilitated ecologically sensitive planning for a forthcoming exploratory drilling project (August 2013).
  - **Arrow Bowen Gas Project:** Floristic impact assessment including detailed baseline ecological assessment of the Arrow Energy's 7800 km2 petroleum lease and exploration tenements in the Northern Brigalow Belt, Queensland. The project involved revision of regional ecosystem mapping over a selected 1 000 km2 area at a scale of 1: 40 000 for the purposes of constraint analysis. Contracted to Arrow Energy, 2012.
  - **Surat Gas Project EIS - Arrow Energy:** Floristic impact assessment including detailed baseline ecological survey of the Arrow Energy's 8200 km2 petroleum lease and exploration tenements in the Southern Brigalow Belt, Queensland. The project involved revision of regional ecosystem mapping over a selected 1 800 km2 area at a scale of 1: 40 000 for the purposes of constraint analysis. Contracted to Coffey Environments, 2009 -2013.
  - **Byerwen Coal:** Floristic survey and mapping assessment of the Byerwen Coal exploration lease including project 1:50 000 scale revision of mapping over the 60km2 site. Byerwen Property in the Northern Brigalow Belt. Unidel 2010, 2012.

- **Curragh North Coal Development Project:** Provision of baseline floristic assessment, 1: 25 000 scale vegetation mapping and environmental impact assessment of the proposed Jellinbah development area (November, 2011).
- **MCG Resources:** Floristic survey and mapping assessment of the MCG Groups MLA's in the Blackwater area, the Brigalow Belt South Bioregion of central Queensland. The study area covered approximately 25 km2 as smaller sections of the larger MDL 152 (Curragh Extended and Curragh South). Contracted to Tecsol (2012).

- **Papua New Guinea**
  - **PNG Biomass Project:** Assessment of the 250km2 PNG Biomass (Markham Valley- Morobe Province) project for the purpose of forestry plantation. Assessment included detail floristic analysis, vegetation mapping and assessment of impacts against IFC Standards (BAAM P/L, Aligned Energy)
  - **Wafi-Golpu Gold-Copper Mine Project Terrestrial Flora and Fauna Assessment:** Floristic baseline assessment and environmental impact assessment for the Wafi-Golpu advanced exploration project. Contracted to BAAM Pty Ltd on behalf of Morobe Mining JV (February 2015 ongoing).
  - **Marengo PNG – Yandera Prospect Floristic Environmental Impact Assessment:** Ecological baseline study and Environmental Impact Assessment of habitats and species affected by development of the proposed Yandera Prospect, Bismarck Ranges, Marengo Province PNG. Included comprehensive analysis of ethnobotanical and faunal resources. Coffey Environments, 2012.
  - **Kantobo to Mubi River Road Project:** A survey of significant floristic values along an 11km section of proposed road alignment. The survey required assessment of floristic values associated with virgin lowland rainforest in the Southern Highlands/ Gulf Province, Papua New Guinea. Subcontracted to Coffey Environments, 2010.
  - **Solwara Project – East New Britain PNG:** Habitat assessment, floristic analysis and mapping of the 80km2 lease area on the East New Britain Coast-Papua New Guinea. Included comprehensive analysis of ethnobotanical and faunal resources. Contracted to Coffey Natural Systems, 2008.

- **Central Queensland Coast**
  - **McFarlane Oil Shale Project-Central Queensland:** Detailed baseline botanical assessment and environmental impact assessment of the 252km2 mineral lease area in the central Queensland Coast Bioregion. The project included 1:40 000 scale aerial photographic interpretation of regional ecosystems and vegetation communities. Contracted to URS Australia (2008 – 2009).
  - **Supplementary EIS Assessment of Arrow Energy's LNG Facility Site, Curtis Island (SEQ):** Review of EIS chapter and terrestrial ecology assessment of the proposed site facility to inform requests for supplementary information. Included assessment of terrestrial flora and fauna on mainland and island portions of the project. Prepared for Coffey Environments, June 2013.
  - **Stuart Oil Shale Floristic Impact Assessment:** Baseline floristic assessment, vegetation community/ regional ecosystem mapping and floristic impact assessment of the Stuart Oil Shale Project Area, Gladstone. Revision of RE mapping undertaken over a 120 km2 area at 1:25 000 scale. Queensland Energy Resources (QER), 2012.
  - **Red Mud Dams Vegetation Assessment:** Completion of an RE and vegetation community assessment of the Red Mud Dams area, Boyne Island. The map and complementary report was an aid to planning for future tailings disposal in the area. QAL (sub-contracted through BAAM Pty Ltd), 2005.

- **Desert Uplands**
  - **Eromanga Basin / Desert Uplands vegetation and floristic constraints analysis:** Provision of floristic and landform constraints analysis and mapping over a 5000km² ATP area to assist sensitive location of a proposed comprehensive seismic survey (500km of proposed survey line). Galilee Energy, 2010.

BIODIVERSITY OFFSET PLANNING AND ASSESSMENT

- **MMG Century – Lawn Hill Station Biodiversity Offsets Project:** Habitat biocondition and vegetation mapping assessment of a 6km stretch of river frontage on Lawn Hill Creek contiguous with Lawn Hill National Park on the Queensland / Northern Territory border. The assessment provided baseline information to assist preparation of a biodiversity offset plan for Lawn Hill Station (July 2014).
- **Exco Resources Biodiversity Offsets Project:** Habitat bio-condition, ecological equivalence assessment, vegetation mapping and general floristic survey of a 42 km² portion of Lawn Hill Station to identify suitable habit for Purple-necked Rock Wallaby.

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MINESITE REHABILITATION MONITORING AND ASSESSMENT

- **MMG Century Rehabilitation Monitoring Project:** Implementation of a baseline monitoring program to assess rehabilitation progress on stabilised waste rock dumps. Prepared to identify trends in vegetation development toward the meeting of mine closure criteria. North-West Highlands (March 2014 ongoing)
- **Arrow Energy - Review of Environmental Authority Conditions for Rehabilitation, ATP 676:** A review of EA conditions for ATP 676 to assess the achievability of current EA requirements for vegetation rehabilitation. The review report was utilised for internal Arrow Energy purposes. Prepared with assistance from Vegetation Management Science (March 2014).

