BMC Dragline Move: Offset Delivery Plan for EPBC 2016/7788

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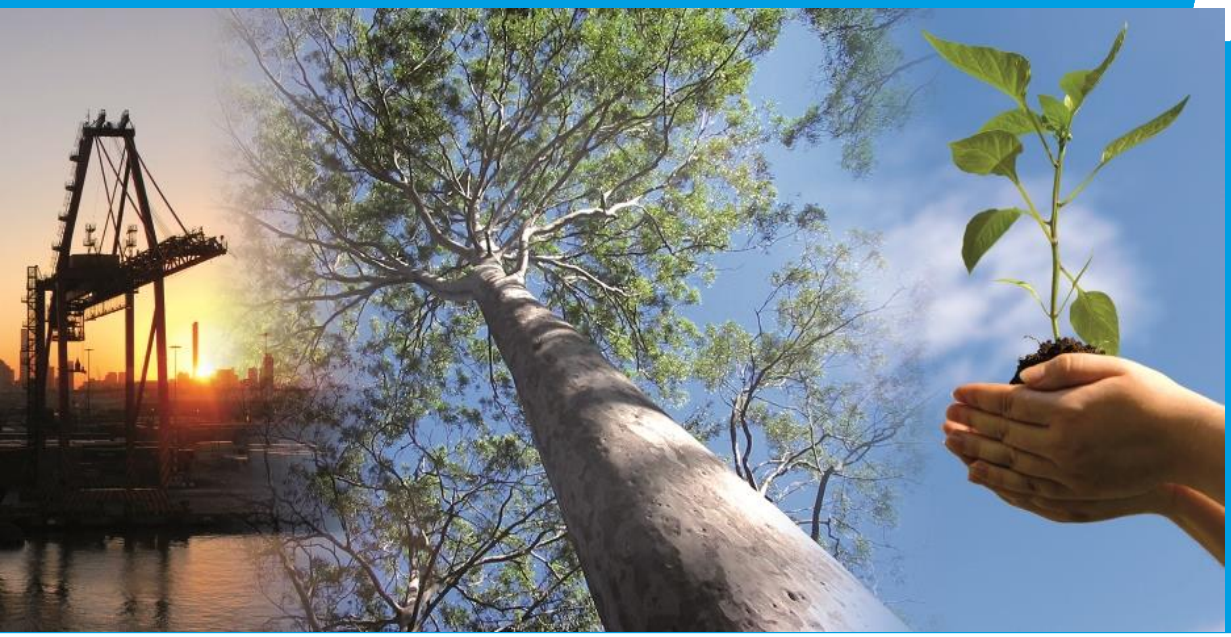

BMC Dragline Move: Offset Delivery Plan for EPBC 2016/7788

Date 12th January 2017

Prepared for BHP Billiton Mitsui Coal Pty Ltd

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Table of Contents

1 EXECUTIVE SUMMARY

BHP Billiton Mitsui Coal (**BMC**) proposes to move (the **Project**) a dragline from Goonyella Riverside mine (**GRM**) to its South Walker Creek mine (**SWC**) in 2017 (see ***Figure 1***). The route will involve the clearing of vegetation along the temporary unsealed pathway that is 77 kilometres (**km**) long and typically 40 metres (**m**) wide, resulting in unavoidable impacts to Matters of National Environmental Significance (**MNES**) and Matters of State Environmental Significance (**MSES**).

The Project was referred to the Department of Environment and Energy (**DoEE**) on the 3rd of October 2016 for impacts to listed threatened species and communities under sections 18 and 18 A of the *Environmental Protection and Biodiversity Conservation Act 1999* (**EPBC**). The referral number is EPBC 2016/7788. Subsequently, the Project was declared a Controlled Action via the Notification of Referral Decision on the 8th November 2016. The letter "Decision on referral Goonyella Riverside Mine to Walker Creek Mine Dragline Move, QLD" to assess the Project via preliminary documentation, also dated the 8th November 2016 detailed the significant impacts to Listed threatened species and communities (section 18 & 18A) of the EPBC. The listed species and communities to be offset are summarised in ***Table 1***.

On the 18th November 2016, a letter titled "Additional information required for preliminary documentation – Goonyella Riverside Mine to Walker Creek Mine Dragline Move, QLD (EPBC 2016/7788) was received by BMC. This document forms part of the requirements for additional information as was detailed in that letter.

The offset proposed satisfies the habitat requirements for the two species for which there are significant impacts as per the Referral Decision, being the Ornamental Snake and Yakka Skink and the Brigalow Threatened Ecological Community (**TEC**). The amalgamated offset area adjoins an area of offset to be secured for the MSES that trigger *the Environmental Offsets Act 2014 (Qld)* (**EOA**). The EPBC offset is for impacts to the Ornamental Snake and Yakka Skink, as per the report titled "*Terrestrial Ecology MNES Assessment, BMC Dragline Move Project*" (Biodiversity Assessment and Management Pty Ltd – 30 September 2016). This ecological report was provided at ***Attachment 3*** of the referral documentation. The impacts are summarised in ***Table 1***. Note that impacts to the Squatter Pigeon (Southern) were not deemed to be a controlled action, however the offset detailed within this document also supports Squatter Pigeon habitat.

This Offset Delivery Plan details the offset that is to be secured to address those impacts that could not be avoided or mitigated onsite.

The offset is located on the one property known as "Croydon Station" which is located within the Brigalow Belt bioregion and experiences similar habitat and climatic conditions as the impact site.

"Croydon Station" (Lot 9 BH194), on which the 346.3-hectare (**ha**) offset is located, is owned by a grazing-enterprise-focused landholder and is situated 90km to the south-east of the Project. "Croydon Station" has patches of Brigalow TEC vegetation already established and substantial areas of brigalow regrowth with gilgai relief. It is these areas that have been targeted to supply the offset for the Project. An area of 113.7ha of this brigalow (27.1ha remnant and 86.6ha regrowth) has been selected primarily because it contains the core habitat requirements for the Ornamental Snake and Yakka Skink, abuts a regional biodiversity corridor that encompasses the Connors River, and will rehabilitate/regenerate to habitat that will satisfy the Project's offset requirements.

Additionally, the offset area contains squatter pigeon habitat, plus a 162.2ha area of eucalypt woodland that adjoins the Connors River adjacent to the Ornamental Snake offset area which has been identified to satisfy requirements for the Project impacts to Queensland MSES. This MSES area will add further value to the MNES offset as it acts as a buffer area, and will deliver further benefits to the MNES species, as the habitat provided in this buffer area is similar to the habitat requirements of the MNES species.

Field verification studies of the property undertaken in March/April 2016 noted that the presence of habitat suitable for the impacted species is co-located with the Brigalow TEC due to the presence of deep cracking soils and gilgai. The presence of the Ornamental Snake and Squatter Pigeon were both verified at that time.

Table 1: Summarised Project impact vs Proposed Offset Areas

Protected Matter	Status	Impact Area (ha)	Habitat Quality Score	Offset Area (ha)	Habitat Quality Score	Regional Ecosystem (RE)	Offset Property
Threatened Species							
Protected animal - *Denisonia maculata* (Ornamental Snake). *Impacts to this species will be offset under the EPBC Act*	Vulnerable	52.33	7.0	254.6	Regrowth 6.0 Remnant 7.0	Remnant 11.3.1 (13.1ha) Regrowth 11.3.1 (7.9ha) Remnant 11.4.9 (13.5ha) Regrowth 11.4.9 (26.8ha) Remnant 11.3.4 (75.3ha) Remnant 11.3.3 (76.4ha) Regrowth 11.3.3 (6.4ha) Remnant 11.3.25 (21.5ha) Remnant 11.3.27 (13.7ha)	Croydon Station
Protected animal - *Egernia rugosa* (Yakka Skink) *Impacts to this species will be offset under the EPBC Act*	Vulnerable	99.35	7.0	245.8	Regrowth 5.0 Remnant 7.0	Remnant 11.3.1 (13.6ha) Regrowth 11.3.1 (59.8ha) Remnant 11.4.9 (13.5ha) Regrowth 11.4.9 (26.8ha) Remnant 11.3.4 (75.3ha) Remnant 11.3.25 (21.5ha) Remnant 11.5.3 (35.3ha)	Croydon Station
Protected animal - *Geophaps scripta scripta* (Squatter pigeon (southern)*	Vulnerable	89.2	7.0	306.1	Regrowth 6.0 Remnant 7.0	Remnant 11.3.1 (13.6ha) Regrowth 11.3.1 (59.8ha) Remnant 11.3.4 (75.3ha) Remnant 11.3.3 (77.7ha) Regrowth 11.3.3 (9.2ha)	Croydon Station

Protected Matter	Status	Impact Area (ha)	Habitat Quality Score	Offset Area (ha)	Habitat Quality Score	Regional Ecosystem (RE)	Offset Property
						Remnant 11.3.25 (21.5ha) Remnant 11.3.27 (13.7ha) Remnant 11.5.3 (35.3ha)	
Threatened Ecological Communities							
Threatened Ecological Community Brigalow (*Acacia harpophylla* dominant and co-dominant) **	Endangered	9.7	7.0	113.7	Regrowth 6.0 Remnant 7.0	Remnant 11.3.1 (13.6ha) Regrowth 11.3.1 (59.8ha) Remnant 11.4.9 (13.5ha) Regrowth 11.4.9 (26.8ha)	Croydon Station

****Note: Impacts to Squatter Pigeon (southern) are assessed by DoEE and the BMC commissioned ecologists to be not significant however BMC is including habitat suitable for Squatter Pigeon (southern) in the offset area as an additional contribution towards the environmental gains being secured.***

*****Note: Impacts to the Brigalow TEC are not considered by BMC to be significant, given pre-existing authorisations; but it is acknowledged that DoEE has a different view and therefore the Brigalow TEC will be offset.***

1.1 Description of the Project

BHP Billiton Mitsui Coal (**BMC**) proposes to move (the **Project**) a dragline from Goonyella Riverside mine (**GRM**) to its South Walker Creek mine (**SWC**) in 2017 along a route approximately 77km in length. The Project is planned to take place so that the dragline can be operational by 1 July 2017 or earlier if possible. A dragline is a large excavator used in the mining sector with a bucket pulled in by a wired cable. The relevant dragline is a Marion 8050 dragline weighing approximately 3,500 tonnes. It has a boom length of 99m and a width of 28m. The dragline will be travelling with the boom up and the bucket removed. It will be approximately 68m high with an additional 5m for the transporter.

As part of the Project, BMC proposes to:

- decommission the current dragline operations at Goonyella Riverside mine, as part of current approved mining activities;
- transport the dragline along a temporary special purpose track or roadway, established through the implementation of vegetation clearing, fill placement and related civil work activities in areas within the proposed Dragline Move corridor where ground conditions are inadequate to enable the dragline to advance;
- rehabilitate the Dragline Move corridor; and
- commission and operate the dragline at South Walker Creek mine as part of current approved mining activities.

The dragline transport route is located within the vicinity of the towns of Moranbah, Nebo and Coppabella within the Isaac Regional Council local government area of Queensland. The proposed alignment of the relocation route generally follows the alignment used for a previous dragline move from South Walker Creek mine to the Goonyella Riverside mine that was carried out in 2000. However, the alignment has changed in certain locations, due to changes in land use since 2000. The Project will involve the construction of a temporary unsealed roadway, 40m to 80m wide, and the transport of the dragline on a specialised transporter, followed by rehabilitation of disturbed areas.

The proposed route is illustrated in ***Figure 2***.

Figure 1: Project Context map

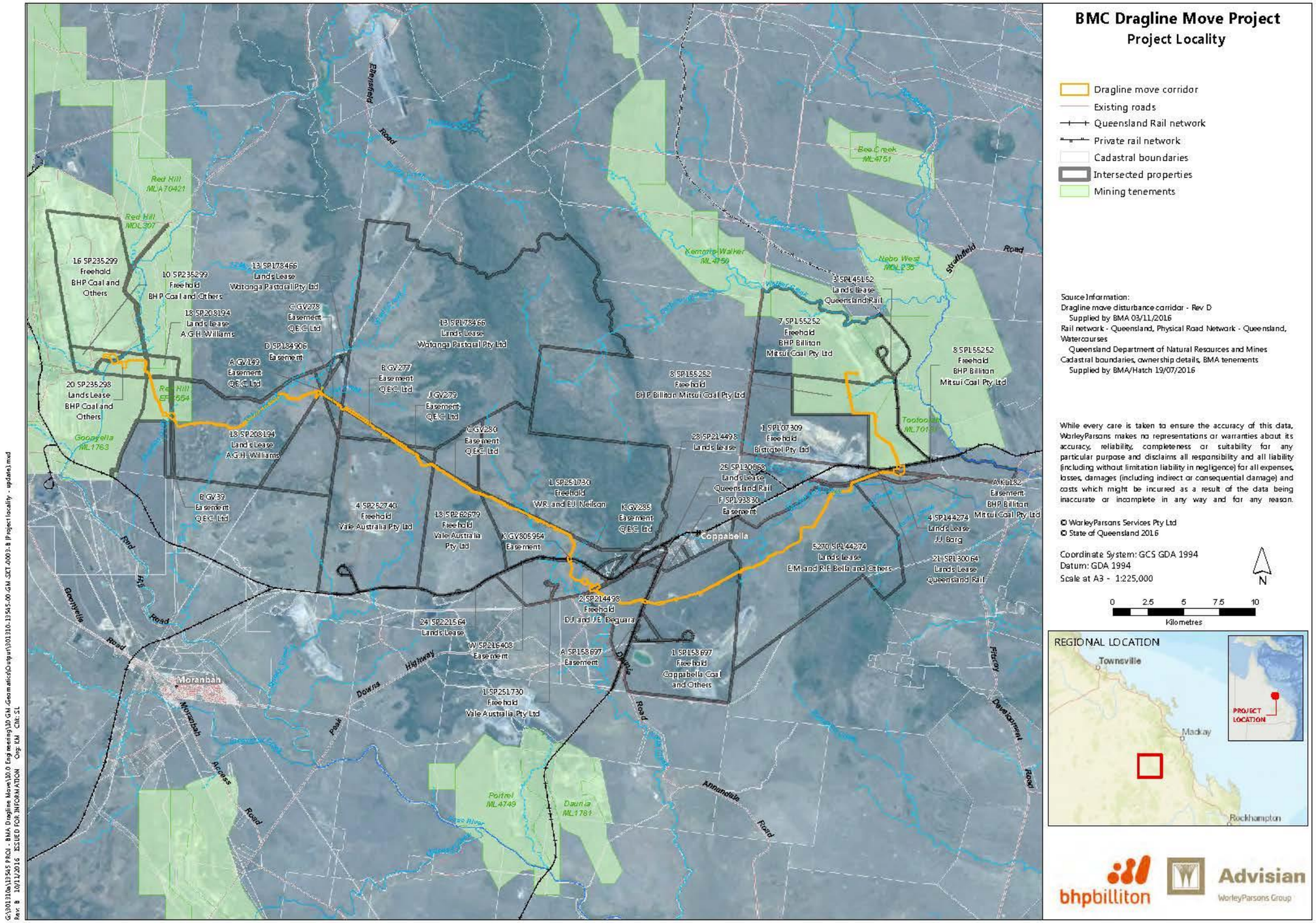
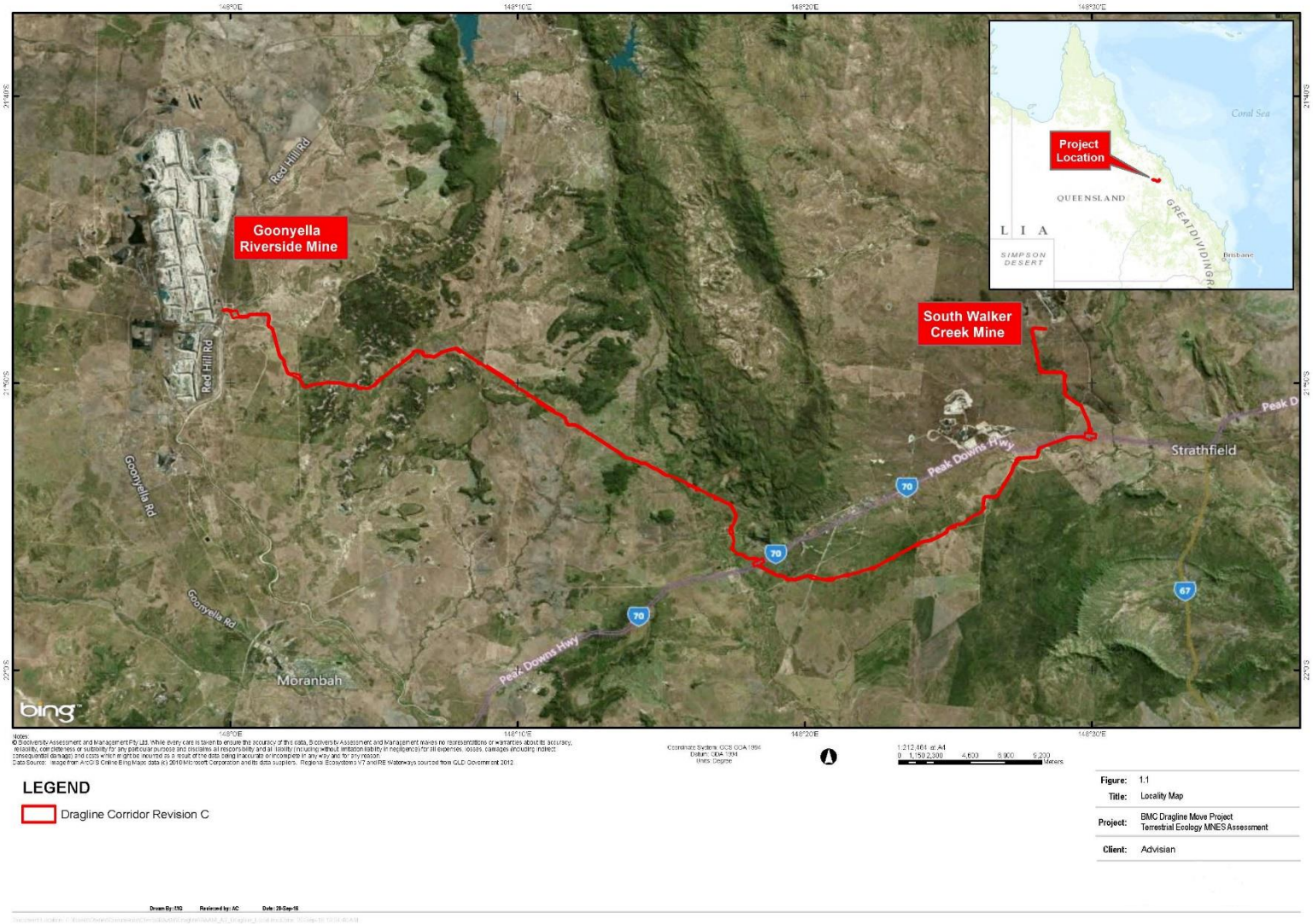


Figure 2: Project route and impact area



1.2 Preliminary Documentation

This Offset Delivery Plan forms part of the preliminary documentation to be submitted to DoEE following the decision on 8 November 2016 that the Project will be assessed by Preliminary Documentation and the subsequent request for additional information dated 18th November 2016. The reference document *is BMC Dragline Walk Goonyella Riverside to South Walker Creek Mine EPBC Act Referral (EPBC 2016/7788).* Attachment 3, section 5 of the previously submitted Referral documentation describes in detail the impacts to MNES, which are offset via this Offset Delivery Plan. These impacts are detailed in section 3.2 of this document.

1.3 Purpose of Offset Delivery Plan

This Offset Delivery Plan provides information as requested in the to the letter titled "Additional information required for preliminary documentation – Goonyella Riverside Mine to Walker Creek Mine Dragline Move, QLD (EPBC 2016/7788) dated the 18th November 2016 and has been prepared to further address the Project's residual significant impacts to MNES as were deemed to be a Controlled Action. The offset proposed will provide environmental benefits to counterbalance the significant impacts of the Project that will remain after measures to avoid, mitigate and manage have been implemented. The offset proposal includes:

- Analysis of the likely offset requirements of the Project under the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy (October 2012)* (**EOP**);
- Assessment of the offsets and process proposed to meet the likely offset requirements of the Project in accordance with the EPBC Act EOP and associated Offsets Assessment Guide; and
- Determination of the overall suitability of and environmental outcome provided by the offset proposed

Table 2 aligns the information requested in the letter of the 18th November 2016 with the appropriate document and section in which it has been addressed.

Table 2: Preliminary documentation requirements and the documents/sections where these are addressed

Number	Requirement	Document and section where this is addressed
1.1	provide a map which displays all new sections of the dragline track alignment, including any EPBC threatened ecological communities that occur at the new sections and any core or essential habitat for the following listed species: Ornamental Snake *(Denisonia maculata),* Yakka Skink *(Egernia rugosa),* Koala *(Phascolarctos cinereus* combined populations of Queensland, New South Wales and the Australian Capital Territory) and Squatter Pigeon (southern) *Geophaps scripta scripta;*	Relevant section in the Preliminary Documentation Overview Report
1.2	indicate on the map where the width of clearance in any new section will exceed 40 metres (such as for stockpiling areas), and the proposed width of clearance in metres.	Relevant section in the Preliminary Documentation Overview Report
1.3	provide a description of the extent of vegetation clearances (in hectares) at new sections of the alignment and an assessment of the potential impacts on any EPBC listed threated species and ecological communities.	This document at ***Section 1***, and ***Table 1.***
2.1	explain (with supporting literature) the impact that the removal of 98 ha of core and essential Koala habitat will have on local Koala population(s);	Relevant section in the Preliminary Documentation Overview Report. Appendix H

2.2	explain (with supporting literature) the impact, if any, that the cleared track constructed for the dragline move will have on fragmenting Koala population(s); and	Relevant section in the Preliminary Documentation Overview Report, Appendix H
2.3	provide a map which displays the extent of the Koala habitat that exists within the broader area of Map 5.4a, 5.4b, 5.4c, 5.4d, 5.4e, 5.4f (2016-7788 Referral Attachment 3 Terrestrial Ecological MNES Assessment Appendices).	Relevant section in the Preliminary Documentation Overview Report. Appendix H
3.1	provide the latest versions of any Environmental Management Plans (EMPs) that are proposed to mitigate impacts to the Ornamental Snake *(D. maculata),* Yakka Skink *(E. rugosa),* and Brigalow (A. *harpophylla* dominant and co-dominant) ecological community through ongoing management and associated monitoring of the proposed action. EMPs proposed for this action should include clear, measurable, time specific outcomes and performance criteria for mitigating impacts on the about listed species and communities, a monitoring regime that will track and record performance criteria and/or outcomes are not being met, and provisions for independent auditing (a guide to EMPs is available on the Department's website at: http://www.environment.gov.au/e[2bc/[2ublications/environmental-management-[2languidelines); and	Relevant section in the Preliminary Documentation Overview Report. Appendix H
3.2	provide the latest versions of any Vegetation Clearing Procedure, Species Management Program and Rehabilitation Plan compiled for the dragline move project.	Relevant section in the Preliminary Documentation Overview Report. Appendix H
4.1	propose a direct offset for impacts to the Ornamental Snake *(D. maculata),* Yakka Skink *(E. rugosa)* and Brigalow (A. *harpophylla* dominant and co-dominant) ecological community that compensates for at least 90 per cent of the impact, as determined by the Minister/Department in accordance with the EPBC Act offsets policy. The identified offset must clearly state whether the conservation gain is proposed to be achieved by: • improving existing habitat for the protected matter; • creating new habitat for the protected matter; • reducing threats to the protected matter; and/or • averting the loss of a protected matter or its habitat that is under threat;	The offset will improve the quality of existing habitat, create new habitat, reduce threats to the existing protected matters and avert the loss of the protected matters – see ***Section 3.3.4***, ***Tables 6A-6C*** and the Offset Area Management Plan (**OAMP**) sections 3 - Restrictions, 4- Risks, and 5 - Management Actions, provided at ***Schedule 1***.
4.2	provide detailed and evidenced based costings for the direct offset if it does not compensate for 100 per cent of the impact. This information is necessary to calculate the cost of the other compensatory measures component of the offset;	N/A The land based offset provides 100% of the required offset. See ***Section 3.3, Tables 6A, 6B*** and ***6C*** of this document
4.3	identify the proposed offset's geographical location (including an appropriately scaled and geo-referenced map);	***Section 3.3***, and ***Figures 3*** and ***4*** of this document.
4.4	detail the time-specific outcomes (Key Performance Indicators) against which achievement of the proposed offset outcomes will be measured. This includes interim milestones so the proponent can demonstrate they are on track to achieving the proposed	Overview is in ***Section 5*** of this document and detailed in the OAMP at ***Schedule 1, at***

	offset outcomes. Please include a monitoring and evaluation plan that will be used to demonstrate that the offset is meeting the interim milestones and final outcomes;	Section 2 - Management outcomes, Section 6 - Monitoring, and Section 7 – Reporting.
4.5	detail the management actions for the proposed offset, describing how the outcomes will be achieved, trigger values for corrective actions and the nature of corrective actions to be implemented if trigger values are reached;	Refer to the OAMP - Section 3 - Restrictions imposed, Section 4 - Risk analysis, and Section 5 - Management actions.
4.6	contain a table detailing the proposed offset's 'score' for each attribute of the *Offsets assessment guide,* an evidence-based justification for the score for each attribute, and literature references to support the evidence-based justification. If the offset involves improving habitat quality, the same methodology for measuring habitat quality must be used at both the impact and offset sites; and	***Tables 6A***, ***6B*** and ***6C*** of this document.
4.7	provide information on current land tenure of the proposed offset site and method of legally securing the offset.	Rolling Term lease that expires on the 31st December 2046. See ***Section 3.3*** and ***Schedule 2*** to this document

2 OFFSET REQUIREMENT

Under the EPBC Act EOP, consideration of offsets is required for MNES where a residual significant impact is likely to remain after avoidance, mitigation and management measures have been undertaken. For the BMC Dragline Move, residual significant impacts are presented in *Attachment 3* of the Referral documentation for the proposed impacts to habitat for the listed threatened species Ornamental Snake, and Yakka Skink. The described impacts to Brigalow TEC are also considered to represent residual significant impacts in the opinion of DoEE as per the assessment level decision letter of 8 November 2016. There are also proposed impacts to Squatter Pigeon habitat that are considered not to be significant by BMC but are nevertheless counter-balanced by BMC's offset proposal.

2.1 Policy Principles

The EPBC Act EOP (dated October 2012), sets out eight key overarching principles that must be applied in determining the suitability of offsets, they are summarised as follows:

1. Deliver an overall conservation outcome that improves or maintains viability;
2. Be built around direct offsets but may include other compensatory measures;
3. Be in proportion to the level of statutory protection that applies;
4. Be of a size and scale proportionate to the residual impacts on the protected matter;
5. Manage the risks of the offset not succeeding;
6. Be additional to what is already required;
7. Be efficient, effective, timely, transparent, scientifically robust and reasonable; and
8. Have transparent governance arrangements.

Considering the above policy principles in relation to the likely offset requirements of the Project, this property has the potential to supply the values required. Furthermore, the property is an amalgamation with one owner that has the potential to provide additional environmental values over and above those required.

Consideration was also given to property plans and any potential conflicting future use of the property to minimise the potential for conflicting land use pressures.

3 PROPOSED OFFSET

3.1 Overview of Impact Site

The impact site being the proposed road construction, is to be used once only, and traverses between the GRM and SWC mines in Central Queensland. *The Project* traverses several watercourses and impacts on several listed threatened species, for which the offset is proposed.

The project will require clearing of all vegetated sections of the relocation route to a minimum 40m width (35m travel width plus 5m side clearance). The required corridor width will be greater than the minimum 40m in some sections of the alignment due to ground conditions (i.e., for stockpiling of stripped topsoil). In vegetated areas, the required corridor width will in some cases be 60m or 80m to allow for vehicular traffic past the dragline and cleared vegetation stockpiling on the edges of the roadway.

The details of the quantum of the habitat to be impacted are detailed in ***Table 3***. The quality of the habitat and TEC to be impacted is detailed in ***Tables 4A-6C*** inclusive.

Table 3: Field-validated remnant regional ecosystems (RE) impacted in the assessment area (April 2016)

Offset Area (ha)	Impact for the entire route
Threatened Species	**(ha of habitat)**
Ornamental Snake (*Denisonia maculata*) REs: 11.3.25, 11.4.2, 11.4.9, 11.9.5	52.44
Yakka Skink (*Egernia rugosa*) REs: 11.3.1, 11.3.2, 11.3.4, 11.3.25, 11.4.2, 11.4.9, 11.5.3, 11.5.9, 11.5.15, 11.7.2, 11.7.3, 11.8.5, 11.9.3, 11.9.4a, 1.9.1, 1.9.2, 11.9.5, 1.9.7a, 11.10.3	105.63
Threatened Ecological Community	**(ha of habitat)**
Brigalow (*Acacia harpophylla* dominant and co-dominant) REs: 11.4.9, 11.5.3, 11.9.1, 11.9.5, 11.9.7	9.73

3.1.1 Avoidance

A dragline relocation project had occurred over part of the alignment approximately 16 years previously and advice was to constrain the new route to these previously cleared areas wherever possible.

The initial route chosen for the Dragline Move was subjected to an investigation to assess the potential impacts via an ecological desktop assessment and habitat modelling. Feedback for avoidance of potential impact to MNES was provided to project planners and the route was adjusted to minimise the need for clearing of remnant habitats.

Following field assessment and adjustment of the habitat model to reflect the results of ground-truthing, a further route refinement was undertaken to ensure that the disturbance footprint was minimised. In ecologically sensitive areas involving MNES, the minimum 40m width corridor will be applied in the majority of these cases in order to limit disturbance. In those areas, “breakout” stockpiling sites for cleared vegetation are required when the 40m wide section of corridor is 500m long or more. These vegetation stockpiling areas have been chosen wherever possible to avoid MNES but will increase the corridor width locally. This approach will result in a lesser total disturbance to MNES than a standard rule involving a breakout area every circa 500m.

3.1.2 Mitigation and management

Environmental impact mitigation measures to reduce direct and indirect impacts of the Project on MNES were included in the report at Attachment 3 within the Referral Documentation on the 3rd October 2016. Different measures will apply as relevant during the pre-construction period, construction, operation and decommissioning phases of the Project. The mitigation and management activities to be undertaken will be consistent with those outlined in section 6.3 of the report at Attachment 3 within the Referral documentation.

3.1.3 Methodology-desktop, modelling and field survey

Prior to field survey work being undertaken, publicly available information on currently recognised terrestrial ecology values was accessed and reviewed to provide the study team with sufficient background to ensure survey methods were suitably designed to detect and verify the actual values of the study area, as currently recognised terrestrial ecology values and associated constraints to development are defined at the national level by Commonwealth environmental legislation, and partially informed by State vegetation mapping.

Habitat modelling was also undertaken for the project. The methodology adopted for the project is based broadly on components of the Biodiversity Assessment and Mapping Methodology (**BAMM**). The BAMM was developed by the Queensland Government to provide a consistent approach for identifying and mapping biodiversity values at the landscape scale in Queensland using vegetation mapping data generated or approved by the Queensland Herbarium as a fundamental basis (Department of Environment and Heritage Protection (**DEHP**) 2014). The components of the BAMM that underpin the habitat mapping methodology of this Project are those components that relate specifically to the identification and mapping of habitat of conservation significant species.

3.2 Methodology - Threatened Species Habitat Assessments and Ecological Equivalence Scoring

The likelihood of occurrence of threatened flora and fauna along with their habitats was assessed through searches of likely habitat as well as opportunistic searches during foot and vehicular traverses. Impacts to MNES were assessed regarding the EPBC Act EOP, and the EPBC Act Offset Assessment Guide was used to calculate the offset area required for each MNES.

Impacts to State Significant Biodiversity Values (**SSBV**) were assessed largely with reference to the Ecological Equivalence Methodology (**EEM**). In both processes EEM scores and parameters established through field survey were considered when applying quality scores to the impact and offset areas.

This process was also applied to the proposed "Croydon Station" offset area. The data collected was used to determine the suitability and size of the offset area required to adequately offset impacts to MNES as identified in the Referral Decision dated the 8th November 2016 and the subsequent Additional Information Request dated 16th November 2016.

Field surveys and site investigations of the impact site were undertaken by Dr Lindsay Popple and Dr Paul Williams on 18‑22 August 2016, and Dr Lindsay Popple, Dr Paul Williams, Ms Shelley Trevaskis and Mr Lui Weber on 29 August ‑ 2 September 2016, inclusive. The findings for the respective impacted TEC and listed threatened species are detailed in their respective sections below.

3.3 Overview of Offset Property – Croydon Station

"Croydon Station" is a 57,900ha property located to the north-west of Rockhampton within the Isaac Regional Council area. The property has a Rolling Term Lease that expires on the 31 December 2046. See the Title Search at ***Schedule 2***. The property encompasses areas of the coastal ranges to the east and the Connors River is located on the western portion of the property. There are significant areas of remnant vegetation along the major creeks and rivers as well as in the range country to the east. Due to the proximity to the coast al ranges to the East, rainfall is circa 850-1,000mm per annum. Filed surveys undertaken have found that Ornamental Snake and Squatter Pigeon inhabit areas of the property and the broad alluvial areas selected for the offset areas maximise the potential for the success of the offset for these species.

3.3.1 Offset Site – General Description

The areas selected as the preferred potential offset sites for BMC on "Croydon Station" are illustrated in ***Figure 3*** and ***Figure 4*** and are within the larger (circa 4,000ha) advanced offset area being negotiated for BHP Billiton Mitsubishi Alliance's (**BMA**) Red Hill Project. As such, this area has already been surveyed by ecologists and the presence of the Brigalow TEC and the respective habitat areas for the impacted species has been established. This area was selected as the best potential offset area for the Dragline Move due to its suitability, as well as having already being the target of ecological survey work. The majority of the offsets for impacts to MSES required for the Project should also be able to be located within this area.

The field ecology work undertaken by Eco Logical Australia (**ELA**) in March/April 2016 on "Croydon Station" identified the regional ecosystems within the area as containing the values required for the Project.

The selected area of 346.3ha abuts the Connors River to the west and has an anabranch of the river flowing along the eastern boundary of the offset area. The area has gilgais and areas of freshwater wetlands and the presence of Ornamental Snake was verified during field ecology surveys. The offset area consists of 113.7ha of the Brigalow TEC which is known habitat for both the Ornamental Snake and Yakka Skink. The balance of the area is eucalypt woodland vegetation that connects the Brigalow offset areas with the Connors River. This area supports Squatter Pigeon as well as Ornamental Snake and will be included in the offset for the MSES impacted by the Project. Management actions are detailed below and in the accompanying Offset Area Management Plan and will ensure that the offset area improves in habitat value and extent.

3.3.2 Offset Site – Clearing/Development History

Significant development on Croydon Station was undertaken during the Brigalow Development Scheme particularly between the years of 1966 and 1975. ***Plate 1*** illustrates the extent of vegetation on the offset area at that time whereas ***Plate 2*** illustrates the pasture development achieved as a result of clearing undertaken in that area as part of the station's development. The re-clearing of regrowth post the initial development phase is part of the recognised and regionally accepted practice for maintaining a grazing enterprise in Central Queensland and the Brigalow Belt. As such, the cycle of woody weed control via chaining, the use of fire and the subsequent over-sowing with buffel pasture is the cycle that is being interrupted with the establishment of the offset.

In the regrowth areas, the year of initial clearing is evidenced from historical photos to have been between 1966 and 1975 – see ***Plate 3*** and ***Plate 4.*** Over the last 18 years regrowth was re-cleared (i.e., with a clearing methodology utilizing two bulldozers and a chain) and seeded during 1989 and 1990. The regrowth areas were then oversown with exotic pasture grass in 1991. The subsequent clearing cycle has been to re-chain and burn every seven to eight years (1990, 1998, 2006, between March and September) guided by seasonal conditions. The regrowth areas are programmed to be re-cleared in the next 2-3 years.

In the remnant areas, thinning and burning is aligned with the re-clearing of the regrowth areas (i.e, every seven to eight years). Fire is used to thin the understorey and to reduce the amount of timber on the ground. The remnant areas are also oversown with exotic pasture grass at the same time as the regrowth areas. The remnant area is scheduled for a thinning program again in parallel with the regrowth areas to increase grazing capacity and to reduce the amount of timber on the ground.

Plate 3 demonstrates the cleared nature of the offset site at time of introduction of the EPBC Act in 2000 and the recurring maintenance of this pasture state is further demonstrated in ***Plate 4*** dated 2004. This supports the ability of the owners to continue this practice under Sections 43B of the EPBC Act - "Continuing Use".