CONSERVATION PLANNING

- North-eastern Australia
  - **Wet Tropics Management Authority Vegetation Mapping Project:** A 1: 25 000 scale aerial photographic interpretation and complementary 1:50 000 map of the structural characteristics, vegetation communities and geology of the Wet Tropics Bioregion, an area of over 30 000 km2. The project required the detailed classification of both remnant and non- remnant vegetation communities and the completion of 38 resource management reports for various regions within the project area. During this time, expert advice was provided to the authority in regard to management aspects of the World Heritage Reserve. The completed mapping product forms the basis for RE mapping and assessment within the Wet Tropics Bioregion (incorporated into Version 5.2 digital RE data produced by EPA). (1997 – 2012, work is ongoing to date of publication expected in August 2012)
  - **Upper Bridge Creek Conservation Area Timber Assessment Report:** Provided an assessment of timber resoures within the 160 km^2 Upper Bridge Creek Conservation Area to the north of Hopevale. Project facilitated negotiations between Traditional Owners and the Queensland Government to agree to terms of transfer to Conservation Reserve. Contracted to DATSIMA (Qld Govt, April 2015).
  - **Mandingalbay Yidinji Lands Biodiversity Planning and Management Project:** Development of biodiversity and land management profile for the Mandingalbay – Yidinji Lands, Wet Tropics World Heritage Area. Biodiversity profile has been applied to guide land management programs for the 'Working on Country' ranger program. Contracted to Djunbunji Ltd. June 2013 ongoing.
  - **Torres Strait Island Biodiversity Planning Project:** Development of biodiversity and land management profiles for 14 selected islands in the Torres Strait, Northern Australia. Biodiversity profiles are being applied to guide land management programs for the 'Working on Country' ranger program. Contracted to Torres Strait Regional Authority, Australian Government). November 2010 to December 2012.
  - **Torres Strait Islands Regional Ecosystem and Vegetation Community Mapping**: A 1:25 000 aerial photographic interpretation of the vegetation, structural associations and regional ecosystems of the islands of the Torres Strait. Spatial data produced during the vegetation survey has been successfully incorporated into the Version 6.0 RE digital database produced by DERM. The survey and mapping project assessed a total land area of 860 km^2 within the Cape York Peninsula Bioregion (Contracted to Torres Strait Regional Authority, Australian Government).
  - **Queensland Herbarium – Wet Tropics Bioregion Regional Ecosystems Classification:** Expert advice provided to the Queensland Herbarium concerning descriptions and classification of regional ecosystems in the Wet Tropics Bioregion. Advice was specific to the release of revised regional ecosystem mapping throughout the state relevant to the implementation of Queensland's "Vegetation Management Act". Queensland Herbarium, 2009.
  - **Queensland Herbarium Non Remnant Vegetation Classification:** An assessment of the remnant status of highly disturbed vegetation communities within the Wet Tropics Bioregional zone, relevant to the implementation of Queensland's "Vegetation Management Act" EPA, 2004- 2005.
  - **Wet Tropics Management Authority Timber Resource Assessment Project (2004):** A resource and timber assessment of freehold tenure within the World Heritage area to provide a means to adequately assess landowner compensation claims. Wet Tropics Management Authority, 2004.
  - **Dawnvale Station Vegetation Mapping Project:** A land management report and detailed aerial photographic interpretation of vegetation within the Dawnvale Grazing Leasehold. The study was commissioned to assist traditional owners in their application for leasehold renewal. Centre for Appropriate Technology, 2001.
  - **Mt Molloy Vegetation and Land Systems Mapping:** Report on the environs of the Mt Molloy Wetlands including a 1:25 000 aerial photographic interpretation of landform, geomorphology and vegetation. Mitchell River Catchment Management Group, 1999.

3D Environmental

- Brigalow Belt / Central Queensland
  - **Newlands Nature Refuge / Wollumbi Brigalow Conservation Reserve ecological assessment:** Detailed vegetation mapping and florisitic analysis of vegetation communities and regional ecosystems on the Newland Nature Refuge and Wollumbi Brigalow Conservation Reserve, Brigalow Belt North Bioregion (total area of 100km²). The study was commissioned for compliance with EPBC offset requirements. XStrata Coal / Footprints Ecology, 2009.

- South-east Queensland
  - **Seqwater Advanced Offsets Project:** Identification of suitable advanced habitat offsets within Seqwater's water infrastructure estate in south-east Queensland. Assessment included the identification habitats suitable for offset at Ewan Maddock, North Pine and Hinze Dam sites to the north and south of Brisbane (contracted to GHD, 2017).
  - **Caboolture Shire Council Vegetation Mapping Project:** Detailed 1:25 000 scale and 1:10 000 scale mapping of vegetation communities, land zones, and regional ecosystems of the Caboolture Shire Council (SEQ) using aerial photograph analysis. Total project area of 1200 km2. The project included detailed floristic sampling of all intact communities identified and the development of a classification scheme to allow assessment of highly disturbed vegetation types. Contracted to Rob Friend and Associates, 2004.
  - **Reedy Creek Conservation Area (Agnes Waters):** Detailed 1:10 000 scale aerial photographic interpretation and map of the vegetation communities in the Reedy Creek Conservation Area relevant to conservation and fire management with a proposed eco-development site (Bush Heritage Trust, 2005).

FIRE / ECOLOGICAL MONITORING PROJECTS

- **Mandingalbay Yidinji / Djunbunji Aboriginal Corporation Fire Monitoring Project**: Implementation of a fire monitoring program to assess the ecological impacts of both wildfire and traditional burning practice on MY Lands. Wet Tropics Bioregion, Yarrabah, Cairns (January 2014 ongoing).
- **East Trinity Monitoring / Wetlands Rehabilitation Project:** Completion of a detailed mapping and flora survey on reclaimed estuarine wetland, including mapping and categorisation of secondary vegetation communities. The study was based aerial photograph interpretation (1:10 000 scale aerial photography). Department of Environment and Resource Management (DERM), 2002 to 2009.
- **Wet Tropics Phytophthora Mapping / Monitoring Project:** Contracted to map rainforest die back resulting from Phytophthora outbreak within the wet tropics rainforest communities. The study was completed with detailed 1:25000 aerial photographic interpretation over 'at risk' areas. James Cook University/Rainforest CRC (1999 - 2001).

FIRE PLANNING PROJECTS

- **Mandingalbay Yidinji / Djunbunji Aboriginal Corporation Fire Management Planning:** Development of a fire management strategy for Mandingalbay Yidinji Lands within the Wet Tropics World Heritage Area. Prepared for the purpose of engaging traditional owners in the on ground management of traditional lands (October 2013 ongoing) and direct ecologically sensitive application of fire to the landscape.
- **Reedy Creek Conservation Reserve Fire Management:** Five-year review of the endorsed fire plan for the Reedy Creek Conservation Reserve, Agnes Water. Included recommendations to accommodate changes in the surrounding urban landscape whilst considering the results and lessons from the previous management period. Bush Heritage Trust 2014.
- **Torres Strait Island Fire Management Project:** Development of fire management plans for biodiversity conservation on Badu, Mua, Saibai, Boigu, Dauan, Mabuiag, Mer and Erub Islands in the Torres Strait. Work was completed in conjunction with Peter Stanton. Contracted to Torres Strait Regional Authority (2012 -2013).
- **Cape York Fire Project:** A fire scar and floristic structural mapping project to assess changes in vegetation communities that have resulted from shifting fire regimes over the past 30 years. Project utilised current and historical aerial photography for interpretation. Balkanu Cape York Land Development Agency (April to June 2003).

GROUNDWATER DEPENDENT ECOSYSTEMS / GAS MIGRATION ASSESSMENT AND MONITORING

- **GDE Site Characterisation – Arrow Surat Gas Project:** Implementation of GDE assessment execution plan involving characterisation of chosen GDE localities through drilling and bore construction (Sonic), isotope analysis of soil and xylem water and leaf water potential. Arrow Energy 2017 / 2018.

3D Environmental

- **GDE Study Execution Plan – Arrow Surat Gas Project:** Execution plan for detailed characterisation of GDE's throughout the Surat Gas Project Area including plans for groundwater assessment, ecological characterisation, leaf, soil and groundwater sampling.
- **Groundwater Dependent Ecosystem (GDE) Assessment – Arrow Energy Surat Gas Project:** Detailed description, characterisation and mapping of GDEs throughout the Surat Gas Project assessment area. Study was commissioned to assist development of the Water Monitoring and Management Plan (WWMP). Contracted to Arrow Energy 2016 and 2017.
- **Banksia Beach Borefield – Groundwater Dependent Ecosystem (GDE) Monitoring**: Monitoring of wet coastal heath to detect impacts of groundwater drawdown on vegetation composition, structure and ecology. Biannual reporting includes an analysis of NDVI datasets to support assessments of vegetation condition. Seqwater (2016 ongoing).
- **Condamine River Gas Seeps Vegetation Monitoring**: Assessment of the impacts of gas migration into soil on the health and vigour of intact riparian vegetation on the Condamine River frontage. Required assessment of the current condition and status of vegetation as well as implementation of a long-term vegetation monitoring program.
- **Groundwater Dependent Ecosystem (GDE) Assessment – Arrow Energy Surat Gas Project:** An assessment of the potential groundwater dependency of ecosystems in Arrow Energy's Surat Project tenements to inform federal requirements for a Groundwater and GDE Management Plan . The project required detailed assessment and integration of groundwater, geology and ecological databases,spring characterisation and recommendations for an ongoing monitoring program (Arrow Energy 2016 ongoing).
- **Groundwater Dependent Ecosystem (GDE) Assessment – Arrow Energy Bowen Gas Project Development Area:** An assessment of the potential groundwater dependency of ecosystems in Arrow Energy's Bowen Gas Project tenements to inform federal requirements for a Groundwater and GDE Management Plan . The assessment focused on the potential groundwater dependency of ecosystems in areas contiguous with the North Goonyella, Suraji, Newlands and Suttor Creek Mining Lease areas with the focus on developing an ecological assessment program to monitor the effects of groundwater drawdown on vegetation condition (Coffey Environments 2015).
- **Sunshine Coast Regional Airport – GDE Assessment**: Assessment of the effects of altered groundwater hydrology on the ecology of wet heath and associated populations of the Endangered *Allocasuarina emuina*. Preliminary review of environmental conditions for the Sunshine Coast Airport Upgrade. Sub-contracted to BMT – WBM (June 2010).

LANDFORM / SOIL AND GEOMORPHOLOGY PROJECTS AND ASSESSMENTS

- **Mornington Wildlife Sanctuary Landform, Geology and Vegetation Community Mapping Project:** A 1: 50 000 aerial photograph interpretation and descriptive landform, soils geological and floristic mapping assessment of the Mornington Wildlife Sanctuary, Kimberley Region, North Western Australia. The report and complementary map provided a baseline study into the factors influencing the area's ecology and diversity. Assisted with preparation of vegetation maps for the property as well as preparation of a floristic inventory. Total survey and mapping area of 3 200 km^2. Contracted to Australian Wildlife Conservancy (2004).
- **Mt Zero Wildlife Sanctuary Landform and Geological Mapping Project:** A 1:25 000 scale aerial photographic interpretation, map, and descriptive report on land systems soils and geology of the Mt Zero/Taravale Wildlife Sanctuary, North Queensland. Total survey and mapping project area of 650 km^2.
- **Agnes Water Geomorphic and Land Zone analysis:** Provision of a geomorphic and soil assessment of a 300ha site south of Agnes Water. The study formed the basis for appraisal of regional ecosystems in the study area. EPA certified regional ecosystem mapping was successfully challenged. Mariner Awaken/ Midell Joint Venture, September 2009.
- **Geomorphological assessments on major river crossings on the proposed PNG to Queensland gas pipeline for the purpose of assessing crossing stability.**

GENERAL ECOLOGY, REHABILITATION AND VEGETATION MANAGEMENT ASSESSMENTS FOR DEVELOPMENT

- **Property Map of Assessable Vegetation:** Preparation of and application for a PMAV over the 250km2 Burdekin Downs property in the Einasleigh Uplands. Includes detailed field site survey, historical aerial photographic interpretation, preparation of supporting material and submission to DNRM. Burdekin Downs Pastoral Ltd, Charters Towers, 2017.
- **Ecological Assessment Report – Seton College, Brisbane**: Assessment of development impacts on the ecology of remnant woodland mapped as having High Ecological Sensitivity. Response to an information request by Brisbane City Council.

- **Vegetation Management Plan – Rehabilitation Plan, Hymix Concrete Batching Site, North Pine River**: Vegetation and Rehabilitation Management Plan for the 250 Bald Hills Road, a 10 ha former industrial site adjacent to the North Pine River to be rehabilitated under court order. Duggan and Hede Pty Ltd for Hymix Australia.
- **Ecological Assessment Report – Yandina Waste Disposal Facility (Sunshine Coast Regional Council)**: Floristic survey and assessment of vegetation condition at proposed waste disposal facility, Yandina on the Sunshine Coast. Prepared for Sunshine Coast Regional Council on behalf of Duggan and Hede Pty Ltd (August 2014).
- **Ecological Assessment Report – Warwick Landfill:** Floristic survey and general ecological assessment of the proposed extension of the Warwick Landfill Site. Prepared for Duggan and Hede Pty Ltd (November 2013).
- **Wooyung Developments, NSW –** Ecological assessment of a proposed Eco-Tourism Facility at Wooyung Beach, Northern NSW. Assessment of a 100ha development site including mapping and assessment of Critically Endangered Littoral Rainforest communities, listed under the Federal and State (NSW) legislation.

WATERWAYS MANAGEMENT PROJECTS

- **Redlands Waterways Reach Management and Riparian Condition Assessment**: A reach and catchment characterisation including riparian habitat assessment, for waterways in the Redland Shire Council area (SEQ). The project involved aerial photograph classification of reach, and field assessment of riparian habitats (Hydrobiology, 2011).
- **Caboolture Waterways Management Project:** Provided a reach and catchment characterisation, including riparian habitat assessment, for waterways in the Caboolture Shire area (SEQ). The project involved aerial photograph classification of reach, and field assessment of riparian habitats (Natural Systems, 2006 - 2007).

EXPERT WITNESS

- Provision of expert advice to Rob Friend and Associates / Iwasaki Resorts in regard to charged breaches against the Vegetation Management Act. Evidence was presented for the defence in Queensland Planning and Environment Court Proceedings.
- Expert witness duties for the case of Queensland Government versus Strathmore Station in regard to charged breaches against the Vegetation Management Act. Contracted to Preston Law, Cairns. Trial is ongoing.

OTHER RELEVANT PROFESSIONAL EXPERIENCE

Feb. 1995 - August 1997

Regional Exploration Geologist – Louisade Archipelago P.N.G: The position required the development of remote epithermal gold prospects on Placer Dome's (now Barrick Gold Corporation) exploration tenements on Misima Island and regional areas. Major tasks included detailed geological mapping, remote sensing and reconnaissance drilling (diamond core). The supervision of exploratory drilling on advanced gold prospects, including resource delineation drilling in the mine vicinity, was also required on a regular basis.

Feb. 1994 - February 1995

Exploration Geologist - Osborne Gold Mine: The major task was to supervise the Osborne regional exploration program during the construction phase of the Osborne Cu-Au Mine (Mt Isa Inlier). Project requirements included the planning and implementation of exploratory drilling programs to test geophysical targets, supervision of RC and Diamond Core drilling rigs, logging of RC chips and diamond core. Project management tasks included the planning of a regional exploration program around a budget of $350K.

PEER REVIEWED PUBLICATIONS

Stanton J. P., Stanton D.J., Stott M. & Parsons M. (2014). Fire Exclusion and the Changing Landscape of Queensland's Wet Tropics Bioregion 1. The Extent and Pattern of Transition. Australian Forestry V77 No.1 51 – 57.

Stanton J. P., Parsons M., Stanton D.J.& Stott M. (2014). Fire Exclusion and the Changing Landscape of Queensland's Wet Tropics Bioregion 2. The Dynamics of Transition Forests and Implications for Management. Australian Forestry V77 No.1 58 – 68.