3.3.3 The prior authorisation and continuing use exemptions

Sections 43A and 43B of the EPBC Act exempt certain actions from the assessment and approval provisions of the EPBC Act. They apply to lawful continuations of land use that started before 16 July 2000 or actions that were legally authorised before 16 July 2000, the date of commencement of the EPBC Act.

These exemptions allow for the continuation of activities that were fully approved by state and local governments before the EPBC Act came into force ("prior authorisation"), or otherwise lawful, activities, which commenced before the EPBC Act came into force, and which have continued without substantial interruption ("continuing uses").

Continuing use

Under the continuing use exemption, assessment and approval under the EPBC Act is not required if:

- the action commenced before 16 July 2000; and
- the use of land, sea or seabed was lawful; and
- the action has continued in the same location without enlargement, expansion or intensification.

As such, the clearing that has been halted during negotiations for the offset site and the subsequent ecological surveys have prevented the re-clearing (via the use of bulldozers and a chain) of the offset area and the subsequent destruction of the microhabitat of fallen woody debris, deep cracks in the soil and the existing gilgai structure, the effects of which usually last circa 10-15 years. The over-sowing with buffel pasture would have been undertaken at the same time with the resultant increase in pasture availability to support a return to the previous higher carrying capacity and the ability to use hot fires for woody regrowth suppression in later years.

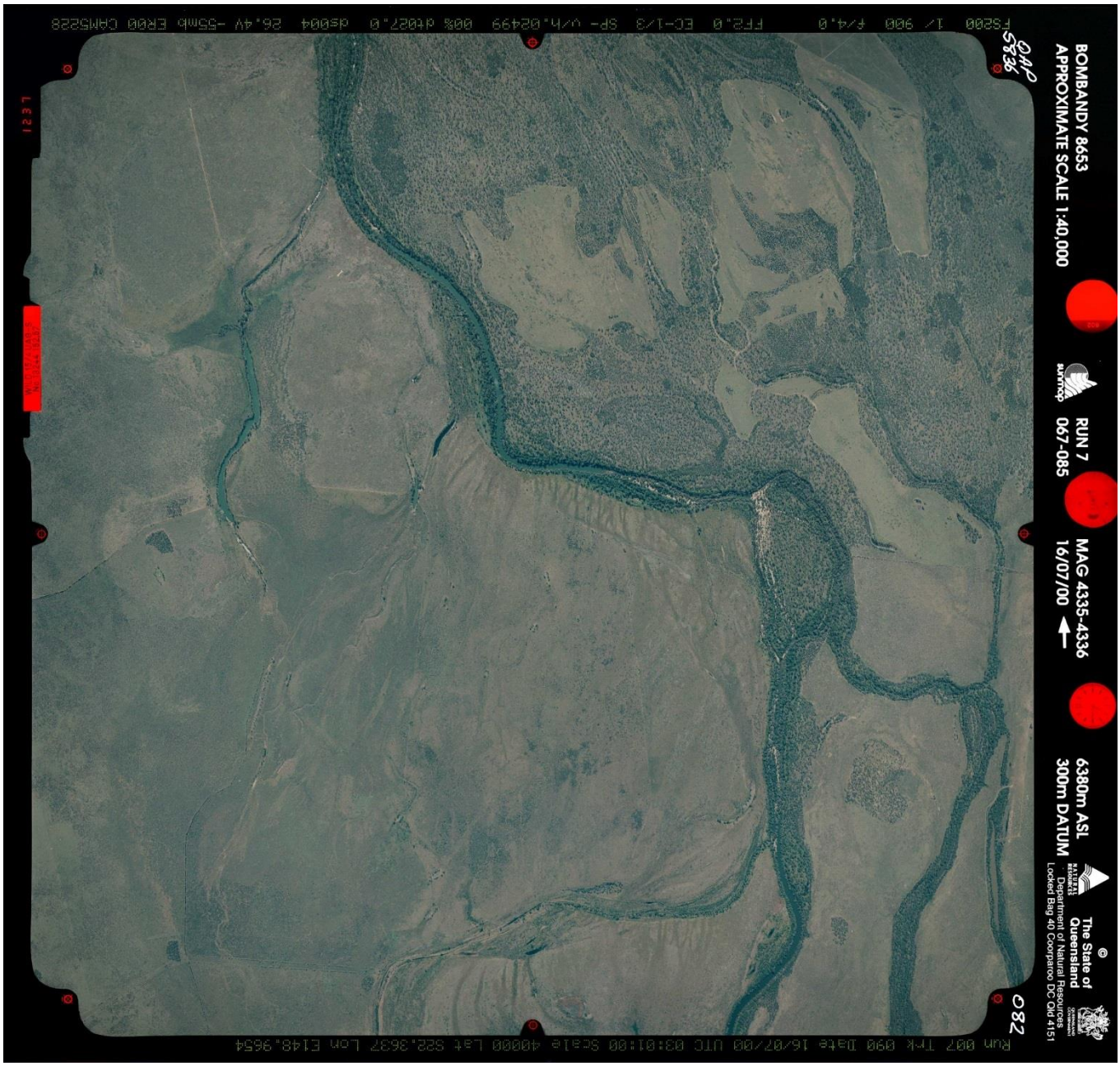
The current cycle of development on Croydon Station was delayed for a number of years over the last decade due to the combined economic forces of several years of lower than average rainfall and low commodity prices (beef). The return to better rainfall conditions over the last few years and an increase in commodity prices has enabled the development cycle to continue with the offset area being planned for control measures in the next 12-18 months.

Plate 1: Croydon Station – Aerial Imagery from 1966

Plate 2: Croydon Station – Aerial Imagery from 1975

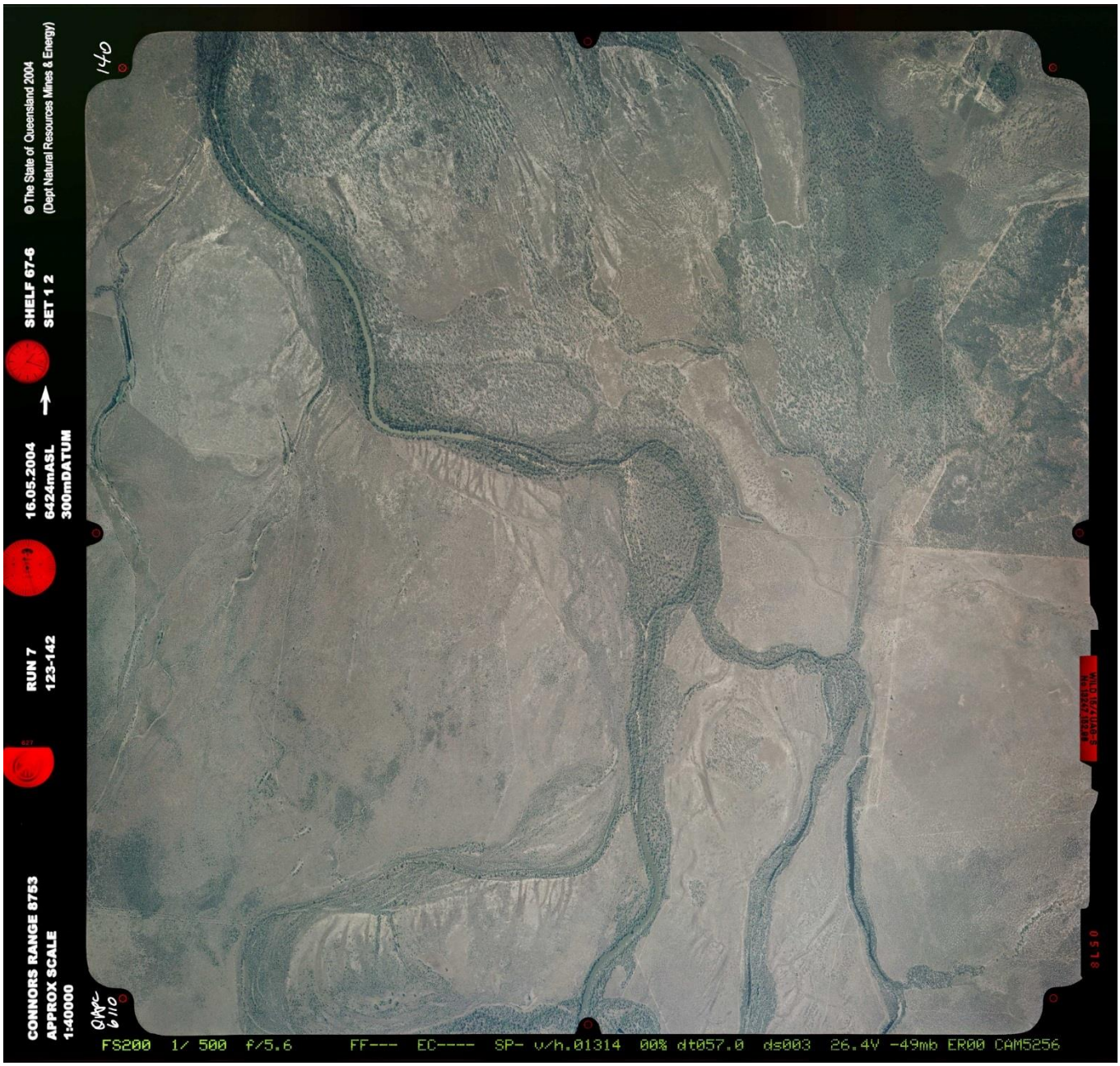
Note: image rotated to match alignment of Plate 1.

Plate 3: Croydon Station – Aerial Imagery from 2000



Note: image rotated to match alignment of Plates 1 and 2.

Plate 4: Croydon Station – Aerial Imagery from 2004



Note: image rotated to match alignment of Plates 1, 2 and 3.

Figure 3: Croydon Station Location Map, Red Hill offset Investigation area and BMC Dragline move project offset area

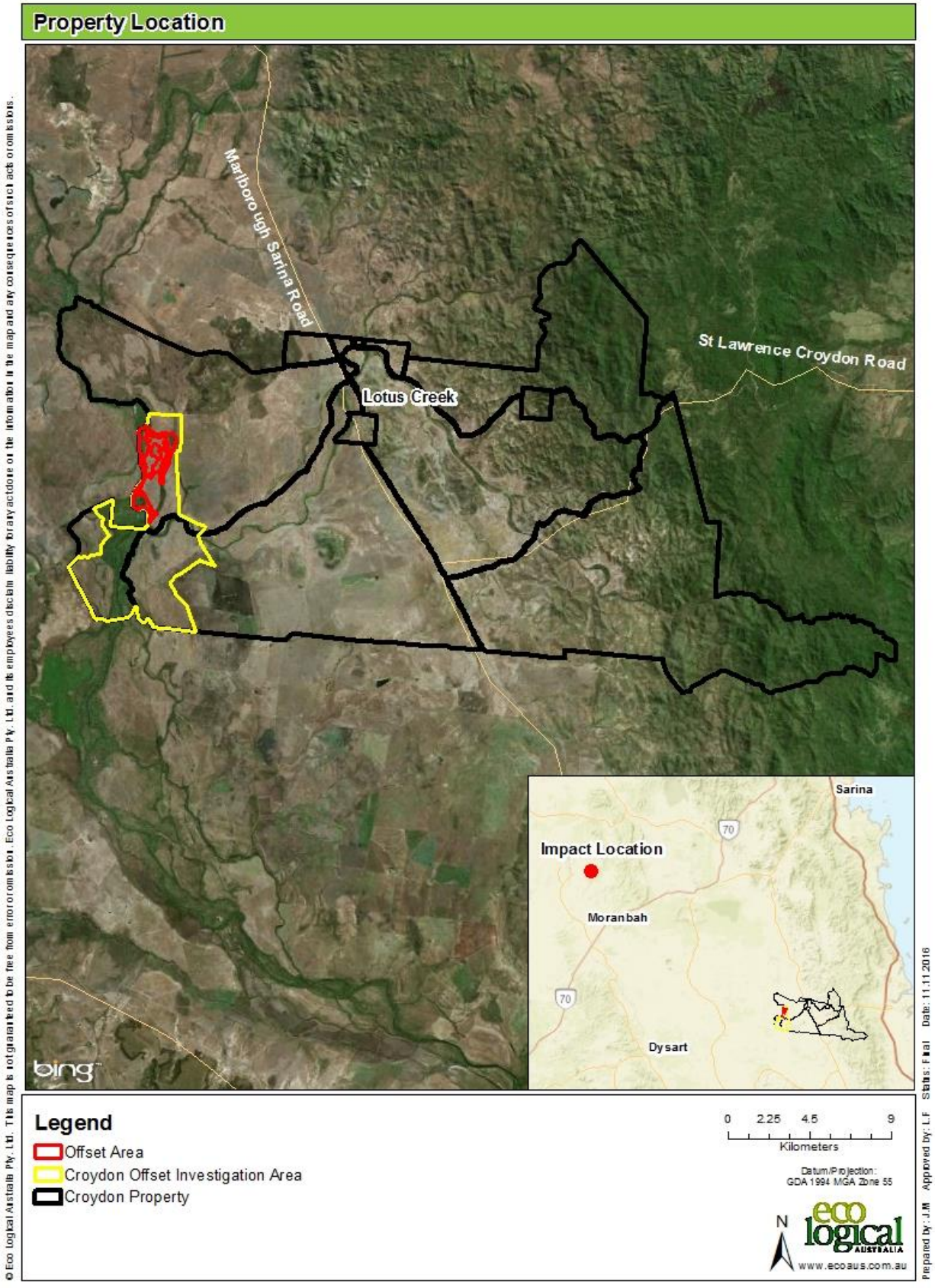
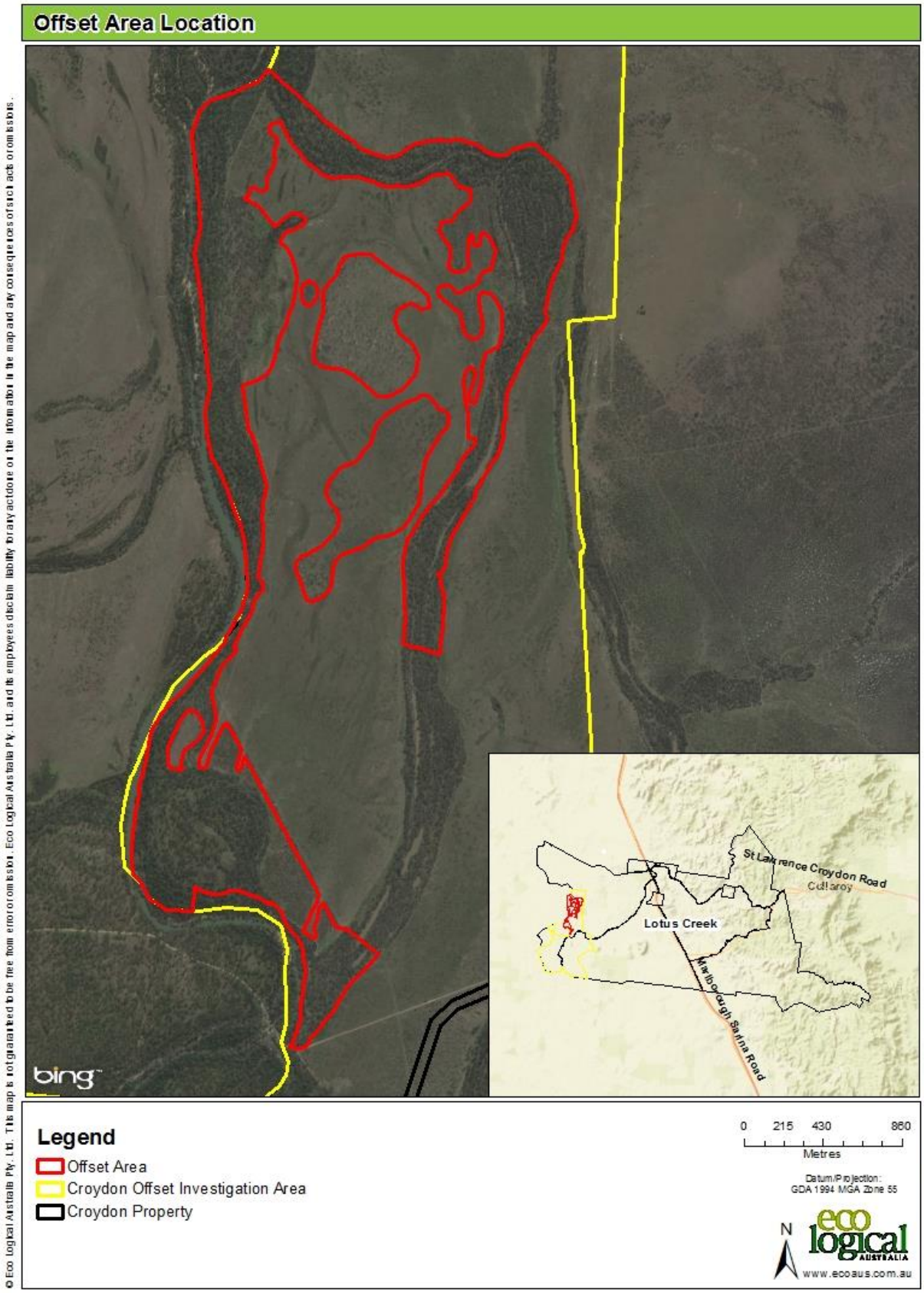


Figure 4: BMC Dragline move project - Offset Area Location Map



3.3.4 Offset Site Surveys and Results

The offset field assessments carried out at Croydon by Ecological Australia Pty Ltd in March/April 2016, consisted of several methodologies including MNES habitat assessment, BioCondition Assessment, the Guide to determining terrestrial habitat quality and Ornamental Snake surveys.

The likelihood of occurrence of threatened flora and fauna along with their habitats were assessed through searches of likely habitat as well as opportunistic searches during foot and vehicular traverses. Offset areas for MNES were assessed with reference to the respective guidelines[1], the EPBC Act EOP and using the EPBC Act Offset Assessment Guide to calculate the offset area required for each MNES.

Habitat quality was assessed using the Guide to determining terrestrial habitat quality. A strategic combination of indicators that measures the overall viability of the site and its capacity to support a prescribed environmental matter. The process for assessing habitat quality is designed in a simple and repeatable way. The process includes mapping, field measurements and simple calculations to score the indicators. The assessment must measure habitat quality at the impact site and the offset site in order to quantify and compare scores. Each of the three indicators are scored, then summed and translated to a final score out of 10.