Fell D.G., Stanton D. J (2015). Vegetation and Flora of Mabuyag Island, Torres Strait, Queensland. Memoirs of the Queensland Museum, Volume 8, Part 1.

3D Environmental

Stephenson PJ, Burch AT, Stanton DJ & Whitehead PW (1998). *Three long lava flows in north Queensland. Journal of Geophysical Research-Space Physics*, 103, 27359 – 27370.

SPECIALIST TECHNICAL TRAINING

Australian Groundwater School: Four-day intensive training course dealing with technical and management aspects of groundwater in an Australian context. Flinders University, Canberra, 2017.

PUBLISHED VEGETATION MAPPING

Stanton J. P and Stanton D. J (2005) *'Vegetation of the Wet Tropical Bioregion of North Queensland'*, published at 1:50 000 scale in co-operation with the Wet Tropics Management Authority, Cairns, Queensland.

Stanton D.J, Fell D. F, Gooding D. O (2009). *'Vegetation of the Torres Strait and Kaurareg Islands'*, 1:25 000 scale vegetation mapping produced in co-operation with Torres Strait Regional Authority, Australian Government.

PRESENTATIONS

IAVCEI (International Association of Volcanology and Chemistry of the Earths Interior) conference, Canberra 1993, *"Using Remote Sensing to Detect Geochemical Heterogeneity within the Kinrara Lava Flow, McBride Lava Province, N.Q."*

EIANZ conference *'Achieving Real Biodiversity Outcomes during the EIS Process'*, April 2010. The presentation was titled *' The Importance of Accurate Regional Ecosystem and Vegetation Mapping in the Assessment of Impact to Biodiversity'*.

ADDITIONAL RELEVANT SKILLS, INTERESTS and CERTIFICATIONS

- Proficient in the Tok Pisin PNG language
- Professional experience as a Lifeguard for Queensland Surf Life Saving Association;
- Former Queensland representative swimmer and current record holder for the Magnetic Island to Townsville swimming race.
- Senior First Aid Certificate Current.
- Above Ground Coal Core and Coal Seam Gas inductions
- Advanced 4wd training certification current.

REFERENCES

Steven Goosem: Principal Scientist, Wet Tropics Management Authority. Ph: 07 4052 0563. Email: steve.goosem@wetma.qld.gov.au

Barton Napier: Principal - Coffey Environments. Trenerry Crescent, Melbourne. Ph: 03 9473 1450. Email: Barton.Napier@coffey.com

Dale Mundraby: CEO Mandingalbay Yidinji Aboriginal Corporation. Ph: 07 4056 8283. Email: dale@djunbunji.com.au

Attachment 8 – Daniel Kelly – Technical specialist – Arrow ecologist undertook field assessment (field lead)

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Daniel Kelly

Technical specialist – Arrow ecologist undertook field assessment (Field lead)

Daniel is an experienced Ecologist who completed an Honours research project in 2015 focused on Koala habitat use across different vegetation communities. He has developed a broad and well-rounded skillset through his involvement in several large-scale infrastructure projects across the east coast of Australia, ranging from Kosciuszko National Park to Townsville. Through both his academic and professional experience, Daniel has cultivated a strong interest in native flora and possesses extensive botanical knowledge across eastern Australia, including the Brigalow Belt.

Qualifications and licences

- Bachelor of Environmental Science (Hons) Ecology, University of Queensland, 2015.
- White Card – Work Safely in the Construction Industry, 2015.
- Introduction to Regional Ecosystems and BioConditioning, 2018.
- Biodiversity Offset Scheme Accredited Assessors Course, 2018.
- 4WD and Defensive Driving, 2018.
- Associate Member Environmental Institute of Australia and New Zealand, 2018 – 2026.
- Advanced Plant Identification Skills for Research and Environmental Assessment, 2019.
- Australian Oil and Gas E&P Industry Safety Inductions (ISI), 2024.
- Ecological Society of Australia, 2025 - current.

Relevant employment history

- EMM Consulting Pty Ltd: January 2018 – April 2024.
- Arrow Energy Pty Ltd: April 2024 – current.

Specialisations

- Environmental approvals and compliance.
- Protected plant surveys.
- Targeted threatened flora and fauna surveys.
- GIS and spatial analysis.
- Data management and analysis.
- Desktop and field-based biodiversity assessments.
- Technical reporting.

Relevant experience

Queensland

- Carmichael mine and rail project (September 2017 – December 2017). Field assessments: Regional ecosystem ground-truthing, contaminated land, breeding places, targeted threatened flora and fauna surveys. Central Queensland (Carmichael Rail Network Pty

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Ltd).

- Carmichael mine and rail project (July 2019). Field assessments: Pest, weed and contaminated land surveys, pre-clearance surveys. Central Queensland (Carmichael Rail Network Pty Ltd).
- Carmichael mine and rail project (July – October 2019). Technical reporting: Species Management Plans (MCU1, MCU2 & MCU3) (Carmichael Rail Network Pty Ltd).
- Karreman Quarries Expansion (October 2018). Field assessments: offset site BioCondition assessments. South-east Queensland (Karreman Quarries).
- ARTC G2K Inland Rail Geotechnical Support (March 2018 – August 2019). Field assessments and reporting: protected plants, pre-clearance surveys, Species Management Plan, and MNES reports. South-east Queensland (Australian Rail Track Corporation).
- Karreman Quarries Expansion (February 2020). Field assessments: hollow bearing tree survey. South-east Queensland (Karreman Quarries).
- Razorback Windfarm Development Approval (April/May 2020). Field assessments: ground-truthing Regional Ecosystem mapping. Mount Morgan Ranges (Epuron).
- Specimen Hill Windfarm Development Approval (April/May 2020). Field assessments: ground-truthing Regional Ecosystem mapping. Callide Range (Epuron).
- Crush Creek exploratory works (2020). Technical reporting support: EPBC self-assessment (Evolution Mining).
- ARTC Inland Rail G2K Ecological Assessments (September 2020 – May 2023). Field assessments: BioCondition and Regional ecosystem ground-truthing, frog surveys, reptile active searches, bird surveys, and habitat assessments. South-east Queensland (Australian Rail Track Corporation).
- Specimen Hill Wind Farm (January 2021). Technical reporting: MSES SRI assessments as a part of the Ecological Assessment Report (Epuron Pty Ltd).
- Townsville Energy Chemicals Hub (March 2021). Technical reporting: Terrestrial Ecology Technical Report (QPM).
- Inland Rail B2G Geotechnical Investigations (May - June 2021). Field assessment and reporting: protected plants. South-east Queensland (ARTC).
- G2H Inland Rail (May – June 2021). Field assessments: Collared Delma active searches and habitat mapping. South-east Queensland (ARTC).
- Bravis Great Artesian Basin Strategy Implementation (August – September 2021). Technical reporting: Bubbling Bore, Bow Park Bore, and Culbernie Station Bore desktop ecological reviews (Bravis).
- QPM Pipeline flora surveys (December 2021 and March 2022). Field assessments: Regional ecosystem ground-truthing, habitat assessments and trapping lines for Ornamental Snake. Central Queensland (Queensland Pacific Metals Ltd).
- Olive Downs Impact and Offset sites (February 2022 – March 2023). Field assessments: protected plant surveys, pre-clear spotlighting and offset site BioCondition assessments (Pembroke Resources).
- Inland Rail Geotechnical survey (July 2022). Technical reporting: EPBC referral (ARTC).
- Boulder Creek Offset Delivery (May – January 2024). Field assessments and reporting: *Cycas megacarpa* relocation plan surveys and management plan updates. Dee Ranges, Central Queensland (Zenviron Pty Ltd).
- Surat Gas Project (SGP) (April 2024 – current):

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- Field validation of vegetation mapping and threatened species habitat assessments.
- Baseline offset site assessments (planning and conducting BioCondition assessments, vegetation mapping and habitat assessments).

Offset site monitoring.

- Special Matters Expert (SME) for construction work package release.

New South Wales

- Mole River (February 2020). Field assessments: Koala dog survey support. New England Tableland (WaterNSW).
- NSW Offset Advice (February 2020). Field assessments: Grassland TEC field assessments. Liverpool Plains, NSW (Dorado).
- HMAS Creswell (March 2021). Reporting: Ecological Gap Analysis (Defence Australia).
- Inland Rail North Star to Border and Border to Gowrie (November 2022 – June 2023). Due diligence field assessments and reporting: verification of vegetation mapping, weed mapping and pre-clearance surveys and reports. Southern Brigalow Belt (Laing O'Rourke).

Pumped hydro and dam projects

- Snowy Hydro 2.0 (Jan 2018 – January 2020). Biodiversity baseline assessments: Targeted threatened flora surveys, BAM plots in addition to targeted threatened reptile (tile grid surveys), amphibian (Booroolong Frog), mammal (trapping for Smoky Mouse), diurnal bird and owl surveys (spotlighting and call playback). Kosciuszko National Park NSW (Snowy Hydro Limited).
- Snowy Hydro 2.0 (March 2019 – February 2020). Biodiversity Monitoring Program field assessments: Smoky Mouse trapping/chipping/habitat monitoring, Booroolong Frog monitoring in addition to weed, feral predator, and feral herbivore monitoring. Kosciuszko National Park NSW (Snowy Hydro Limited).
- Burrawang to Avon Tunnel (November 2019). Field assessments: Amphibian and Avifauna surveys. Lake Avon (WaterNSW).
- Burrawang to Avon Tunnel (February 2020). Field assessments: targeted threatened Flora surveys. Lake Avon (WaterNSW).
- OMPS (May 2022). Field assessments: threatened Flora surveys using the two-phase method. Carrai Plateau (Oven Mountain Pumped Hydro Storage).
- OMPS (June 2022). Field assessments: Camera trap deployment for threatened fauna species. Carrai Plateau (Oven Mountain Pumped Hydro Storage).
- OMPS (July 2022) Owl and Glossy Black-cockatoo surveys. Carrai Plateau (Oven Mountain Pumped Hydro Storage).
- OMPS (October 2022). Field assessments: Small Snake Orchid and Barrington Tops Ant Orchid surveys. Carrai Plateau (Oven Mountain Pumped Hydro Storage).
- Dungowan Dam Biodiversity Assessments (February 2023). Field assessments: Threatened Flora surveys. New England Tableland (WaterNSW).
- OMPS (November 2023). Field assessments: *Pultenaea rubescens* distribution and abundance surveys outside footprint. Carrai Plateau (Oven Mountain Pumped Hydro Storage).
- CHDR (November 2023 – February 2024). Field assessments: Targeted threatened flora surveys – wet sclerophyll and lowland rainforest. Northern Rivers (Clarrie Hall Dam Raising – Tweed Shire Council).

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Volunteering

- National Parks Association Queensland Council & Advocacy Committee (August 2016 – January 2018).
- National Parks Association internship (January – August 2016).
- University of Queensland School of Geography and Planning Volunteer Research Assistant - PhD fieldwork support (May and October 2015).
- Bulimba Creek Catchment Co-ordinating Committee (November 2015) Volunteer.
- The Wilderness Society (January – December 2017) Volunteer assisting/advising campaign managers with conservation research and GIS.

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Attachment 9 - Nazim Uddin – Technical specialist - Arrow ecologist undertook field assessment

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Md. Nazim Uddin

Technical specialist – Arrow ecologist undertook field assessment

Experienced Ecologist and Environmental Scientist with over 20 years of expertise in plant ecology, biodiversity conservation, and restoration ecology. Demonstrated expertise in ecological assessments, environmental approvals, and compliance within the oil and gas industry. Skilled in flora and fauna surveys including protected plant surveys & report writing for approval, spatial analysis (ArcGIS), and habitat quality assessment. Strong background in research, stakeholder engagement, and technical reporting to support regulatory and project outcomes.

Education

- Graduate Certificate in Data Science, The University of Newcastle (2022)
- PhD, Plant Ecology & Environmental Management, Victoria University (2014)
- MSc, Environmental Science, Saitama University, Japan (2009)
- MSc, Water Resources Development, BUET, Bangladesh (2005)
- BSc (Hons), Environmental Science, Khulna University (2002)

Core Competencies

- Ecological (biodiversity) assessment & reporting
- Protected flora surveys & reporting for approval
- Environmental approvals & compliance (QLD & VIC context)
- GIS and spatial analysis (ArcGIS)
- Habitat Quality Assessment
- Data analysis (R, Python, SPSS, Excel)
- Stakeholder engagement and collaboration
- Scientific research and publication
- PROFESSIONAL EXPERIENCE

Ecologist

Arrow Energy, Brisbane | Aug 2022 – Present

- Undertake desktop ecological assessments to identify ecological constraints and inform project planning.
- Conduct field surveys, including protected plant assessments, and prepare technical reports supporting environmental approvals.
- Monitor rehabilitation sites and assess compliance against completion criteria.
- Perform spatial analysis and mapping using ArcGIS, supporting ecological data management and GIS integration.
- Collaborate with cross-functional teams (HSE, GIS, approvals) to ensure regulatory compliance and project delivery.

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- Snake Handling and Relocation
- GIS Training
- First Aid & CPR
- Habitat Hectares Training for VQA
- White Card
- Agricultural Chemical User Permit (ACUP)
- Current driver's license

Training attended

More than 30 trainings on policy, instrument & techniques, software, academic writing & publications. Notable training:

- Weed Spotter Training Module
- Weed Spotter eLearning
- Biosecurity Online Training Course
- National EPP Response Management
- Nature Stewards| Outdoors Victoria Training Program (10 weeks)

Technical skills

- Ecological assessments, impact reporting, and environmental compliance
- Flora and fauna surveys, including protected plant assessments
- GIS and spatial analysis (ArcGIS)
- Habitat condition assessment and field sampling techniques
- Data analysis (R, Python, SPSS, Excel)
- Technical reporting and stakeholder engagement

Publications

- 25 peer-reviewed (ISI-indexed) publications
- 20 additional peer-reviewed publications with more than 20 conference publications
- ~944 citations | h-index: 19 | i10-index: 21

Md. Nazim Uddin - Google Scholar

Professional membership

- Ecological Society of Australia, Australia
- British Ecological Society, UK
- International Association for Ecology
- International Society of Root Research (ISRR), Dundee, UK
- Bangladesh Society of Environmental Scientists (BSES), Dhaka, Bangladesh

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Attachment 10 - Alan Key – Offsets Specialist and Broker - Plan preparation

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.