The key indicators for determining habitat quality of a land based impact site or an offset site are:

- site condition: a general condition assessment of vegetation compared to a benchmark
- site context: an analysis of the site in relation to the surrounding environment
- species habitat index: the ability of the site to support a species.

The variance in structure, function and quality of habitat on an impact or offset site is accounted for by delineating sites into 'assessment units' based on broad condition state and distinct regional ecosystems. Once the habitat quality of an offset site has been determined it is then assessed based on its ability to improve and provide a conservation outcome for the impacted matter.

3.3.5 Mapped Vegetation

Table 4 lists the vegetation mapped during offset area field surveys and aligns four regional ecosystems that are the preferred habitat for the listed species Ornamental Snake and Yakka Skink.

[1] Ornamental Snake, Yakka Skink: see *Survey guidelines for Australia's threatened reptiles – Guidelines for detecting reptiles listed as threatened under the* Environment Protection and Biodiversity Conservation Act 1999, *Department of Sustainability, Environment, Water, Population and Communities (2011)* found at http://www.environment.gov.au/system/files/resources/eba674a5-b220-4ef1-9f3a-b9ff3f08a959/files/survey-guidelines-reptiles.pdf. Squatter Pigeon: see *Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the* Environment Protection and Biodiversity Conservation Act 1999, *Department of the Environment, Water, Heritage and the Arts, 2010*, found at http://www.environment.gov.au/system/files/resources/107052eb-2041-45b9-9296-b5f514493ae0/files/survey-guidelines-birds.pdf

Table 4: REs field verified in the MNES offset area on Croydon Station

RE Code	Short Description (Queensland Herbarium, 2015)	VM Status*	Preferred habitat	EPBC Act Status	BVG 1M **	Area (ha)
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Endangered	Ornamental Snake Yakka Skink	Endangered (Brigalow)	25a	13.6 remnant 59.8 regrowth
11.4.9	*Acacia harpophylla* shrubby woodland with *Terminalia oblongata* on Cainozoic clay plains	Endangered	Ornamental Snake Yakka Skink	Endangered (Brigalow)	25a	13.5 remnant 26.8 regrowth
11.3.4	*Eucalyptus tereticornis* woodland to open forest on alluvial plains	Of concern	Ornamental Snake Yakka Skink	Not listed	16c	75.3 remnant
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains	Least concern	Ornamental Snake/ Squatter Pigeon	Not listed	16c	77.7 remnant 6.4 regrowth
Total;						275.90

** Note: Vegetation Management Status (*Vegetation Management Act 1999 (Qld)*)*

*** Note: Broad Vegetation Group (1:1,000,000)*

3.3.6 Offset Site Start Values

The Offset Site start values for each MNES are detailed in ***Table 6A, Table 6B*** and ***Table 6C***.

3.3.7 Ornamental Snake

The Ornamental Snake inhabits low-lying areas with deep cracking clay soils that are subject to seasonal flooding, and adjacent areas of clay and clay loams. Within the Project footprint, four REs were identified as being preferred habitat. They are REs 11.3.25, 11.4.2, 11.4.9 and 11.9.5. The removal of 21.6 ha of primary habitat for the Ornamental Snake will be offset as this is the impact to these vegetation types outside of the mining lease areas. Maps illustrating the impact areas for Ornamental Snake habitat are shown at ***Appendix A1***.

Weighting of quality components

- Site condition = 4/10 according to vegetation type in combination with microhabitat features (gilgai and coarse woody debris and ground litter) and condition of vegetation;
- Site context = 4/10 according to size of habitat areas, connectivity and proximity of habitat with other vegetated habitats and larger remnant areas; and
- Species stocking rate = 2/10 where 0 = absent, 1 = present in low numbers, 2 = present in high numbers based on survey of the site and nearby records.

Table 5A provides a description of the rationale for the impact site scoring used in the EPBC Act Offset Assessment Guide for the Ornamental Snake primary habitat.

Table 5A: Impact Area - EPBC Act Offset Assessment Guide Inputs – Ornamental Snake

Attribute	Value	Rationale/assumption
Impact Area	52.44 ha	
Description		The regional ecosystems in the impact area that are consistent with the habitat requirements for this species are 11.3.25, 11.4.2, 11.4.9 and 11.9.5, due to the presence of cracking clay soils and gilgai in these ecosystems.
Quality	7/10	Site condition - 3 The habitat quality score was derived using the *Guide to determining terrestrial habitat quality* and the scores averaged across the 12 sites surveyed. The score reflects the condition of the vegetation. A conservative approach has been adopted for the modelling results. The scores for the individual survey sites are derived from the filed report supplied previously as Attachment 3 to the Preliminary Documentation
		Site context – 3 The impact site in context to the landscape and the suitability for the species is the presence of nearby records and the number of watercourses crossed. A conservative approach has been adopted for the modelling results.
		Species stocking rate – 1 Based on modelling of preferred habitat and nearby records

3.3.8 Ornamental Snake – Offset Site Attributes

Habitat values for Ornamental Snake were assessed by the presence of critical habitat factors as listed in the SPRAT and survey guidelines. Critical habitat factors such as gilgai, cracking clay, fallen foody debris and close proximity to water were all factored into the assessment. Ornamental Snake was confirmed as occurring within the larger offset area on Croydon Station.

Proposed offsets for the Ornamental Snake consist of the following vegetation and REs:

- 11.3.1 (remnant AU1 and non-remnant AU2);
- 11.3.3 (remnant AU6 and non-remnant AU7);
- 11.3.4 (remnant AU5);
- 11.3.25 (remnant AU8);
- 11.3.27 (remnant AU9); and
- 11.4.9 (non-remnant AU3, AU4)

Detailed data from the field surveys is at shown at ***Appendix C1: Supporting Information*** and ***Appendix C2: Detailed Field Data and Assessment Units.***

The proposed offset area provides 254.6 ha of Ornamental Snake habitat that contains the preferred habitat structure, resources and essential microhabitat features that are species requirements outlined in the Commonwealth species profile and threat database (**SPRAT**). This habitat can be described as woodland and regrowth communities analogous to REs 11.3.1 and 11.4.9 that support gilgai and soil cracks. Woodland and regrowth communities within close proximity to wetlands or large waterway systems (stream order 8) are also areas of identified Ornamental Snake habitat within the offset area, which includes communities analogous to REs 11.3.3 and 11.3.4.

The woodland communities within the offset area are in remnant condition and contain aquatic habitat suitable to support the species' preferred prey of frogs. Habitat on clays plains were found to contain a variety of shallow to deep gilgai that could retain soil moisture as well as large pools of water suitable for use as breeding habitat for frog species. Based on the presence and condition of aquatic habitat, foraging resources were verified during field surveys to be abundant within remnant habitat areas. In addition, remnant habitat areas were found to contain an abundance of coarse woody debris, deep leaf litter and/or soil cracks that could provide sufficient shelter habitat for the species. Habitat quality assessments found these remnant areas to be in moderate to high condition.

The regrowth communities within the offset area were also found to contain suitable aquatic habitat and therefore foraging resources for Ornamental Snake. The abundance of shelter habitat was not as high as remnant habitat areas; however deep soil cracks were present throughout regrowth areas. Habitat quality assessments found regrowth habitat to be in poor to moderate condition.

The proposed offset area occurs in the lower catchment of the Connors River, which consists of a series of braided channels, lagoon wetland systems and floodplains, all land form types where the species is often found in greatest numbers. Species presence has been confirmed within the area and species abundance was found to be high during fauna surveys within suitable habitat areas, which includes areas of regrowth habitat. This recorded presence is now the most eastern known population for the species. The proposed offset area and surrounding suitable habitat is therefore considered important in maintaining the population of Ornamental Snake in the region.

Weighting of quality components

Specific habitat requirements of Ornamental Snake include the presence of gilgai (the diet is comprised predominantly of frogs) in Brigalow, Gidgee, Blackwood or Coolibah woodland or open forest ideally with coarse woody debris and ground litter. The connectivity of suitable habitat and remnant vegetation is considered important for dispersal. The species is known to travel at least 1 km from remnant/wooded gilgai habitat, in drought conditions for example. According to the *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* (Department of Sustainability, Environment, Water, Population and Communities (**SEWPaC**), 2011) 'suitable habitat' for the Ornamental Snake is considered important if it is:

- habitat where the species has been identified during a survey;
- near the limit of the species' known range;
- large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations); or
- a habitat type where the species is identified during a survey, but which was previously thought not to support the species (SEWPaC, 2011).

The Draft Referral guidelines also states that due to the limited information about the Ornamental Snake, important habitat should be considered a surrogate for important populations (SEWPaC, 2011).
It is therefore considered that site condition and site context are more important habitat characteristics.

- Site condition = 4/10 according to vegetation type in combination with microhabitat features (gilgai and coarse woody debris and ground litter) and condition of vegetation
- Site context = 4/10 according to size of habitat areas, connectivity and proximity of habitat with other vegetated habitats and larger remnant areas
- Species stocking rate = 2/10 where 0 = absent, 1 = present in low numbers, 2 = present in high numbers based on survey of the site and nearby records.

A copy of the EPBC Offset Assessment Guide calculator output worksheets for the Ornamental Snake is provided at ***Schedule 3A***. ***Table 5B*** below provides a description of the input values used for the calculation.

Table 5B: EPBC Act Offset Assessment Guide Inputs – Ornamental Snake

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Area (ha)	213.5	41.1	Area verified in field assessments conducted by ELA (2016) The area comprises REs that are listed as Essential Habitat under the VMA for the Ornamental Snake habitat – see the list at **Appendix C3**. Some of the REs are not listed in Table 4.1 of the Impact site report as they do not have deep cracking soils. The Ornamental Snake has been found in the offset area within the REs listed for use as an offset and are suitable because of their proximity to water. Proposed offsets for the Ornamental Snake consist of the following vegetation and REs • 11.3.1 (remnant AU1) • 11.3.3 (remnant AU6) • 11.3.4 (remnant AU5) • 11.3.25 (remnant AU8) • 11.3.27 (remnant AU9) • 11.4.9 (remnant AU3) See **Appendix C2** for photos and detailed field data of each of the Assessment Units (AU).	Area verified in field assessments conducted by ELA (2016). The area comprises REs that are listed as Essential Habitat under the VMA for the Ornamental Snake habitat - see the list at **Appendix C3**. Some of the REs are not listed in Table 4.1 of the Impact site report as they do not have deep cracking soils. The Ornamental Snake has been found in the offset area within the REs listed for use as an offset and are suitable because of their proximity to water. Proposed offsets for the Ornamental Snake consist of the following vegetation and REs • 11.3.1 (non-remnant AU2) • 11.3.3 (non-remnant AU7) • 11.4.9 (non-remnant AU4). See **Appendix C2** for photos and detailed field data of each of the Assessment Units (AU).

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Quality				
Start quality	7	5	Site condition score – 3 Vegetation condition is moderate with recruitment levels and structural complexity generally resembling an undisturbed community. However, weed incursion and therefore species diversity varies from low to high, canopy and shrub cover has been disturbed and in some areas, there is a lack of large mature trees. Habitat quality for Ornamental Snake is high due to moderate existing threats in the form of grazing, feral pig presence and some weed cover, and the abundance of foraging and sheltering resources. These areas within the offset area are likely to play an important role in the maintenance of the species in the region. Key habitat aspects for coarse woody debris, organic litter, weed cover, habitat shelter and quality as well as foraging abundance score from low to high with the major limiting factor being coarse woody debris scoring low in some sites and weed cover being moderate to high across most sites. These factors are then flow through to the quality and availability of shelter for the species.	Site condition score – 2 The regrowth communities within the offset area were found to contain suitable aquatic habitat and therefore foraging resources for Ornamental Snake although in a poor to moderate condition due to the immature in the structure of the community and the associated habitat factors. The abundance of shelter habitat was not as high as remnant habitat areas; however deep soils cracks were present throughout regrowth areas. Habitat quality assessments found regrowth habitat to be in poor to moderate condition with the main limiting factors being a lack of shelter in the form of fallen woody debris which was absent on nearly all the regrowth sites and a higher weed cover was present. This is detailed in the field survey data at **Appendix C2**, - see “fallen woody debris” and “weed cover” in AUs 2, 4 and 7. Due to the higher grass cover in the regrowth areas, the grazing capacity/pressure is higher potentially impacting the soil structure via compaction, especially in wet conditions. The elevated weed cover in the form of grass exacerbates this threat along with an abundance of feral pigs utilising the area for foraging and wallowing.
			Site context score - 3 Site context ranges from moderate to high due to varying levels of connectivity to surrounding vegetation. Some areas form large contiguous vegetation patches, whilst others are more fragmented and isolated. All areas are situated within a mapped ecological corridor.	Site context score - 2 The overall site context is generally moderate due to reduced connectivity to surrounding remnant vegetation (the regrowth offset assessment unit boundaries are predominantly only between 10-50% of the length of the boundaries area connected) as the individual offset assessment units are smaller and isolated vegetation patches with varying levels of connectivity to surrounding remnant vegetation. All areas are situated within a mapped ecological corridor raising the score to moderate. This is detailed in the field survey data at **Appendix C2**, - see “GIS based attributes” in AUs 2, 4 and 7.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
			Species stocking rate = 1 The offset area is within the known distribution of the Ornamental Snake in Queensland; it is known to occur and has been previously recorded in the offset area (ELA, 2016). It is known to be present as potential habitat is available, however, it is not assumed to be present in high numbers.	Species stocking rate = 1 The offset area is within the known distribution of the Ornamental Snake in Queensland; it is known to occur and has been previously recorded in the offset area (ELA, 2016). It is known to be present as potential habitat is available, however, it is not assumed to be present in high numbers. `
Future quality without offset	6	3	Site condition score – 2 Part of the property's routine management for grazing which is undertaken in on a 7-8-year cycle (ongoing purpose) is the thinning of remnant vegetation within the limits of the self-assessable codes under the Vegetation Management Act 1999 (Qld) and then a subsequent use of fire in summer to reduce the presence of coarse woody debris to enable easier access for livestock and to increase exotic grass cover by reducing the competition from shrubs and secondary canopy layers. This would cause a further reduction in the scores for coarse woody debris (sites with coarse woody debris would drop from a 5 or 2 to 0), weed cover (from 10 to 5) and for a shorter term, a reduction in organic litter although this would most likely recover within the ecological survey cycle depending on the time of surveys in comparison to the timing of thinning and burning. Further impacts would be expected due to the increased use of the remnant vegetation areas for shelter once the regrowth areas were re-cleared. There is considerable risk of soil compaction and subsequent effect on soil cracks and habitat quality due to the reduction in water quality for frogs that are the species preferred food source thus affecting the habitat shelter and foraging scores. Grazing during wet periods would continue without the restrictions within the Offset Area Management Plan as grazing without the offset	Site condition score – 1 As discussed in **Section 3.3.2** of the EPBC Offset Delivery Plan, the regrowth areas on the property are scheduled for re-clearing and subsequent burning as part of the ongoing cycle of pasture maintenance. Plate 3 and Plate 4 in **Section 3.3.3** illustrate the condition in which the pasture in the offset area is usually maintained. As can be seen from these images, there is no woody debris (scores would drop to 0), essentially 100% exotic pasture cover (weed cover scores would drop to 0) and a resultant higher grazing capacity and pasture utilisation. This clearing will remove any standing vegetation, however for this species, the greatest impact will be to the maintenance of an absence of coarse woody debris, a further reduction in organic litter (as a result of the use of fire) which is used for sheltering, as well as an increase in exotic grass cover. An increase in grazing pressure and compaction as a result of the increased grass cover, (the reason that re-clearing is undertaken), cattle can also compact soils and reduce soil cracks that provide shelter habitat for the species causing a further reduction in the associated abundance and quality of shelter scores. Additionally, there would be the increased impact of compaction due to increased grazing pressure, especially in the event of moist soil conditions being present. Under the "business as usual" scenario, the area is grazed on a continuous basis with cattle only being removed during December/January/February due to seasonal flooding conditions - thus "pugging" of wet soil especially in gullies is an increased threat to the habitat of the species. Continued presence of grazing can also lead to erosion and sedimentation of wetlands, waterways and gilgai areas impacting negatively on frog

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
			is timed to only be excluded during the normal flood months of December to February. The site condition score is an indication of the average quality without the offset over a 20 year period taking into consideration the 7-8 year cycle of thinning, and burning.	populations, which are a key prey item for the Ornamental Snake. There would also be an impact on the on food sources for the species (frogs) due to a reduction in water quality during these times. This would further impact on the already moderate to low foraging habitat scores. The site condition score is an indication of the average quality without the offset over a 20 year period taking into consideration the 7-8 year cycle of re-clearing burning and grazing.
			Site context – 3 Site context score would be maintained as there would be no impact to the context with regards the amount of remnant vegetation within 1km of the offset, patch size or ecological corridor scores. There would be some impact to the connectivity of the patch with regards the loss of the regrowth adjacent to some patches, however the impact on the species within the remnant areas would not be excessive.	Site context – 1 Under site context, the most limiting factors that would be impacted by "business as usual" (re-clearing and burning of the regrowth) would be patch size (would reduce the score substantially) and connectivity to adjacent remnant vegetation (a further reduction in scores). The re-clearing of the site would reduce the habitat extent and connectivity, impacting on the species ability to disperse.
			Species stocking rate – 1 As a result of the above practices and impacts to habitat, as well as impacts to connectivity reducing the species ability to move across the landscape, it is anticipated that there would be an impact to species population, however the score remains at 1 as it would still be present, however not in high numbers	Species stocking rate – 1 As a result of the above practices and impacts to habitat, food supply and foraging ability as well as impacts to connectivity reducing the species' ability to move across the landscape, it is anticipated that there would be an impact to species population, however the score remains at 1 as it would still be present, however not in high numbers
Future quality with offset	9*	7	Site condition score – 4 Protection and management of this area can improve the current condition, particularly by control of the existing weed levels, by allowing the improvement of habitat quality by ensuring continued natural succession and development of mature features such as the retention of coarse woody debris, the increase in organic litter and the reduction in the impacts of cattle grazing on the soil condition by grazing only being allowed during the dry season.	Site condition score – 3 Regrowth communities are generally on a trajectory of improvement. With active management, such as prevention of clearing, prevention of sowing exotic pasture species, reduced cattle grazing, use of fire and pest animal management, this improvement can be accelerated and degradation prevented and improve the quality and abundance of foraging and habitat. Attributes that are considered most reasonable related to the species requirements and would increase in score over the term of the offset would