Attachment 11 - Paul Finn – Principal Ecologist - Plan preparation

CURRICULUM VITAE

Paul Gerard Finn
Brisbane, Queensland, Australia

ACADEMIC QUALIFICATIONS

Doctor of Philosophy (2009)
School of Environment & Centre for Innovative Conservation Strategies, Griffith University

Bachelor of Science with First Class Honours (1996)
Australian School of Environmental Studies, Griffith University

EMPLOYMENT HISTORY and WORK EXPERIENCE

Paul is a Certified Environmental Practitioner with over 20 years' experience in project management, regulatory approvals and compliance, community consultation, research, environmental monitoring, experimental and statistical design, data management, analysis and interpretation, ecological and biodiversity assessment, fauna and flora surveys, and GIS mapping.

Paul has a background in ornithological research, obtaining his PhD in 2009, and has authored a number of refereed and popular articles, and presented his research at local and international conferences, workshops and public lectures. Paul has collaborated on many research projects, taking responsibility for experimental design, field work, data analysis and publishing on a diverse range of projects incorporating population biology, community ecology and conservation of birds.

Paul's consulting experience includes targeted threatened species surveys, species management plans, ecological impact assessment, legislation and environmental authority interpretation and negotiation with government agencies. He is a skilled consultant and field ecologist, and is experienced in leading teams to undertake fauna and flora surveys. Paul has a particular interest in natural resource management, conservation, ecology, environmental offsets, and ornithology.

Currently Paul is working as a biodiversity technical advisor and ecology subject matter expert in the coal seam gas industry, managing ecological assessments and regulatory compliance, providing clarity on federal and state legislated species and vegetation community impact management and offsets, and delivering reports to support various approvals.

Principal Ecologist / Team Lead Ecology, Arrow Energy Pty Ltd (June 2013–present)
Employed by Arrow as a Principal Ecologist / Team Lead Ecology, I am accountable for the delivery of technical advice and maintaining ecology standards in order to service exploration and appraisal, well delivery and the production of domestic gas. This position involves the management of ecology resources (internal staff and external contractors) across Arrow's tenements within both the Surat and Bowen Basins to deliver regulatory compliance and best practice ecology standards and work practices. The responsibilities of this position include:

- Promoting Health, Safety and Environment (HSE) standards;
- Managing a team by planning, coordinating and scheduling work to be completed;
- Recruiting, mentoring, training and developing personnel, and associated performance management;
- Providing technical advice, appropriate ecological survey methods, work scopes and reporting to solve compliance issues;
- Liaising and engaging with leadership personnel, external clients, contractors, and government regulators; and,
- Developing lean initiatives to increase quality and productivity of the ecology function, and improve profitability of projects.

Senior Ecologist, Sinclair Knight Merz (May 2012–May 2013)
Employed by Sinclair Knight Merz (SKM) as a Senior Ecologist and Project Manager, I delivered projects for clients in both the private and government sectors, related to infrastructure, energy and resources, environment and urban growth. This role included leading teams of ecologists in the field and actively training and mentoring junior staff in the field and the office, to ensure professional outcomes and effective project delivery. Key skill areas include: project management, stakeholder engagement, research, environmental monitoring, experimental and statistical design, data management, analysis and interpretation, review of scientific papers and reports, ecological and biodiversity assessment, fauna and flora surveys, species management and interpreting government legislation.

Selected project experience:

- **New Acland Coal Mine Stage 3 Expansion (New Hope Group)** – Targeted Koala (*Phascolarctos cinereus*) surveys for EPBC Act advice/referral including habitat assessments and Spot Assessment Technique (SAT), groundtruthing of threatened flora (*Bothriochloa biloba*, *Digitaria porrecta*, *Homopholis belsonii*, and *Stemmacantha australis*).
- **Surat Pipeline Header (Arrow Energy Pty Ltd)** – Detailed ecological assessment including fauna trapping, nocturnal fauna surveys including harp trapping for bats, bird surveys, targeted threatened species searches and micro-habitat assessments.
- **Nathan Dam Ecological Assessment (SunWater)** – Targeted Koala (*Phascolarctos cinereus*) surveys for EPBC Act advice/referral including habitat assessments, line-transect searches and SAT, ground-verification of a threatened ecological community (Coolibah - Black Box Woodlands), and wetland assessments.
- **New Parallel Runway (Brisbane Airport Corporation)** – Project management, monitoring birdlife and associated habitat use, data analysis and interpretation, environmental management.
- **Pumicestone Road Interchange Upgrade (Department of Transport and Main Roads)** – Environmental assessment, ecological advice on detailed design, environmental management plan, and species management plan.
- **Roma Flood Levee (Maranoa Regional Council)** – Groundtruthing of EPBC Act MNES and NC Act listed species and breeding places, detailed assessment of a

threatened ecological community (Weeping Myall Woodlands), regional ecosystems and high value regrowth verification, and EPBC Act referral advice.
- **Sibelco Taragoola Limestone Project (Sibelco Australia Limited)** – Property vegetation management plan (PVMP), and negotiation with the Queensland Department of Environment and Heritage Protection (DEHP).

Technical Advisor, Holcim Australia Pty Ltd (July 2005–February 2013)
Employed by Holcim as an Intertidal Expert (Water Mouse (*Xeromys myoides*) and Shorebirds) on the Technical Advisory Panel (TAP) for a sand extraction operation at Donnybrook, Queensland. The formation and use of the TAP (consisting of three experts in their fields) was a requirement of the operation, triggered by the *Environment Protection and Biodiversity Conservation Act 1999* and imposed by the Department of the Environment. The main aim of the TAP was to ensure the maintenance of Ramsar wetland values and includes:
- Assisting with the design and implementation of intertidal wetland monitoring programs; and,
- Reviewing subsequent data collected by independent environmental consultants.

Senior Ecologist, RPS Group (February 2010–April 2012)
Employed by RPS Australia East Pty Ltd as a Senior Ecologist and Project Manager, I delivered projects for clients in both the private and government sectors, related to infrastructure, energy and resources, environment and urban growth. This role included leading teams of ecologists in the field and actively training and mentoring junior staff in the field and the office, to ensure professional outcomes and effective project delivery. Key skill areas include: project management, stakeholder engagement, research, environmental monitoring, experimental and statistical design, data management, analysis and interpretation, review of scientific papers and reports, ecological and biodiversity assessment, fauna and flora surveys, vegetation offsets, landscape rehabilitation, bushfire management, interpreting government legislation and GIS mapping.

Selected project experience:

- **Coal Seam Gas Exploration Gunnedah Basin (Santos)** – Detailed ecological assessment including fauna trapping, nocturnal surveys, habitat assessments and bird surveys, targeted threatened species searches, EPBC Act referral for a threatened ecological community (Box Gum Woodland).
- **Ecological Scouting in South-west QLD (Origin Energy)** – Undertaking pre-clearance ecological surveys for future coal seam gas infrastructure in cooperation with other team members including surveyors, cultural heritage monitors, geologists and Origin Energy staff.
- **New Parallel Runway (Brisbane Airport Corporation)** – Project management, monitoring birdlife and associated habitat use, data analysis and interpretation, environmental management.
- **GLNG Facility, Curtis Island, Gladstone (Bechtel)** – Significant species management plan including spotter-catcher procedures for the construction phase.
- **Queensland to South Australia / New South Wales Link Gas Pipeline (QSN Link) Looping Project (Epic Energy Queensland Pty Ltd)** – Targeted surveys for weeds of national significance and other declared pest plants.
- **QCLNG Pipeline, Curtis Island (Queensland Gas Company)** – Targeted Water Mouse (*Xeromys myoides*) surveys for EPBC Act clearance including habitat assessment, diurnal searches and nocturnal trapping.

- **Moranbah to Peak Downs and Goonyella Mines, Transmission and Water Lines (BMA – BHP-Mitsubishi Alliance Coal Operations Pty Ltd)** – Regional ecosystems verification, targeted threatened species searches, tertiary vegetation assessment, vegetation offset calculations and EPBC Act advice.
- **Pinkenba Review of Environmental Factors (Port of Brisbane Pty Ltd)** – Project management, ecological assessment, detailed fauna and flora surveys, regional ecosystems verification, vegetation mapping.
- **Sewage Pipeline (Redlands Water and Waste)** – Vegetation assessment and management plan, development approvals processing, consultation.
- **Bald Hills Quarry (Neilsen's Quality Gravels Pty Ltd)** – Ecological impact assessment, detailed fauna survey, vegetation survey and management plan, riparian condition assessments, rehabilitation planning, GIS mapping, consultation.
- **Redlands land developments (Harridan Pty Ltd and Sentinel Pty Ltd)** – Field surveys of Koala habitat including identification of food trees and SAT, desktop assessments of corridor connectivity and SPRP Koala habitat mapping, GIS mapping, reporting in regard to legislative requirements, environmental management plans, bushfire management plans.
- **Brisbane north shore development, Hamilton (Urban Land Development Authority)** – Project management, marine vegetation management plan, consultation.
- **Ipswich land developments 'Paradise Waters' (Stocklands Developments)** – Project management, environmental assessment, property map of assessable vegetation (PMAV), vegetation management plan, detailed tree survey, targeted searches for threatened species, GIS mapping.
- **Benaraby landfill expansion (Gladstone Regional Council)** – Species management plan, detailed fauna and flora surveys, GIS mapping.
- **The Village at Redcliffe (Hardev Property Development)** – Environmental offsets, habitat offset packaging, rehabilitation planning, GIS mapping.
- **Deception Bay land development 'Brolga Lakes' (Erneve Pty Ltd)** – Monitoring birdlife and associated habitat use, data analysis and interpretation, environmental management.
- **Willawong land development (Maximus Industrial Pty Ltd)** – Vegetation management plan, detailed tree survey, rehabilitation planning, GIS mapping, environmental approvals processing.
- **Murrarie land development (Incitec Pivot Limited)** – Due diligence environmental assessment, fauna and flora surveys, GIS mapping.

Conservation Officer / Program Coordinator, Seagrass-Watch, Moreton Bay Marine Park (October 2002–December 2009)
Employed by the Department of Environment and Resource Management's Queensland Parks and Wildlife Service, the Wildlife Preservation Society of Queensland and the Queensland Conservation Council to set up and coordinate 'Seagrass-Watch', a community-based habitat monitoring program, in Moreton Bay.

The responsibilities of this position included:

- writing grant applications;
- establishing and maintaining effective volunteer involvement;
- locating suitable survey sites and coordinating the collection, collation, evaluation, analysis and interpretation of data;
- preparing a range of multi-media extension material including newsletters, public presentations, technical and administrative reports, and scientific conference and journal papers;

- training new volunteers (on-site and through workshops) and assisting volunteers with field work;
- maintaining and servicing equipment used in the sampling program;
- liaison, consultation and negotiation with government agencies, local stakeholders and interest groups;
- working with various legislative documents including, but not limited to: the *Nature Conservation Act 1992*, *Environmental Protection Act 1994*, *Coastal Protection and Management Act 1995*, *Environment Protection and Biodiversity Conservation Act 1999* and *Marine Parks Act 2004*;
- managing staff and university students on industrial placement; and,
- undertaking various administrative, budgeting and financial duties.

Doctor of Philosophy Candidate, Consultant Ecologist, Research Assistant and Tutor, Griffith University (January 1994–December 2009)

- **Doctor of Philosophy Candidate:** The aim of my research was to identify characteristics of important feeding habitats for the conservation of the Far Eastern Curlew (*Numenius madagascariensis*) on its non-breeding grounds in Moreton Bay, Queensland.

- **Consultant Ecologist:** Employed to conduct monthly surveys of birds for the Brisbane City Council and the Port of Brisbane Corporation. The focus of these consultancies was to facilitate the ecologically sustainable management of focal areas by identifying threats to the birds' long-term survival and making recommendations for their protection and management.

- **Research Assistant:** I have collaborated on many research projects, assisting with experimental design, field work, data analysis and publishing on a diverse range of projects incorporating population biology, community ecology and conservation of birds, and biodiversity assessments of remnant vegetation. Recipient of the 1995 **Brian R. King Research Award** for seabird research (administered by the Raine Island Corporation).

- **Tutor:** Employed as an ecology tutor by Griffith University for 1st-, 2nd- and 3rd-year courses, including 'tropical ecology' conducted in Danum Valley, Borneo.

PUBLICATIONS

Journal Articles

1. **Finn, P.G.** and Catterall, C.P. 2023. Towards an efficient indicator of habitat quality for Eastern Curlews on their intertidal feeding areas. Australasian Journal of Environmental Management. 30, 26-47.
2. Lloyd, P., **Finn, P.G.** and Popple, L. 2021. Ten years of monitoring shorebird use of a mudflat at Brisbane Airport in Moreton Bay, Queensland. Stilt. 76, 64-73.
3. **Finn, P.G.**, Udy, N.S., Baltais, S.J., Price, K. and Coles, L. 2010. Assessing the quality of seagrass data collected by community volunteers in Moreton Bay Marine Park, Australia. Environmental Conservation. 37, 83-89.
4. **Finn, P.G.**, Catterall, C.P. and Driscoll, P.V. 2008. Prey versus substrate as determinants of habitat choice in a feeding shorebird. Estuarine, Coastal and Shelf Science. 80, 381-390.

5. **Finn, P.G.**, Catterall, C.P. and Driscoll, P.V. 2007. Determinants of preferred intertidal feeding habitat for Eastern Curlew: A study at two spatial scales. Austral Ecology. 32, 131-144.
6. **Finn, P.G.**, Driscoll, P.V. and Catterall, C.P. 2002. Eastern Curlew numbers at high tide roosts versus low tide feeding grounds: a comparison at three spatial scales. Emu. 102, 233-239.
7. **Finn, P.G.**, Catterall, C.P. and Driscoll, P.V. 2001. The low tide distribution of Eastern Curlew on feeding grounds in Moreton Bay, Queensland. Stilt. 38, 9-17.
8. **Finn, P.G.** and Hughes, J.M. 2001. Helping Behaviour in Australian Magpies, *Gymnorhina tibicen*. Emu. 101, 57-63.
9. Jones, N.D. and **Finn, P.G.** 1999. Translocation of aggressive Australian Magpies: a preliminary assessment of a potential management action. Wildlife Research. 26, 271-279.

Book Chapters

10. Fuller R., Milton D.A., Rothlisberg P., Clemens R.S., Coleman J., Murray K., Dhanjal-Adams K.L., Edwards D., **Finn P.G.**, Skilleter G., Stigner M., and Woodworth B.K. 2019. Migratory shorebirds of Moreton Bay. Pp. 431-444 in Tibbetts I.R., Rothlisberg P.C., Neil D.T., Homburg T.A., Brewer D.T., and Arthington A.H. (eds.) Moreton Bay Quandamooka & Catchment: Past, present, and future. The Moreton Bay Foundation. Brisbane, Australia. Available from: https://moretonbayfoundation.org/
11. **Finn, P.G.** 2007. Feeding ecology and habitat selection. Pp. 51-59 in Geering, A., Agnew, L. and Harding, S. (eds.) Shorebirds of Australia. CSIRO Publishing, Victoria.