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
			Improvements in the following attributes that are related to the species habitat are expected over the course of the offset. Coarse woody debris (increases from a score of 0 to a score of 2), organic litter (maintains a score of 5), weed cover (increases from 0 and 3 in some sites to an average of a score of 5 across the entire offset area). This would lead to an increase in the abundance of shelter for the species and an increase in this relative score. It is also expected that there would be an increase in the quality and availability of the foraging habitat within RE 11.3.1 due to a decrease in the impacts of cattle on the water quality due to not grazing during wet periods, therefore improving the habitat of the preferred food source for the species being frogs. *Note- a score of 8 is utilised in the offset calculator within Schedule 3 (EPBC Offset Assessment Guide Results) to provide a level of conservatism.	be coarse woody debris (increase in score from 0 to 2), organic litter (increase in score from 3 to a consistent 5 across the regrowth areas) and weed cover from a series of low scores to an average of 5 across the regrowth areas. Removal of stock during the wet season will decrease soil compaction, limit understorey trampling and improve water quality of frog habitat. This will in turn improve the quality and abundance of foraging and sheltering resources. This will have a positive impact on the scores for the abundance of shelter and foraging habitat available for the species. Control of pest species will also reduce potential threats to Ornamental Snake.
			Site context – 4 The site context is expected to increase as the scores for both connectivity and the amount of remnant vegetation within a 1km buffer would increase as the regrowth areas adjacent to the remnant areas became remnant areas therefore increasing the connectivity of the individual patches.	Site context – 3 Protection from clearing will increase connectivity and patch size, which in turn would increase the area's ability to sustain viable populations.
			Species stocking rate – 1 The species is known to be present in the area (ELA 2016) and the improvement in condition and context should support a higher population. However, for conservative scoring, the future population estimate is left unchanged as being present but not in high numbers.	Species stocking rate – 1 The species is known to be present in the area (ELA 2016) and the improvement in condition and context should support a higher population. However, for conservative scoring, the future population estimate is left unchanged as being present but not in high numbers.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Time until ecological benefit	20	20	Estimated time for weed and pest reduction, further development of features such as the amount of coarse woody debris, improvement in water quality for the food source (frogs) and the establishment of a good soil structure that enables the species to exploit soil cracks for shelter and for increase in Ornamental Snake abundance and breeding success (due to better quality habitat and more prey items).	Estimated time for canopy layer to mature and provide leaf litter and fallen woody debris for sheltering habitat, improvement in water quality for the food source (frogs) and the establishment of a good soil structure that enables the species to exploit soil cracks for shelter and for increase in Ornamental Snake abundance and breeding success (due to better quality habitat and more prey items). This timeframe also accommodates for an increase in Ornamental Snake abundance and breeding success (due to better quality habitat and more prey items).

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Confidence in quality scores	90%	90%	The prevention of thinning activities, stick raking of coarse woody debris and the subsequent use of fire to remove this habitat feature have a high certainty under the Offset Area Management Plan. The field survey results (**Appendix C2**) demonstrate the amount of accumulated woody debris that would be retained under the management plan. The scores for the coarse woody debris present when the field surveys were undertaken we predominantly under half of the benchmark score and are detailed below. • 11.3.1 (remnant AU1) – survey site scores 2, 5, 2 with a maximum possible score of 5; • 11.3.3 (remnant AU6) - survey site scores 0, 2 with a maximum possible score of 5 (freshwater wetland); • 11.3.4 (remnant AU5) - survey site scores 5, 5 with a maximum possible score of 5; • 11.3.25 (remnant AU8) - survey site scores 2, 5, 5 with a maximum possible score of 5; and • 11.3.27 (remnant AU9) - survey site scores 5, 0 with a maximum possible score of 5. Weed cover varies significantly across the assessment units with a variation of a score of 0 (more than 50% weed cover) to a score of 10 – maximum 5% weed cover). The removal of the thinning, burning and stick raking threat in conjunction with the reduction in grazing pressure and time and the reduction in the use of the remnant areas as cattle shelter areas will assist in the increase in coarse woody debris, and native ground cover thus preventing further weed incursion in the remnant areas.	Improvement in quality and abundance of sheltering habitat is reliant on natural succession of the canopy, secondary layers and shrub layers of the vegetation community which will evolve as a result of the prevention of clearing, stick raking of coarse woody debris and burning of same, and the use of fire for woody regrowth control. The scores for coarse woody debris (shelter) and organic litter are low for this species in the regrowth areas and the control of the threats as per **Section 3.3.2** of the EPBC Offset Delivery Plan would enable the vegetation community to mature which will lead to an increase in these scores over time. As the canopy establishes and increases in cover (currently low scores for canopy height and cover), there will be a resultant gradual decreasing of exotic grass and weed cover as the canopy closes. In parallel, there will be an increase in coarse woody debris, organic litter and native grass cover which are all low to non-existent in the current scores. As exotic grass cover decreases, there will be a resultant reduction in grazing capacity and grazing pressure which will in turn reduce soil compaction and the resultant effect on soil cracking. Grazing under the Offset Area Management Plan is restricted to dry times thus further reducing the impacts on soil cracks via “pugging” as well as the impacts to water quality affecting the species primary food source being frogs. These factors will increase the scores for quality of shelter and foraging habitat which are predominantly moderate with some poor scores. Additionally, a pest animal and fire control program is detailed in the Offset Area Management Plan which will further decrease the risks associated with the offset achieving the required outcomes and increase the shelter quality and foraging scores for the regrowth areas.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Raw gain	2	4	As per OAG	
Adjusted gain	1.8	3.6	As per OAG	
Risk of Loss				
Risk of loss without offset	10%	90%	Continuation of thinning of secondary canopy and shrub layers, the use if stick raking and burning of coarse woody debris (lower scores to 0 or 2 in most areas of remnant vegetation) (7-8-year cycle in line with the treatment of the regrowth areas) with the intent of increasing exotic grass cover and therefore allow for a higher grazing capacity in areas of Ornamental Snake habitat would degrade essential habitat features that are critical to supporting the species. These actions would not destroy the habitat, however would have a detrimental effect on the quality of that shelter and foraging habitat and abundance of the species in the remnant areas resulting in lower scores for these attributes. At this point in time, the quality of habitat is moderate for this species throughout the remnant area. These scores are connected to the lower scores associated with canopy cover which is then associated with the higher exotic grass (scores would reduce to average 3 across the site) cover and the consistent scores 0 or 2 being less than 10% and 50% coarse woody debris cover as compared to the benchmark for each regional ecosystem. These factors would then translate into lower scores for the abundance of shelter available for the species. As a result of the implementation of the offset, there would also be an increase in the context scores as the amount of remnant vegetation within the area would increase.	The offset areas have been historically cleared since the early 1970s - see **Plate 3**, **Plate 4**, **Section 3.3.2** and **Section 3.3.3** of the EPBC Offset Delivery Plan. The recurring clearing undertaken periodically as described in those sections is scheduled to be undertaken again within the next 2-3 years with the clearing and subsequent burning and stick raking only being delayed until the end of the wet season. This recognised practice of woody weed control and pasture improvement results in the destruction of the native species richness, canopy and shrub layer with a result that the scores for these attributes (see **Appendix C2**) would decrease dramatically. The act of chaining and stick raking would also result in damage to the structure of the gilgai, soil cracks and levelling of the soil surface. This would result in a further decrease in the shelter and foraging quality scores associated with the regrowth areas. The treatment of the regrowth will result in an increase in exotic grass cover (increase in weed cover score). Subsequently this increase in pasture cover will enable an increase in grazing capacity with a subsequent increase in soil compaction and damage to soil cracks and a resultant decrease in the abundance and quality of the shelter scores for the regrowth areas. Additionally, impacts will be to the quality and abundance of foraging habitat for the preferred food source (frogs) for the species. This would be as a result of the physical actions of the re-clearing practices and then the subsequent higher grazing capacity affecting water quality as grazing would not be restricted to the dry season as it is under the Offset Area Management Plan.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
				As the area was being used for grazing (and cleared for that purpose) well before the introduction of the EPBC Act in 1999, the landowner is exempt from the EPBC Act under section 43B as discussed in **Section 3.3.3**. Year of initial clearing – from historical photos is evidenced to have been between 1966 and 1975 – see **Plate 3** and **Plate 4** Over the last 15 years: • Regrowth was re-pulled and seeded during 1989 and 1990 • Oversown with exotic pasture grass in 1991 • The subsequent re-clearing cycle was to re-chain and burn every 7-8 years during the dry months with timing being dependent on seasonal conditions • Regrowth areas are programmed to be re-cleared, burnt and stick raked in the next 2-3 years. The Risk of Loss without an Offset is very high due to these re-clearing, burning practices and there is 100% certainty that these practices will occur without the restrictions within the Offset Area Management Plan.
Risk of loss with offset	2%	2%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be managed. Stochastic events such as natural fires and flooding will still pose a risk to the offset area. Management actions and remediation activities will be in place to assist in reducing these risks or the severity of outcomes.	
Time over which loss is averted	20	20	Maximum of 20 years.	

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Confidence in risk scores	90%	90%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be undertaken for fire management purposes during the dry season. This will effectively reduce risk of loss in the quality of the offset site.– i.e., the banning of clearing and pasture improvement activities has a high averted loss factor as discussed in **Section 3.3.2** and **Section 3.3.3**. These actions are effective immediately on securing the offset and will avert the immediate risk of re-clearing and the subsequent effect on habitat, shelter and foraging scores and attributes. There is little risk to the improvement in the quality of the offset site over time with the averted loss, management of fire and grazing times to be restrained to low intensity burns as per the recommendations in the Regional Ecosystem Description Database and grazing restricted to dry times where there is reduced risk associated with soil compaction and pugging which effects soil structure and the presence of cracks. The increase in canopy cover, coarse woody debris, organic litter and reduction in weed cover will also increase the scores for those attributes over time and subsequently be reflected in the shelter and foraging quality and abundance scores. This gives a high confidence in the outcome of the offset when managed as per the accompanying Offset Area Management Plan. This confidence is supported with a robust Monitoring and Reporting schedule within the OAMP which is based on an adaptive management strategy related directly to these measurable indicators (attributes).	
Raw gain	17.08	36.17	As per OAG	
Adjusted gain	15.37	32.55	As per OAG	
Results				
Net present value	45.05	31.28	As per OAG	
% impact offset	122.72%	63.51%	As per OAG	
TOTAL % impact offset	186.23%		Proposed offset area offsets significant residual impacts on Ornamental Snake	

3.3.9 Yakka Skink

The Yakka Skink lives in colonies within a wide distribution area from Cape York to the St George area in south-west Queensland. The species is reliant on soil types that enable burrowing and to those areas that have an abundance of hollow logs and/or the presence of rocks and boulders. There were 19 REs identified by the modelling as preferred habitat within the Project footprint. These are listed in ***Table 6A*** along with the rationale for the EPBC calculator input scores. Maps illustrating the impact areas for Yakka Skink habitat are shown at ***Appendix A2***.

Weighing

- Site condition = 4/10 according to vegetation type in combination with microhabitat features (coarse woody debris and ground litter) and condition of vegetation
- Site context = 4/10 according to size of habitat areas, connectivity and proximity of habitat with other vegetated habitats and larger remnant areas
- Species stocking rate = 2/10 where 0 = absent, 1 = present in low numbers, 2 = present in high numbers based on survey of the site and nearby records.

Table 6A: Impact Area - EPBC Act Offset Assessment Guide Inputs – Yakka Skink

Attribute	Value	Rationale/assumption
Impact Area	105.63 ha	
Description		Yakka Skink has a preferred habitat that is consistent with a number of plant species *(Brigalow Belt Reptiles Workshop 2010; Department of Environment 2016c*). There are 19 REs within the impact area that have at least one of the following species within their composition: brigalow, mulga, bendee, lancewood, belah, poplar box, ironbark, and white cypress. The 19 REs are: 11.3.1, 11.3.2, 11.3.4, 11.3.25, 11.4.2, 11.4.9, 11.5.3, 11.5.9, 11.5.15, 11.7.2, 11.7.3, 11.8.5, 11.9.3, 11.9.4a, 11.9.1, 11.9.2, 11.9.5, 11.9.7a, and 11.10.3.
Quality	6/10	Site condition – 2 The habitat quality score was derived using the *Guide to determining terrestrial habitat quality* and the scores averaged across the 12 sites surveyed. Site condition of the vegetation and habitat was highly variable scoring from 6 to 0 and averaging 5, The scores for the individual survey sites are derived from the field report supplied previously as Attachment 3 to the Preliminary Documentation
		Site context - 2 Site context scores were more consistent and varied between 4 and 5. Suitability for the species was also more consistent between 3.5 and 4.
		Species stocking rate – 1 Based on modelling of preferred habitat and nearby records

3.3.10 Yakka Skink – Offset Site Attributes

The proposed offset area provides 245.8 ha of Yakka Skink habitat that is dominated by preferred vegetation type, substrate and essential microhabitat features that are species requirements outlined in the Commonwealth species profile and threat database. This habitat can be described as woodland and regrowth communities analogous to REs 11.3.1, 11.4.9, 11.5.3, 11.3.25 and 11.3.4.

Habitat

Suitable habitat for the Yakka Skink is considered to be open-forests to low-woodlands and scrub in Queensland RE Land Zones (**LZ**) 3, 4, 5, 7, 8, 9, 10 and 12 (LZ 8 not considered core habitat; LZ 12 is found in the Wet Tropics bioregion only). Colonies have been found in large hollow logs, cavities or burrows under large fallen trees, tree stumps, logs, stick-raked piles, large rocks and rock piles, dense ground-covering vegetation, and deeply eroded gullies, tunnels and sinkholes.

The Yakka Skink is found in open dry sclerophyll forest or woodland (*Wilson and Knowles, 1988; Cogger, 2000*). This species will often take refuge among dense ground vegetation, large hollow logs, cavities in soil-bound root systems of fallen trees and beneath rocks. They may also excavate burrow systems among low vegetation or below logs (*Ehmann, 1992*). In cleared habitat, Yakka Skinks may persist where shelter sites such as tunnel erosion, rabbit warrens and log piles exist (*TSN, 2008*).

Threats

The main identified threat to the Yakka Skink is a continued legacy of past broadscale land clearing and habitat degradation. The Brigalow Belt Bioregion is an area of high human impact (*Covacevich et al., 1998*) with much of the region modified through agricultural and urban development *(McDonald et al., 1991; Cogger et al., 1993)*.

Other threats to the Yakka Skink include inappropriate roadside management, removal of wood debris and rock microhabitat. These threats are addressed within the Offset Area Management Plan for both remnant and regrowth communities in the offset area and these threats have been taken into consideration in assessing the habitat quality and risks of success for the offset.

The woodland communities within the offset area are in remnant condition and occur on the soil substrates that are preferential for the species. In some portions, this habitat is also dominated by a canopy often associated with the species including brigalow and poplar box. Both structural complexity and floristic diversity within remnant habitat was found to be moderate to high, providing an array of habitat niches for the species' food source such as invertebrates. Based on this habitat condition, foraging resources were verified during field surveys to be abundant within remnant habitat areas. In addition, remnant habitat areas were found to contain an abundance of coarse woody debris, deep leaf litter in some areas, and large logs, which provide sufficient shelter habitat for the species. Habitat quality assessments found these remnant areas to be in moderate condition.

The regrowth communities within the offset area were also found to occur on preferential soil substrates and contain associated canopy species. However, due to the degraded condition of these habitat types, both foraging and sheltering resources were found to be limited. Habitat quality assessments found regrowth habitat to be in poor to moderate condition. The risk of re-clearing, oversowing with pasture grasses, stick raking and burning of woody debris have been discussed in ***Sections 3.3.2*** and ***Section 3.3.3***.

Similar to the impact area, the offset area occurs in northern areas of the Brigalow Belt where populations of Yakka Skink are scattered and fragmented. Targeted searches for the species were not undertaken during field assessments; however previous records of the species occur within 106 km of the offset area. This is similar to the impact area where closest records of the species to the impact site are 190 km away.

Weighting of quality components

Known important habitat requirements for the Yakka Skink include any contiguous patch of suitable habitat, particularly remnant vegetation, where a colony is known or identified and any microhabitat where colonies are likely to be found, ideally with coarse woody debris and ground litter, connectivity of suitable habitat and remnant vegetation is considered important for dispersal of these fragmented populations.

According to the *Draft Referral guidelines for the nationally listed Brigalow Belt reptiles* 'suitable habitat' for the Yakka Skink is considered important if it is:

- habitat where the species has been identified during a survey;
- near the limit of the species' known range;
- large patches of contiguous, suitable habitat and viable landscape corridors (necessary for the purposes of breeding, dispersal or maintaining the genetic diversity of the species over successive generations); or
- a habitat type where the species is identified during a survey, but which was previously thought not to support the species (*SEWPaC, 2011*).

The Draft Referral guidelines also states that due to the limited information about the Yakka Skink, important habitat should be considered a surrogate for important populations (*SEWPaC, 2011*).

It is therefore considered that site condition and site context are more important habitat characteristics:

- Site condition = 4/10 according to vegetation type in combination with microhabitat features (sandy soils, coarse woody debris and ground litter) and condition of vegetation;
- Site context = 4/10 according to size of habitat areas, connectivity and proximity of habitat with other vegetated habitats and larger remnant areas; and
- Species stocking rate = 2/10 where 0 = absent, 1 = present in low numbers, 2 = present in high numbers based on survey of the site and nearby records.

A copy of the EPBC Offset Assessment Guide calculator output worksheets for the Yakka Skink is provided at ***Schedule 3B***. ***Table 6B*** below provides a description of the input values used for the calculation.

Table 6B: EPBC Act Offset Assessment Guide Inputs – Yakka Skink

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Area (ha)	159.2	86.6	Area verified in field assessments conducted by ELA (2016) Proposed offsets for the Yakka Skink consist of the following vegetation and REs all of which are within the listed preferred land zones for habitat as per the *Approved Conservation Advice for Egernia rugosa (Yakka Skink)* • 11.3.1 (remnant AU1) • 11.3.4 (remnant AU5) • 11.3.25 (remnant AU8) • 11.4.9 (remnant AU3) • 11.5.3 (remnant AU10)	Area verified in field assessments conducted by ELA (2016) Proposed offsets for the Yakka Skink consist of the following vegetation and REs • 11.3.1 (non-remnant AU2) • 11.4.9 (non-remnant AU4).
Quality				
Start quality	7	5	Site condition - 3 Vegetation condition is moderate with recruitment levels and structural complexity generally resembling an undisturbed community. However, weed incursion and therefore species diversity varies from low to high, canopy and shrub cover has been disturbed and in some areas, there is a lack of large mature trees. Threats to the species habitat are low apart form a moderate threat due to high weed cover and only moderate presence of course woody debris in RE 11.5.3 (AU10). Habitat shelter quality and availability for Yakka Skink is poor in 2 sites, moderate in 2 and high in 1 site (11.3.25 – AU8). This is due to the low (score of 2 being <10%) of coarse woody debris in 2 sites and only moderate levels in another 2 sites (score 5). Weed cover being moderate to high across most sites. These factors are then flow through to the quality and availability of shelter for the species.	Site condition score – 2 The regrowth communities within the offset area were found to contain suitable foraging resources for Yakka Skink although in a poor to moderate condition due to immaturity in the structure of the community and the associated habitat factors. Habitat quality assessments found regrowth habitat to be in poor (score 1) to moderate (score 5) condition with the main limiting factors being a lack of shelter in the form of fallen woody debris which was absent on nearly all the regrowth sites and a high weed cover being present. This is detailed in the field survey data at ***Appendix C2***, - see “fallen woody debris” and “weed cover” in AUs 2 and 7. Due to the higher grass cover in the regrowth areas (weed cover scores 0 (>50% weed cover) and 5 (> 5% to 25% weed cover) and a coarse woody debris cover scoring 0 (<10% of the benchmark) there

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
			Foraging habitat scores moderate to high due to the large patch sizes and the abundance of foraging resources which enables movement of the species for foraging activities.	is a lack of shelter for the species which scores a 1 being a poor quality and abundance of shelter.
			Site context score - 3 Site context ranges from low to high due to varying levels of connectivity to surrounding vegetation. Some areas form large contiguous vegetation patches, whilst other are more fragmented and isolated. All areas are situated within a mapped ecological corridor. These areas within the offset area are likely to play an important role in the maintenance of the species in the region.	Site context score - 2 The overall site context is generally moderate due to reduced connectivity to surrounding remnant vegetation (the regrowth offset assessment unit boundaries are predominantly only between 10-50% of the length of the boundaries area connected) as the individual offset assessment units are smaller and isolated vegetation patches with varying levels of connectivity to surrounding remnant vegetation. All areas are situated within a mapped ecological corridor raising the score to moderate. This is detailed in the field survey data at ***Appendix C2***, - see "GIS based attributes" in AUs 2 and 7.
			Species stocking rate – 1 The offset area is within the known distribution of the Yakka Skink being two hours north of Rockhampton. It is suspected to be present as potential habitat is available, however, it is not assumed to be present in high numbers	Species stocking rate – 1 The offset area is within the known distribution of the Yakka Skink being two hours north of Rockhampton. It is suspected to be present as potential habitat is available, however, it is not assumed to be present in high numbers.
Future quality without offset	6	3	Site condition score - 2 Part of the property's routine management for grazing which is undertaken in on a 7-8-year cycle (ongoing purpose) is the thinning of remnant vegetation within the limits of the self-assessable codes under the *Vegetation Management Act 1999 (Qld)* and then a subsequent use of fire in summer to reduce the presence of coarse woody debris to enable easier access for livestock and to increase exotic grass cover by reducing the competition from shrubs and	Site condition score - 1 As discussed in ***Section 3.3.2*** of the EPBC Offset Delivery Plan, the regrowth areas on the property are scheduled for re-clearing and subsequent burning as part of the ongoing cycle of pasture maintenance. ***Plate 3*** and **Plate 4** in ***Section 3.3.3*** illustrate the condition in which the pasture in the offset area is usually maintained, i.e., 100% pasture cover. As can be seen from these images, there is no woody debris (scores would remain at 0 for most sites and drop to 0 in RE 11.4.9), essentially 100% exotic pasture

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
			secondary canopy layers. See ***Section 3.3.2*** of the EPBC Offset Delivery Plan. This would cause a further reduction in the scores for coarse woody debris (sites with coarse woody debris would drop from a 5 or 2 to 0), weed cover (from 10 to 5) and for a shorter term, a reduction in organic litter although this would most likely recover within the ecological survey cycle depending on time of surveys in comparison to the timing of thinning and burning. Further impacts would be expected due to the increased use of the remnant vegetation areas for shelter once the regrowth areas were re-cleared. There is considerable risk to the availability and the quality habitat shelter scores 2 of which are already low (RE 11.3.1 and 11.4.9) due to the near lack of coarse woody debris (scores of 1 being less than 10% of the benchmark) as discussed above. There would be a corresponding increase in weed cover in these sites which already score between 0 and 5 being a weed cover of more than 50% to a weed cover of between 5-25%. This will further impact on the shelter available to the species although not to the same extent as the loss of woody debris however the increase in exotic pasture cover would increase fuel loads and therefore the impact of any fires on habitat availability. The site condition score is an indication of the average quality without the offset over a 20 year period taking into consideration the 7-8 year cycle of thinning, and burning.	cover (weed cover scores would drop to 0) and a resultant higher grazing capacity and pasture utilisation. This clearing will remove any standing vegetation, however for this species, the greatest impact will be to the maintenance of an absence of coarse woody debris, a further reduction in organic litter (as a result of the use of fire) which is used for sheltering, as well as an increase in exotic grass cover. An increase in grazing pressure as a result of the increased grass cover, (the reason that re-clearing is undertaken) could also contribute to a further reduction in the associated abundance and quality of shelter scores. Foraging habitat scores are already poor to moderate in the regrowth areas, at best these scores (predominantly score 1) would be maintained, and more probably, the scores in the more mature regrowth areas of a foraging abundance of 5 would be reduced to a score of 1, being poor. The site condition score is an indication of the average quality without the offset over a 20 year period taking into consideration the 7-8 year cycle of re-clearing burning and grazing

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
			Site context score– 3 Site context score would be maintained as there would be no impact to the context with regards the amount of remnant vegetation within 1km of the offset, patch size or ecological corridor scores. There would be some impact to the connectivity of the patch with regards the loss of the regrowth adjacent to some patches, however the impact on the species within the remnant areas would not be excessive.	Site Context – 2 Under site context, the most limiting factors that would be impacted by "*business as usual*" (re-clearing and burning of the regrowth areas) would be patch size (would reduce the score substantially) and connectivity to adjacent remnant vegetation (a further reduction in scores). The re-clearing of the site would reduce the extent of habitat and its connectivity, impacting on the species' ability to disperse.
			Species stocking rate – 1 As a result of the above practices and impacts to habitat, as well as impacts to connectivity reducing the species' ability to move across the landscape, it is anticipated that there would be an impact to species population, however the score remains at 1 as it would still be present, however not in high numbers	Species Stocking Rate- 0 Under the regrowth re-clearing and burning scenario with the resultant increase in non-native grass cover and higher stocking rate, significant impacts are anticipated to the core habitat requirements of coarse woody debris (already poor), organic litter (drop in scores from 5 to 3) and an increase in trampling effects of cattle there is a significant chance that the Yakka Skink would retreat to the remnant vegetation areas. Movement would be significantly reduced with no cover available and predation rates higher due to this lack of shelter availability.
Future quality with offset	9*	7	Site condition score – 4 Protection and management of this area can improve the current condition, particularly by control of the existing weed levels, by allowing the improvement of habitat quality by ensuring continued natural succession and development of mature features such as the retention of coarse woody debris, the increase in organic litter and the reduction in the impacts of cattle grazing on the soil condition by grazing only being allowed during the dry season thus preventing slumping and compaction of sandy soils and substrates that are conducive to burrow construction. Improvements in the following attributes that are related to the species habitat are expected over the course of the offset. Coarse	Site condition score – 3 With active management, such as prevention of clearing, prevention of sowing exotic pasture species, reduced cattle grazing, use of fire and pest animal management, the improvement seen to date in the start quality scores can be accelerated and degradation prevented to improve the quality and abundance of foraging and habitat. Attributes that are considered most reasonable related to the species requirements that would increase in score over the term of the offset would be coarse woody debris increase in score from 0 to 2, organic litter increase in score from 3 to a consistent 5 across the regrowth areas and weed cover from a series of low scores to an average of 5 across the regrowth areas. This in turn will have a positive impact on

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
			woody debris (increase form a score of 0 to a score of 2), organic litter (maintain a score of 5), weed cover (increase from 0 and 3 in some sites to an average of a score of 5 across the entire offset area). This would lead to an increase in the abundance of shelter for the species and an increase in this relative habitat quality score. *Note- a score of 8 is utilised in the offset calculator within Schedule 3 (EPBC Offset Assessment Guide Results) to provide a level of conservatism.	the abundance and quality of shelter available which scores a 1 or poor at the current time. Control of pest species will also reduce potential threats to Yakka Skink by reducing predation by wild pigs.
			Site context – 4 The site context is expected to increase as the scores for both connectivity and the amount of remnant vegetation within a 1km buffer would increase as the regrowth areas adjacent to the remnant areas became remnant areas therefore increasing the connectivity of the individual patches.	Site context – 3 Protection from clearing will increase connectivity and patch size, which in turn would increase the area's ability to sustain viable populations. Connectivity scores would improve as the regrowth areas achieve remnant status thus returning the entire offset area to remnant status resulting in greater ability for the species to traverse the landscape.
			Species stocking rate – 1 The species is known to be present in the area (ELA 2016) and the improvement in condition and context should support a higher population. However, for conservative scoring, the future population estimate is left unchanged as being present but not in high numbers.	Species stocking rate – 1 The species is known to be present in the area (ELA 2016) and the improvement in condition and context should support a higher population. However, for conservative scoring, the future population estimate is left unchanged as being present but not in high numbers.
Confidence in quality scores	90%	90%	The prevention of thinning activities, stick raking of fallen woody debris (coarse woody debris) and the resultant use of fire to remove this habitat feature have a high certainty under the Offset Area Management Plan. The field survey results in ***Appendix C2*** demonstrate the amount of accumulated woody debris that would be retained under the management plan. The scores for the coarse woody debris present when the field surveys were undertaken are:	Improvement in quality and abundance of sheltering habitat is reliant on natural succession of the canopy, secondary layers and shrub layers of the vegetation community which will evolve as a result of the prevention of clearing, stick raking of coarse woody debris and burning of same, and the use of fire for woody regrowth and fallen timber control. The scores for coarse woody debris (shelter) and organic litter are low for this species in the regrowth areas and the control of the threats as per ***Section 3.3.2*** of the EPBC Offset Delivery

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
			• 11.3.1 (remnant AU1) – survey sites 2, 5, 2 with a maximum possible score of 5; • 11.5.3 (remnant AU10) – survey sites 5, 5, 5 with a maximum possible score of 5; • 11.3.4 (remnant AU5) - survey sites 5, 5 with a maximum possible score of 5; • 11.3.25 (remnant AU8) - survey sites 2, 5, 5 with a maximum possible score of 5; and • 11.4.9 (remnant AU3) - score of 0 with a maximum possible score of 5. Weed cover varies significantly across the sites with a variation of a score of 0 (more than 50% weed cover) to a score of 10 – maximum 5% weed cover). The removal of the thinning, burning and stick raking threat will assist in the prevention of further weed incursion and increase in the remnant areas. Confidence in the ability to achieve an improvement in quality/condition in the remnant areas is high with the highest contributing attributes being the accumulation over time of coarse woody debris to increase those scores and the reduction of non-native plant cover. These attributes are achieved by removing the risk of thinning and the use of inappropriate fire regimes and the subsequent reduction in non-native plant cover as the canopy closes.	Plan would enable the vegetation community to mature which will lead to an increase in these scores over time. As the canopy establishes and increases in cover (currently low scores for canopy height and cover), there will be a resultant gradual decreasing of exotic grass and weed cover as the canopy closes. In parallel, there will be an increase in coarse woody debris, organic litter and native grass cover which are all low to non-existent in the current scores. As exotic grass cover decreases, there will be a resultant reduction in grazing capacity and grazing pressure which will in turn reduce soil compaction and the resultant effect on burrowing ability. Confidence in the uplift in coarse woody debris scores, reduction in weed cover and the resultant increase in shelter abundance and quality scores is high as the threats to these will be removed by the Offset Area Management Plan by the removal of clearing and inappropriate burning. As the canopy layer increases in height and the canopy cover increases, there will be a natural decrease in the buffel grass cover (non-native plant cover) and an increase in these scores. Additionally, a pest animal and fire control program is detailed in the Offset Area Management Plan which will further decrease the risks associated with predation on the species.
Raw Gain	2	4	As per OAG	
Adjusted Gain	1.8	3.6	As per OAG	
Risk of Loss				

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Risk of loss without offset	10%	90%	Continuation of thinning of secondary canopy and shrub layers, the use if stick raking and burning of coarse woody debris (lower scores to 0 or 2 in most areas of remnant vegetation) (a 7-8-year cycle in line with the treatment of the regrowth areas) with the intent to increase exotic grass (non-native plant) cover and therefore allow for a higher grazing capacity, would degrade essential habitat features that are critical to supporting the species. These actions would not destroy the habitat, however would have a detrimental effect on the quality of that shelter and foraging habitat and abundance of the species in the remnant areas resulting in lower scores for these attributes. At this point in time, the quality and availability of habitat is moderate for this species throughout the remnant area. These scores are connected to the lower scores associated with canopy cover which is then associated with the higher non-native plant (scores would reduce to average 3 across the site) cover. Coarse woody debris, a key habitat element for the Yakka Skink, consistently scores 0 or 2 being less than 10% and 50% coarse woody debris cover as compared to the benchmark for each regional ecosystem. The continuing use of inappropriate fire regimes would translate in to lower scores for the abundance of shelter available for the species. There will be some loss of the quality and abundance of habitat over time within the remnant areas without the offset restrictions on thinning, burning and stick raking.	The offset areas have been historically cleared since the early 1970s. See ***Plate 3***, ***Plate 4***, ***Section 3.3.2*** and ***Section 3.3.3***. The recurring clearing undertaken periodically as described in those sections is scheduled to be undertaken again within the next 2-3 years only being delayed until the end of the wet season. This recognised practice of woody weed control and pasture improvement results in the destruction of the regrowth as well as the removal of coarse woody debris and organic litter via the subsequent use of fire to remove the fallen timber. See ***Plate 4*** and ***Plate 5*** in ***Section 3.3.3*** as an illustration of the condition that the site is usually maintained. This practice is supplemented in later years with the use of fires to further suppress regrowth and to maintain a pasture free of fallen woody debris (scores are generally below 10% of the benchmark for the respective RE's). Therefore, the Yakka Skink habitat is at risk of being re-cleared, burnt and has a resultant increase in non-native grass cover which will increase the carrying and grazing capacity of the area. This will impact the essential habitat features for the species to the extent that they are lost. As the area was being used for grazing (and cleared for that purpose) well before the introduction of the EPBC Act in 1999, the landowner is exempt from the EPBC Act under section 43B as discussed in ***Section 3.3.3***. The 100% confidence in the area being re-cleared if the offset is not in place and the subsequent loss of habitat gives a high confidence in the loss of the habitat for this species.
Risk of loss with offset	2%	2%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be managed. Stochastic events such as natural fires and flooding will still pose a risk to the offset area. Management actions and remediation activities will be in place to assist in reducing these risks or the severity of outcomes.	
Time over which loss is averted	20	20	Maximum of 20 years	

Attribute	Score		Rationale	
	Remnant	Regrowth	Regrowth	Remnant
Confidence in risk scores	90%	90%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be undertaken for fire management purposes during the dry season. This will effectively reduce risk of loss in the quality of the offset site.– i.e., the banning of clearing and pasture improvement activities has a high averted loss factor as discussed in *Section 3.3.2* and *Section 3.3.3*. These actions are effective immediately on securing the offset and will avert the immediate risk of re-clearing and the subsequent effect on habitat, shelter and foraging scores and attributes. There is little risk to the improvement in the quality of the offset site over time with the averted loss, management of fire and grazing times to be restrained to low-intensity burns as per the recommendations in the Regional Ecosystem Description Database and grazing restricted to dry times where there are reduced effects on soil structure. The increase in canopy cover, coarse woody debris, organic litter and reduction in weed cover will also increase the scores for those attributes over time and subsequently be reflected in the shelter and foraging quality and abundance scores. This gives a high confidence in the outcome of the offset when managed as per the accompanying Offset Area Management Plan. This confidence is supported with a robust Monitoring and Reporting schedule within the OAMP which is based on an adaptive management strategy related directly to these measurable indicators (attributes).	
Raw gain	12.74	76.21	As per OAG	
Adjusted gain	11.46	68.59	As per OAG	
Results				
Net present value	33.59	49.13	As per OAG	
% impact offset	53.00%	77.51%	As per OAG	
TOTAL % impact offset	130.51%		Proposed offset area offsets significant residual impacts on Yakka Skink	

3.3.11 Brigalow TEC

Brigalow is the commonly accepted name for the species *Acacia harpophylla* and the vegetation in which this species is dominant or co-dominant, and is used in both Queensland (e.g. see *Sattler and Williams 1999*) and in New South Wales (e.g. *Keith 2004; New South Wales Scientific Committee 2002, 2005*) to describe the regional ecosystems/vegetation communities that correspond with the listed Brigalow ecological community. All 16 of the REs that comprise the listed Brigalow ecological community in Queensland are also listed as Endangered under the *Vegetation Management Act 1999 (Qld) (Butler 2007; Queensland Environmental Protection Agency 2008)*.

The Brigalow TEC to be impacted by the Project is to the extent of 9.7ha. The impact area EPBC calculator scores and rationale are presented in ***Table 7A***. Maps illustrating the impact areas for the Brigalow TEC are shown at ***Appendix A3***, and the EPBC Calculator outputs are at ***Schedule 3C.***

Weighing

Given the importance of condition, threats and connectedness of Brigalow patches reported in the conservation advice for the TEC, all quality components are considered important. Nonetheless, condition is weighted marginally higher for this project as Brigalow communities were assessed as part of the EIS, prior to the release of the current EPBC Act condition threshold criteria. Therefore, a minimum condition level that meets the current diagnostic criteria cannot be assumed for all patches as described in point 3 of Section 2.1. Ecological equivalence scores and parameters were used where appropriate to apply quality scores to the impact and offset sites and are provided in Appendix B. Quality components are weighted as follows:

- Site condition = 4/10 according to weed presence (i.e. greater than 50% exotic perennial cover), structural composition, groundcover parameters (i.e. organic litter, vegetative cover, fallen woody debris), species richness and recruitment of key components
- Site context = 3/10 considering existing and likelihood of ongoing threats, fragmentation and connectedness with other vegetation
- Species stocking rate = 3/10 where larger connected patches are of higher value.