Theses

12. **Finn, P.G.** 2009. Habitat selection, foraging ecology and conservation of Eastern Curlews on their non-breeding grounds. PhD Thesis. Griffith University, Brisbane.
13. **Finn, P.G.** 1996. Why do helpers help, in cooperatively breeding Australian Magpies?: a test of the indirect fitness benefits hypothesis using microsatellite DNA. BSc (Honours) Thesis. Griffith University, Brisbane.

Major Reports

14. **Finn, P.G.** 2011, 2012 and 2013. Shorebird surveys for the new parallel runway EPBC Act approval. Reports prepared for the Brisbane Airport Corporation Pty Ltd, Brisbane. avg. 42 pp.
15. Driscoll, P.V. and **Finn, P.G.** 2002. Continuation of monitoring birdlife at Fisherman Islands. Report prepared for the Port of Brisbane Corporation, Brisbane. 48 pp.
16. **Finn, P.G.**, Catterall, C.P. and Driscoll, P.V. 2002. Key habitats for conservation of the Eastern Curlew on its feeding grounds. PhD report prepared for the Wetlands Unit, Biodiversity Group, Environment Australia (Commonwealth of Australia, Department of the Environment), Canberra. 100 pp.
17. Jones, D.N. and **Finn, P.G.** 1998. Translocation of Aggressive Australian Magpies as a Potential Management Option: A Preliminary Assessment. Report prepared for the Suburban Wildlife Research Group, Australian School of Environmental Studies, Griffith University, Brisbane. 35 pp.

CONFERENCE PRESENTATIONS

1. **Finn, P.G.** Catterall, C.P. and Driscoll, P.V. 2022. Habitat Selection of Eastern Curlews (*Numenius madagascariensis*) on their intertidal feeding grounds in Moreton Bay, South East Queensland. Australasian Shorebird Conference, Brisbane, October. (Spoken).

2. **Finn, P.G.** and Catterall, C.P. 2009. Choice of feeding sites by Eastern Curlews (*Numenius madagascariensis*) on their non-breeding grounds. Australasian Shorebird Conference, Hobart, September. (Spoken).
3. **Finn, P.G.** and Catterall, C.P. 2009. Choice of feeding sites by a global migrant shorebird on its austral wintering grounds. International Congress of Ecology, Brisbane, August. (Spoken).
4. **Finn, P.**, Udy, N., Baltais, S., Price, K. and Maxwell, P. 2007. Distribution and status of seagrasses in Moreton Bay and an evaluation of community based monitoring (Seagrass-Watch). Queensland Coastal Conference, Bundaberg, September. (Poster).
5. **Finn, P.**, Udy, N., Baltais, S., Price, K. and Maxwell, P. 2007. Seagrass-Watch Moreton Bay: Community based monitoring of seagrass resources. Australian Marine Sciences Association Conference, Melbourne, July. (Spoken).
6. **Finn, P.G.**, Catterall, C.P. and Driscoll, P.V. 2005. Relationship between Eastern Curlew predation and intertidal prey availability on wintering grounds in subtropical eastern Australia. Ecological Society of Australia Conference, Brisbane, December. (Spoken).
7. **Finn, P.G.**, Catterall, C.P. and Driscoll, P.V. 2002. Characteristics of key feeding habitat for Eastern Curlew at two spatial scales in subtropical eastern Australia. Ecological Society of Australia Conference, Cairns, December. (Spoken).
8. **Finn, P.G.**, Catterall, C.P. and Driscoll, P.V. 2000. Feeding Distribution of Eastern Curlew in Moreton Bay. Griffith University Ecology and Evolution Postgraduate Symposium, Brisbane, October. (Spoken).
9. **Finn, P.G.**, Catterall, C.P. and Driscoll, P.V. 2000. Distribution and site selection in Eastern Curlew at feeding grounds in Moreton Bay. Southern Hemisphere Ornithological Congress and Australasian Shorebird Conference, Brisbane, July. (Spoken).
10. **Finn, P.G.**, Driscoll, P.V. and Catterall, C.P. 1999. The low tide distribution of Eastern Curlew at feeding grounds in Moreton Bay. Griffith University Ecology and Evolution Postgraduate Symposium, Brisbane, October. (Spoken).
11. **Finn, P.G.**, Driscoll, P.V. and Catterall, C.P. 1999. The low tide distribution of Eastern Curlew at feeding grounds in Moreton Bay. Australasian Shorebird Conference, Victoria, June. (Spoken).
12. **Finn, P.G.** and Hughes, J.M. 1996. Do Australian Magpie 'Helpers' Gain Indirect Benefits? Griffith University Ecological Review Postgraduate Symposium, Brisbane, November. (Spoken).
13. **Finn, P.G.** and Hughes, J.M. 1996. Helping Behaviour in the Australian Magpie (*Gymnorhina tibicen*). Australasian Society for the Study of Animal Behaviour Conference, Canberra, September. (Spoken).
14. **Finn, P.G.** and Hughes, J.M. 1995. Relationship of Helpers to Offspring in the Australian Magpie (*Gymnorhina tibicen*). Australasian Society for the Study of Animal Behaviour Conference, Brisbane, April. (Poster).

LICENCES and ATTAINMENTS

- Manual C- and R-class open driver's and recreational shipmaster's licences.
- Construction Industry White Card.
- GIQ Coal (Standard 11) and Coal Board Medical.
- Origin Energy Modules 0 and 1 HSE Leadership Programs.
- Arrow Energy, Epic Energy, Santos, Queensland Gas Company, BHP-Mitsubishi Alliance, Macarthur Coal and New Hope Coal safety inductions for contractors.

- APPEA Introduction to the Petroleum Industry.
- ASIC authority for working airside at the Brisbane Airport.
- Fauna handling, including venomous snakes and other dangerous animals, training and experience.
- Rehabilitation (spotter-catcher activity) Permit (WA0041700) and Damage Mitigation Permit (WA0041640).
- National accreditations include: 'SAIEMS604A - Conduct an Environmental Management Systems Audit'; 'SAIEMS605A - Evaluate an Organisation's Environmental Management Systems Audit'; and, 'AHCFAU301A - Respond to Wildlife Emergencies'.
- Australian Bat Lyssavirus vaccination.
- QLD Herbarium training courses including: Vegetation Structure; Regional Ecosystems; Plant Identification; and, BioCondition.
- Department of Environment and Science approved suitably qualified person under the *Flora Survey Guideline – Protected Plants*.
- Senior First Aid and Remote Area First Aid qualifications.
- Defensive driving qualifications including: 'PMASUP236B - Operate vehicles in the field'; 'RIIVEH201B - Operate light vehicle'; and, 'AHCMOM211 - Operate side by side utility vehicles'.
- 'Elements of Shipboard Safety' qualification and the accrual of a total of 21 'days at sea' as a 'deckhand' operating various commercial vessels from 5 to 12 m in length and 37 to 232 kW in power, within 'smooth' and 'partially smooth' waters of Moreton Bay.

PROFESSIONAL MEMBERSHIPS

- Certified Environmental Practitioner (CEnvP) Scheme: Ecology Specialist since 2014.
- Environment Institute of Australia and New Zealand: member since 2012.
- Ecological Society of Australia: member since 2000.
- BirdLife Australia and Threatened Bird Network: member since 1999, on the management committee of BirdLife Australia Southern Queensland from 2010-2012.
- Australasian Wader Studies Group: member since 1999.
- Queensland Wader Study Group: member since 1993, on the management committee from 1996-2005 and 2015-present.

REFEREES

Available on request.