Table 7A: Impact Area - EPBC Act Offset Assessment Guide Inputs – Brigalow TEC

Attribute	Value	Rationale/assumption
Impact Area	9.73ha	
Description		Within the Project footprint, this TEC is restricted to ground verified REs 11.4.9. 11.9.1 and 11.9.5. Eight patches were identified in total and were consistent with the attributes required of a remnant or regrowth Brigalow TEC. All the patches were generally in a good condition. See Attachment 3, Appendix E of the Preliminary Documentation.
Quality	7/10	Site condition - 3 The habitat quality score was derived using the *Guide to determining terrestrial habitat quality* and the scores averaged across the 14 sites surveyed. The score reflects the condition of the vegetation. The quality score is derived from Appendix E to the field report supplied previously as Attachment 3 to the Preliminary Documentation
		Site context – 3 In context to the landscape, the patches are contiguous with other remnant vegetation communities and therefore a conservative approach has been taken to this score

Attribute	Value	Rationale/assumption
		Species stocking rate – 1 The impact is to a 13ha patch and to the fringes of other patches

3.3.12 Brigalow TEC - Offset Site Attributes

The proposed offset area provides 113.7 ha of brigalow dominated vegetation that is consistent with the Brigalow TEC diagnostic characteristics as outlined in the *Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* dated 17th December 2013. These areas can be described as woodland and regrowth communities with a canopy layer dominated by brigalow and analogous to the listed brigalow REs 11.3.1 and 11.4.9.

The woodland communities within the offset area are in remnant condition and for the majority of these areas, currently meet the condition threshold criteria to be classified as the Brigalow TEC. Patches are greater than 0.5 ha, highly connected with surrounding vegetation, exotic perennial grass cover is generally below 50% and structural complexity and species diversity is high. Habitat quality assessments found these communities to be in moderate condition.

The regrowth communities within the offset area vary in age with only a small portion comprising the mature structure and low exotic perennial grass cover to meet the condition threshold criteria to be classified as the Brigalow TEC. Nonetheless, areas not currently meeting the condition thresholds have the potential to be returned to TEC status through active management. Habitat quality assessments found these communities to be in poor to moderate condition.

***Acacia harpophylla* open forest on alluvial plains**

The vegetation community occurs in a large patch in the north-eastern corner and in several smaller patches throughout the offset area. The tall canopy layer is dominated by brigalow (*Acacia harpophylla*) with coolibah (*Eucalyptus coolabah*) and yellow-wood (*Terminalia oblongata*) also present.

The understorey contains both a mid-storey and shrub layer. The mid-storey is dominated by yellow-wood, brigalow and red bauhinia (*Lysiphyllum carronii*) with sally wattle (*Acacia salicina*) and whitewood (*Atalaya hemiglauca*) also occurring. The shrub layer consists of a mixture of species including juvenile brigalow and yellow-wood, currant bush (*Carissa ovata*), lolly bush (*Clerodendrum floribundum*), Leichhardt bean (*Cassia brewsteri*) and scrub boonaree (*Alectryon diversifolius*).

The ground layer is dominated by a mixture of native and exotic grasses, including the exotic species buffel grass (*Cenchrus ciliaris*) and sabi grass (*Urochloa mosambicensis*) and native species, including brigalow grass (*Paspalidium caespitosum*), Queensland bluegrass (*Dichanthium sericeum*) and native millet (*Panicum decompositum*).

The vegetation community has a high native species richness with only minor weed incursion in the ground layer. The canopy layer is mature and a high availability of habitat resources such as fallen woody debris and leaf litter are present within the community. Overall, based on site condition assessment this community was determined to be in moderate-high condition.

This community falls within the Broad Vegetation Group (**BVG**) 25a, is in remnant condition (i.e., >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.3.1, which has a vegetation management (**VM**) class and biodiversity (**BD**) status of "Endangered".

***Acacia harpophylla* regrowth on alluvial plains**

The vegetation community occurs in two large and several smaller patches, predominantly in the north of the offset area. The low (4 - 6m) canopy layer is dominated by brigalow and coolibah, with red bauhinia, sally

wattle and poplar box (*Eucalyptus populnea*) also occurring. The mid-storey is dominated by brigalow and sally wattle with yellow-wood also occurring.

The sparse shrub layer consists of a mixture of species including brigalow, red bauhinia, desert lime (*Citrus glauca*), Leichhardt bean and *Capparis* spp. The ground layer is dominated by exotic grasses such as buffel and sabi grass with some native species such as brigalow grass, fairy grass (*Sporobolus caroli*) and forest bluegrass (*Bothriochloa bladhii*) occasionally occurring. Scattered native forbs present within the ground layer include ruby saltbush (*Enchylaena tomentosa*) and fine sida (*Sida filiformis*). A number of exotic forbs including the declared weeds parthenium (*Parthenium hysterophorus*) and harrisia cactus (*Harrisia* spp.) also occur.

The vegetation community is in an immature state and has not reached the canopy height or cover of a remnant community. The community has moderate native species richness and weed incursion within the ground layer ranges from moderate to high. The community does however contain high availability of habitat resources including wood debris and leaf litter. Overall based on site condition assessment, this community was determined to be in moderate condition.

This vegetation community is analogous to RE 11.3.1, however, due to the level of previous disturbance, it is currently of non-remnant status.

***Acacia harpophylla* with *Terminalia oblongata* shrubby woodland on clay plains**

The vegetation community occurs in three patches located in the north, centre-west and south portions of the offset area. Brigalow dominates the canopy and mid-storey, with yellow-wood also present in the mid-storey. The sparse shrub layer is dominated by yellow-wood, currant bush and scrub boonaree.

The ground layer is dominated by a mix of native and exotic grasses. Exotic grasses include buffel grass, sabi grass and guinea grass occur, as well as the native species native millet, fairy grass and brigalow grass. Scattered forbs including native sesbania pea (*Sesbania cannabina*), Buddha pea (*Aeschynomene indica*) and exotic noogoora burr (*Xanthium occidentale*) also occur. Various native sedges and cyperus spp. were noted within low-lying areas of the community.

The vegetation community has a canopy height and cover consistent with a remnant community, however, it has a low species richness, particularly tree and shrub species. Habitat resources such as fallen woody debris and organic litter cover are relatively low; however deep gilgai formations and soil cracks are present. Weed incursion is high (average 70% of total ground cover). Overall, this community was determined to be in low-moderate condition.

This community falls within the BVG 25a, is in remnant condition (i.e., >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.4.9, which has a VM class and BD status of "Endangered".

***Acacia harpophylla* with *Terminalia oblongata* regrowth on clay plains**

The vegetation occurs primarily in two patches, one in the north-east corner and one in the south of the offset area. A relatively small isolated occurrence of the community is located near the centre of the northern portion of the offset area.

The low (3–5 m) canopy and mid-storey layers are dominated by a mixture of brigalow, red bauhinia, coolibah, whitewood and yellow-wood. The shrub layer is dominated by brigalow, with Stuart's desert rose (*Gossypium stuartianum*) also occurring.

The ground layer is dominated by native grasses including fairy grass, brigalow grass and *Aristida* spp. Native forbs including fine sida, ruby saltbush, nepine (*Capparis lasiantha*) and pink tongues (*Rostellularia adscendens*) also commonly occur. Declared weed species including harrisia cactus and parthenium were also occasionally recorded within the community.

The vegetation community lacks the canopy height and cover of a remnant community due to historical land uses involving the clearing of mature vegetation. The immature state of the community means it lacks other remnant community characteristics such as the presence of large mature trees and availability of habitat

resources such as fallen woody debris and organic litter. However, deep gilgai formations and soil cracks are present. Moderate weed incursion occurs in the ground layer. Overall, based on site condition assessment, this community was determined to be in low-moderate condition. The community is associated with RE 11.4.9, however due to the level of previous disturbance it is currently of non-remnant status.

A copy of the EPBC Offset Assessment Guide calculator output worksheets for the Brigalow TEC is provided at ***Schedule 3C***. ***Table 7B*** below provides a description of the input values used for the calculation.

Table 7B: EPBC Act Offset Assessment Guide Inputs – Brigalow TEC

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Area (ha)	27.1	86.6	Area verified in field assessments conducted by ELA (2016) Proposed offsets for the Brigalow TEC consist of the following REs all of which are within the in the *Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant) ecological community* dated 17th December 2013. • 11.3.1 (remnant AU1) 13.6ha • 11.4.9 (remnant AU3) 13.5ha	Area verified in field assessments conducted by ELA (2016) Proposed offsets for the Brigalow TEC consist of the following RE's all of which are within the in the *Approved Conservation Advice for the Brigalow (Acacia harpophylla dominant and co-dominant)* • 11.3.1 (non-remnant AU2) 59.8ha • 11.4.9 (non-remnant AU4) 26.8ha
Quality				
Start quality	7	6	Site condition score – 3 The condition of the Brigalow TEC remnant patches is moderate with recruitment levels of Native species being high, however there being an excess of canopy cover (over 200% of the benchmark), a lack of large trees (scored 5 being 0-50% of the benchmark) and a lack of coarse woody debris. Weed incursion is low in RE 11.3.1 but high in RE 11.4.9 suggesting some ongoing disturbance resulting in the lack of fallen timber and higher grass cover.	Site condition - 1 Site condition is poor with all attributes apart from native species recruitment and richness and the number of trees. The balance of the attributes making the TEC scored poorly with a lack of canopy height, canopy cover (scores 3 and 2 respectively) the absence of large trees and coarse woody debris all scoring zero.
			Site context score - 3 Site context ranges from moderate to high due to varying levels of connectivity to surrounding vegetation. Some areas form large contiguous vegetation patches, whilst others are more fragmented and isolated. All areas are situated within a mapped ecological corridor.	Site context - 2 Site context is generally moderate due to reduced connectivity to surrounding remnant vegetation resulting in smaller and isolated vegetation patches. However, all areas are situated within a mapped ecological corridor which raises the overall score.
			Species stocking rate = 1 The remnant patches are not large and therefore only score 2 for patch size although connectivity to adjoining remnant vegetation is good.	Species stocking rate – 3 Although the TEC is in a poor condition, the patches are a good size each scoring a 5 and adjoining remnant areas of vegetation increasing their value.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Future quality without offset	6	6	Site condition score – 2 The condition of the Brigalow TEC remnant patches will remain in a moderate condition however there is a consistent impact to coarse woody debris and weed cover in RE 11.4.9 suggesting some ongoing disturbance resulting in the lack of fallen timber and higher non-native plant cover. As the property development cycle is due to be renewed with the recovery in seasonal conditions and commodity prices, the use of thinning and fire to manage the excess in canopy cover and shrub cover would recommence resulting in a reduction in the overall structure of the TEC, and increase in weed cover (score lower to 5 being 5-25% weed cover) and the continuing lack of structure in the form of coarse woody debris (already scoring 2 and 0)	Site condition - 1 Site condition is poor with all attributes apart from native species recruitment and richness and the number of trees. The balance of the attributes making the TEC scored poorly with a lack of canopy height, canopy cover (scores 3 and 2 respectively) the absence of large trees and coarse woody debris all scoring zero. This will decrease further with the re-clearing of all standing regrowth thus lowering those scores to 0. Effectively, the scores without the offset will be low for all attributes that contribute to the structure and maturity of the TEC. Re-clearing is 100% certain within the next 2-3 years as per the development cycle discussed previously.
			Site context score - 3 Site context ranges from moderate to high due to varying levels of connectivity to surrounding vegetation. Some areas form large contiguous vegetation patches, whilst others are more fragmented and isolated. All areas are situated within a mapped ecological corridor.	Site context - 2 Site context is generally moderate due to reduced connectivity to surrounding remnant vegetation resulting in smaller and isolated vegetation patches. However, all areas are situated within a mapped ecological corridor which raises the overall score.
			Species stocking rate = 1 The score remains as 1, due to the small patch size, although it will form part of a contiguous area of the brigalow TEC.	Species stocking rate – 3 Although the TEC is in a poor condition, the patches are a good size each scoring a 5 and adjoining remnant areas of vegetation increasing their value.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Future quality with offset	8	7	Site condition score – 3 Protection and management of this area can improve the current condition, particularly by removal of the threat of thinning and burning therefore by allowing the improvement of the TEC quality by ensuring continued improvement in the presence of large trees, canopy cover reducing to the benchmark levels as trees mature, the development of a secondary and shrub layer via natural succession and development of mature features such as the retention of coarse woody debris. Improvements in the following attributes that are related to the TEC are expected over the course of the offset. Improvement in canopy cover scores, shrub canopy scores, coarse woody debris (increase form a score of 0 to a score of 2), organic litter (maintain a score of 5), weed cover (increase from 0 and 3 in some sites to an average of a score of 5 across the entire offset area).	Site condition score – 3 Regrowth communities are generally on a trajectory of improvement. With active management, such as prevention of clearing, reduced cattle grazing, use of fire this improvement can be accelerated and the slow accumulation of coarse woody debris begun. Attributes that are considered most reasonable related to the TEC and that would increase in score over the term of the offset would be canopy height, canopy cover, coarse woody debris (increase in score from 0 to 2), organic litter (increase in score from 3 to a consistent 5 across the regrowth areas) and weed cover (from a series of low scores to an average of 5 across the regrowth areas).
			Site context – 4 The site context is expected to increase as the scores for both connectivity and the amount of remnant vegetation within a 1km buffer would increase as the regrowth areas adjacent to the remnant areas became remnant areas therefore increasing the connectivity of the individual patches.	Site context – 3 Protection from clearing will increase connectivity and patch size, and increase the amount of remnant vegetation within a 1 km area which is the measure for context in the landscape. This will be a contributing factor to the outcome of the implementation of the offset
			Species stocking rate – 1 Patch size is not large and although connectivity will improve, the increase will not affect this scoring.	Species stocking rate – 1 The patch sizes of the regrowth areas are substantial and there is the opportunity for this score to outperform during the term of the offset. However, a conservative score has been adopted in this case.
Time until ecological benefit	10	20	Estimated time for canopy improvement, some increase in coarse woody debris and a resultant decrease in non-native plant cover. Over time, there will be further development of features such as the amount of coarse woody debris, and the presence of large trees which will both improve the condition of the TEC.	Estimated time for canopy layer to mature and provide leaf litter and fallen woody debris increasing the condition of the TEC. Initially, the fastest response is expected to be in the height of the canopy, canopy cover and resultant decrease in non-native plant cover.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Confidence in quality scores	90%	90%	The prevention of thinning activities, stick raking of fallen woody debris (coarse woody debris) and the resultant use of fire to remove this element of the TEC have a high certainty under the Offset Area Management Plan. The field survey results (see ***Appendix C2***) demonstrate the current lack of accumulated woody debris within the remnant areas and the high to moderate non-native plant cover. The Offset Area Management plan would restrict the threats to the accumulation of the coarse woody debris which would therefore be retained. The scores for the coarse woody debris present when the field surveys were undertaken are: • 11.3.1 (remnant AU1) – scores at the survey sites - 2, 5, 2 with a maximum possible score of 5 • 11.4.9 (remnant AU3) – survey site score - 0 with a maximum possible score of 5 Weed cover varies significantly across the sites with a variation of a score of 0 (more than 50% weed cover) to a score of 10 – maximum 5% weed cover). The removal of the thinning, burning and stick raking threat will assist in the prevention of further weed incursion and increase in the remnant areas.	Improvement in quality of the community is time dependant once the threats have been addressed and will be as a result of the prevention of re-clearing, burning and stick raking of coarse woody debris, and the further use of fire in later years for woody regrowth control. The scores for canopy cover, canopy height, species richness would all increase by the removal of this major threat to the TEC. All of these scores would improve over time and importantly, would not fall to a poor to 0 condition if the re-clearing was to eventuate. The increase in height and canopy cover will also result in the gradual decreasing of non-native plant cover (grass cover) as the canopy closes and the resultant reduction in grazing capacity and grazing pressure. The prevention of clearing, appropriate use of fire and the accumulation of woody debris is detailed in the Offset Area Management Plan which will further the risks associated with the offset achieving the required outcomes. This results in a high confidence of success.
Raw gain	2	1	As per OAG	
Adjusted gain	1.8	0.9	As per OAG	
Risk of Loss				

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Risk of loss without offset	10%	90%	Continuation of thinning of secondary canopy and shrub layers, the use of stick raking and burning of coarse woody debris (lower scores to 0 or 2 in most areas of remnant vegetation) (7-8-year cycle in line with the treatment of the regrowth areas) with the intent to increasing exotic grass cover and therefore allow for a higher grazing capacity in the remnant areas would degrade the condition of the TEC. These actions would have a detrimental effect on the already lower scores associated with canopy cover which is then associated with the higher exotic grass (scores would reduce to average 3 across the site) cover and the consistent scores 0 or 2 being less than 10% and 50% coarse woody debris cover as compared to the benchmark for each regional ecosystem. These factors would then translate into lower scores for the condition of the TEC.	The offset areas have been historically cleared since the early 1970s - see ***Plate 3***, ***Plate 4***, ***Section 3.3.2*** and ***Section 3.3.3*** of the EPBC Offset Delivery Plan. The recurring clearing undertaken periodically as described in those sections is scheduled to be undertaken again within the next 2-3 years with the clearing and subsequent burning and stick raking only being delayed until the end of the wet season. This recognised practice of woody weed control and pasture improvement results in the destruction of the native species richness, canopy and shrub layer with a result that the scores for these attributes (see ***Appendix C2***) would decrease dramatically. The treatment of the regrowth will result in an increase in exotic grass cover (increase in weed cover score). As the area was being used for grazing (and cleared for that purpose) well before the introduction of the EPBC Act in 1999, the landowner is exempt from the EPBC Act under section 43B as discussed in *Section 3.3.3*. Year of initial clearing – from historical photos is evidenced to have been between 1966 and 1975 – see ***Plate 3*** and ***Plate 4.*** Over the last 15 years: • Regrowth was re-pulled and seeded during 1989 and 1990 • Oversown with exotic pasture grass in 1991 • The subsequent re-clearing cycle was to re chain and burn every 7-8 years during the dry months with timing being dependent on seasonal conditions • Regrowth areas are programmed to be re-cleared, burnt and stick raked in the next 2-3 years. The Risk of Loss without an Offset is very high due to these re-clearing, burning practices and there is 100% certainty that these practices will occur without the restrictions within the Offset Area Management Plan.
Risk of loss with offset	2%	2%	The offset area will be legally secured and clearing activities will be prohibited. Stochastic events such as natural fires and flooding will still pose a risk to the offset area. Management actions and remediation activities will be in place to assist in reducing these risks or the severity of outcomes.	

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Time over which loss is averted	20	20	Maximum of 20 years.	
Confidence in risk scores	90%	90%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be undertaken for fire management purposes during the dry season. This will effectively reduce risk of loss – i.e., the banning of clearing and pasture improvement activities has a high averted loss factor as discussed in ***Section 3.3.2*** and ***Section 3.3.3***. These actions are effective immediately on securing the offset and will avert the immediate risk of treatment via re-clearing planned to occur within the next 12-18 months in the offset site. There is little risk to the improvement in the quality of the offset site over time with the averted loss, management of fire and grazing times. This gives a high confidence in the outcome of the offset when managed as per the accompanying Offset Area Management Plan. Part of this confidence is also attributed to the Monitoring and Reporting schedule within the OAMP which is based on an adaptive management strategy related directly to measurable indicators.	
Raw gain	2.17	76.21	As per OAG	
Adjusted gain	1.95	68.59	As per OAG	
Results				
Net present value	1.54	38.43	As per OAG	
% impact offset	75.50%	564.30%	As per OAG	
TOTAL % impact offset	639.80%		Proposed offset area substantially offsets significant residual impacts on Brigalow TEC	

4 LEGALLY-BINDING MECHANISM

All direct offset sites will be secured using one of the legally-binding mechanisms on title that are available to ensure the protection of the offset and implementation of the Offset Area Management Plan. These legally-binding mechanisms are:

- an environmental offset protection area under section 30 of the *Environmental Offsets Act 2014 (Qld)*;
- an area declared as an area of high nature conservation value under section 19F of the *Vegetation Management Act 1999 (Qld)*, where it is secured for the purposes of an environmental offset;
- declared as a nature refuge under section 46 of the *Nature Conservation Act 1992 (Qld)*, where it is secured for the purposes of an environmental offset;
- declared as a protected area under section 29(1) of the *Nature Conservation Act 1992 (Qld)*, where it is secured for the purposes of an environmental offset; or
- secured as a statutory covenant for environmental purposes under the *Land Act 1994 (Qld)* or *Land Title Act 1994 (Qld)*. The mechanisms adopted to secure offsets will ultimately depend upon the mechanisms available and agreed to by the relevant parties.

In this instance, the offset will be secured via a Voluntary Declaration as an area of high conservation value under the *Vegetation Management Act 1999 (Qld).* Once this has been registered on the title, the offset area will be mapped as a Category A area on the Property Map of Assessable Vegetation (**PMAV**). An area mapped as Category A on a PMAV is red in colour and is described as an "Area subject to compliance notices, offsets and voluntary declarations".

5 OFFSET MANAGEMENT ACTIONS

5.1 Croydon Station

An Offset Area Management Plan (**OAMP**) has been prepared in accordance with the specific requirements contained within the final Offset Strategy (referred to here as the Offset Delivery Plan) approved by DoEE. The OAMP includes, but is not limited to, information on the threats and the management actions required on the offset site to abate those threats identified to the Ornamental Snake and the Yakka Skink. The OAMP contains details of the management and the reporting and monitoring program that will extend until the management outcomes are achieved.

Management actions recommended include:

- Limitations on the clearing of vegetation to that required for maintenance of fencing and fire control lines;
- Exclusion of domestic livestock from the offset area except for the infrequent grazing associated with fuel reduction in dry periods;
- Feral pest animal management;
- Management of fire; and
- A weed management program.

Please see ***Schedule 1*** for the OAMP for "Croydon Station". The schedule of management actions for the Croydon Station property is shown in ***Table 8*** below for ease of reference.

Table 8: Offset Area Management Actions

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions

Forestry Operations, Native Timber Harvesting and general vegetation impacts Consistent with the risk of clearing as identified in the Brigalow Conservation Advice and Draft Recovery Plan, Conservation Advice for Reptiles of the Brigalow Belt and Conservation Advice for the Squatter Pigeon (Southern)	1. Vegetation clearing on the offset area is restricted to: a) that necessary for the removal of non-native weeds or declared pests b) ensure public safety c) maintenance of existing roads, fence lines, water pipelines and firebreaks; and d) that necessary to establish and maintain access to BioCondition assessment and photo point monitoring sites. Where vegetation clearing is sought for any other purpose, the Landholder must contact the relevant department administering the *Vegetation Management Act 1999 (Qld).* 2. Native forest practice (harvesting of timber for forestry purposes) <u>is not</u> allowed under this Offset Area Management Plan. 3. Clearing for new fencing will be on the outside of the offset area boundary or along the property boundary. **Note:** Any vegetation clearing must be undertaken in accordance with: • best practice management methods; and • any applicable legislative requirements. For example, the	Only in those areas subject to non-native weed control, fire control lines and fences.	Vegetation clearing for approved purposes may occur as required.	Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder.	No evidence of recent forestry or timber harvesting activities are evident during term of the offset area management plan. Vegetation clearing for any purpose to be recorded as part of the quarterly inspection conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder. Trigger for remedial action and reassessment of the management actions detailed: detection of illegal clearing	Upon being notified or becoming aware of prohibited vegetation clearing in the offset area, the Landholder is to reassess access protocols for any lessees etc. and general access within one fortnight. The Offset Area Report will document any known prohibited vegetation clearing that has occurred during the reporting period and the correlating responsive actions. **Residual Risk: Low**

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
	clearing of endangered, vulnerable or near-threatened plant species or the tampering with animal breeding places under *Nature Conservation Act 1992 (Qld)* Under the *Vegetation Management Act 1999*, clearing in Least Concern regional ecosystems for fences, roads or tracks is exempt clearing if it is less than 10 m in width. Any new fences, roads or tracks will be less than 10 m in width for each piece of infrastructure. Clearing to establish or maintain a necessary firebreak to protect infrastructure (other than fences, roads and tracks) to a maximum width of 20 m or 1.5 times the height of the tallest adjacent tree, whichever is the greater.					

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
Fire Consistent with the risk of inappropriate fire regimes as identified in the Brigalow Conservation Advice and Draft Recovery Plan, Conservation Advice for Reptiles of the Brigalow Belt and Conservation Advice for the Squatter Pigeon (Southern)	1. Fire is to be excluded from the offset area except for low intensity ecological burns at the end of the wet season by: a) maintaining firebreaks relative to the offset areas; b) using a low intensity fire >7 years interval; and c) firebreaks are to be co-located with roads and fence lines on the property where possible. **Note:** Fire is not to be used as a tool for regrowth management on the offset areas.	May be undertaken throughout the offset areas.	All fire (apart from force majeure events) will be excluded from the offset area during Squatter pigeon (southern) breeding and nesting times being mostly the dry season (April to October). Fire control lines must be inspected quarterly. Maintenance must be undertaken as required and at least every two years. If fire is used, it must be a low intensity fire at >7 years interval immediately after the end of the wet season, which is generally March to April. Ecological	Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder. The undertaking of an ecological burn will be by a suitably qualified person in consultation with an ecologist.	Evidence of fire is not observed during the term of the offset area management plan, except for prescribed low intensity ecological burns. Any observed incidence of wild fire, prohibited burning or force majeure events will be recorded during quarterly inspections conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder. Trigger for remedial action and reassessment of the management actions detailed: destruction of regrowth, fallen timber and the occurrence of deliberately lit hot fires	Upon being notified or becoming aware of prohibited fire in the offset area, the Landholder is to reassess access protocols for any lessees etc., signage and general access within one fortnight. After any occurrence of fire in the offset area, the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder will: 1. inspect and repair, and widen if necessary, all firebreaks; and 2. reassess fuel load reduction practices; and 3. exclude grazing until the grass cover present at the end of the dry season is a minimum: ○ Brigalow communities 60% groundcover or 1500kg/ha pasture biomass ○ Eucalypt Communities 60% groundcover or 850kg/ha pasture biomass. *Note that groundcover is used to accommodate the change in the*

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
			burns should not cover more than 30% of the offset area.			*structure of the community over time from pasture to a reginal ecosystem* Grass cover measurements must be in accordance with the methodology stated in the *Land Manager's Monitoring Guide* (Department of Environment and Resource Management, 2010) (DERM)[2] (or any subsequent published version of this document) as attached to the OAMP, or any subsequent published version of this document. If a low intensity ecological burn exceeds 30% of the offset area, then control measures to contain the fire are to be implemented immediately. Controlled back burning from the next fire control line is the preferred method. The Offset Area Report will document any known incidences of fire that have occurred during

[2] *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#

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
						the reporting period and the correlating responsive actions. **Residual Risk: Low**
Fencing Consistent with the risk of excess fire as identified in the Brigalow Conservation Advice and Draft Recovery Plan, and overgrazing as identified in the Conservation Advice for Reptiles of the Brigalow Belt and Conservation Advice for the Squatter Pigeon (Southern)	Install and routinely inspect fencing to secure the offset area and prevent unauthorised access.	All external boundaries of the offset area. Where the boundary coincides with the property boundary, the fence may align with the property boundary. A fenced area may include non-offset areas.	Fencing of offset areas will be established within three months of the Queensland Government approving the voluntary declaration. If cattle are grazing the offset area, fencing must be inspected monthly. During non-grazing periods, fencing must be inspected quarterly.	Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder.	Quarterly inspections will identify if fences are preventing cattle and unauthorised people from accessing the offset area. These inspections may be conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder. Trigger for remedial action and reassessment of the management actions detailed: detection of illegal access, cattle grazing out of allowed times and thresholds, overgrazing	Upon being notified or becoming aware of an unsecure offset area, the Pastoral Manager is to undertake fence maintenance and repairs to resecure the offset area as soon as possible and within 30 days. The Offset Area Report will document the installation, maintenance and repair of fences during the reporting period. **Residual Risk: Low**

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
Following extreme weather conditions of drought, flood and cyclones Consistent with the general risks as identified in the Brigalow Conservation Advice and Draft Recovery Plan, Conservation Advice for Reptiles of the Brigalow Belt and Conservation Advice for the Squatter Pigeon (Southern)	Determine the extent of damage to the offset area and fencing caused by the event.	Throughout the offset area with attention paid to riparian areas and the boundary fencing.	As soon as safely possible post a flood or cyclone event. For a drought event, inspections must be monthly.	Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder.	Within one week after the cessation of a flood or cyclone event, an inspection conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder will determine if the offset area is secure. During drought events, monthly inspections will be conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder to record the vegetation condition in the offset area.	Upon being notified or becoming aware of flood and cyclone event occurring in offset area, the Pastoral Manager is to undertake fence maintenance and repairs to resecure the offset area within one fortnight. Upon being notified or becoming aware of a drought event occurring in offset area, the Pastoral Manager is to remove cattle from the offset area within one fortnight. The Offset Area Report will document the repair of fences and removal of cattle from offset areas, because of extreme weather conditions, during the reporting period. **Residual Risk: Low**
Grazing Consistent with the risk of excess fire as identified in the Brigalow Conservation Advice and Draft Recovery Plan, and	Stocking rates are not fixed as this region is subject to significant changes in grass cover with seasonal conditions. The use of cattle in larger numbers for a short period of time in the late dry season and prior to the wet season and if required,	Stock will be grazed in the offset areas for fuel reduction purposes only during the dry season.	As required when grass fuel loads exceed 50% during the dry season. The dry season is normally between	Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder.	During grazing periods, monthly inspections will be conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder to record the minimum grass	Upon being notified or becoming aware of grass cover falling below the stated percentage in the offset area, the Pastoral Manager is to remove cattle from the offset area within one fortnight. Grazing period may recommence when the grass cover has increased to the levels

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
overgrazing/habitat destruction as identified in the Conservation Advice for Reptiles of the Brigalow Belt and habitat destruction and food competition Conservation Advice for the Squatter Pigeon (Southern)	again during winter is the preferred method of controlled grazing. **Fire and grazing management relating to the Ornamental Snake offset area:** A fire in the offset area is foreseen under one of two scenarios: 1. a natural event beyond the control of the approval holder or the landholder • the establishment of fire control lines (i.e. firebreaks) will assist in mitigating the risk posed by such natural events 2. a low intensity ecological burn permitted by the Pastoral Manager, Landholder or suitably qualified person appointed by the Landholder A low intensity ecological burn permitted under the OAMP may not occur more frequently than once every seven years and the timing of such burns may only occur immediately after the end of the wet season (usually March or April). Furthermore, these low intensity ecological burns are prohibited during the Squatter Pigeon (southern) breeding and nesting times (i.e. the dry season). Consequently, the opportunity to conduct low intensity ecological burns will be very infrequent. Throughout the offset area, management actions for fire and grazing are interlinked		April and October; however, if unseasonal rainfall should occur, then grazing is to be allowed only if there is no evidence of moisture in the stream order 1 gullies to ensure that "pugging" of the soil by livestock does not occur.		cover and security (i.e. fences) of the offset area. Graze stock during the dry season, at rates and times necessary to reduce the fuel load in the offset areas with a minimum grass cover to be present at the end of the dry season as follows: • Brigalow communities 60% groundcover or 1500kg/ha pasture biomass • Eucalypt Communities 60% groundcover or 850kg/ha pasture biomass. *Note that groundcover is used to accommodate the change in the structure of the community over time from pasture to a reginal ecosystem* No evidence of "pugging" is to occur in stream order 1 gullies. Trigger for remedial action and reassessment of the	listed for each RE using the methodology in the *Land Manager's Monitoring Guide* (DERM, 2010) as attached, or any subsequent published version of this document. Upon being notified or becoming aware of cattle causing significant adverse impacts to low-lying offset areas, the Pastoral Manager is to remove cattle from the offset area within 72 hours. Upon being notified or becoming aware of an unsecure offset area, the Pastoral Manager is to undertake fence maintenance and repairs to resecure the offset area within one fortnight. The Offset Area Report will document the grazing periods that occurred in the offset areas during the reporting period and the correlating responsive actions that occurred as part of grazing management.

	due to the necessity to manage increased fuel loads that will establish as a consequence of reduced grazing intensity. As Brigalow trees in the offset area establish and mature, their resulting canopy cover will naturally diminish the fuel load as Buffel grass will decline in extent as the canopy cover increases. Until such time, intervention in the form of both low intensity grazing and infrequent low intensity ecological burns will achieve this outcome. The use of stock grazing in the Ornamental Snake offset area has the potential to adversely impact on the species' habitat *if poorly managed*. At the time of the ecological survey, stock grazing in the offset area was permitted and the area was assessed as suitable habitat for the Ornamental Snake. Therefore the continued use of stock in the area, albeit with a more restricted approach, is expected to support the enhancement of the offset area. The management actions seek to avoid adverse impacts by monitoring the offset area more frequently during grazing periods. The Ornamental Snake offset area is comprised of regional ecosystems (RE) 11.3.1, 11.4.9, 11.3.3 and 11.3.4. Stock occupation will impact on grass cover, therefore upon a predefined minimum grass cover percentage being reached in each of these communities, stock must be removed from the offset area. Stock may not be reintroduced unless the grass cover (again) exceeds 80% during the dry season. Importantly, any sign of significant adverse				management actions detailed: detection of cattle grazing out of allowed times and thresholds, overgrazing, pugging from cattle in wet conditions	**Residual Risk: Low**

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
	impacts to low-lying offset areas as a result of stock use (e.g. pugging) will trigger the removal of stock from the offset area. The allowance of stock to the offset area triggers a higher management intensity to mitigate the increased risk of adverse impacts. This management approach will identify adverse impacts as they arise and trigger remedial action as necessary. The success of stock grazing in the Ornamental Snake offset area will become apparent during the first dry season under offset area management in either 2017 or 2018 (management actions will commence upon grant of the voluntary declaration).					
Pest animals Consistent with the risk of habitat damage and predation identified in the Conservation Advice for Reptiles of the Brigalow Belt and Conservation Advice for the Squatter Pigeon (Southern)	Minimise the introduction of pest animals and control of existing populations of pest animals (wild dogs, pigs, feral cats and foxes) within the offset areas in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002* (Qld). Wild pig, deer and dog populations are generally small and highly transient, and therefore the scale of impact is small. Major damage to the environment/habitat occurs when large numbers of animals congregate in the area. Current control of pigs and wild dogs is undertaken via a baiting program on the property. Additional to this measure, the	All offset areas.	Preferably in the winter and spring months to minimise impacts to the Squatter Pigeon (southern) during breeding and nesting. Destruction of wetland habitat by feral pigs is also a threat to the Ornamental Snake, along with the associated destruction of frog habitat and direct	Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder.	Quarterly inspections to record the presence of wallow holes, tracks and visual incidents in the offset area. These inspections may be conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder. Baseline levels for pest animals are not able to be established due to the transient nature of the animals. Numbers are established via visual signs	Upon being notified or becoming aware of pest animals causing damage to the offset area, the Pastoral Manager is to implement pest control measures within one month. If twelve or more half grown and/or mature wild pigs, deer or dogs are noted during the quarterly inspections, then a control program will be initiated. The Croydon Station Pastoral Manager or Landholder may approach neighbouring landowners to discuss the

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
	Pastoral Manager, during quarterly inspections of the offset area may remove any wild pigs, deer or wild dogs that are seen. If an increase in pig, deer or dog activity is noted, an additional trapping, baiting and/or control program is to be instigated until the increased activity has ceased. There was no evidence of extensive damage from deer, foxes, rabbits or wild cats detected during surveys as part of the Environmental Impact Assessment, however, if the occurrence of these animals is detected, a control program integrated with that for wild pigs and dogs will be implemented.		competition for their food source (frogs). When a group of animals is observed, a control program will be implemented. The timing of control program will address the threats to both species.		recorded during quarterly inspections. Trigger for remedial action and reassessment of the management actions detailed: detection of large numbers of feral animals as per the thresholds detailed	increased pest animal presence and an integrated control program may be developed. The Offset Area Report will document the indications or sightings of pest animals during the reporting period and the correlating responsive actions. **Residual Risk: Low**
Pest plants (i.e. weeds) Consistent with the risk of excess fire from excessive weed cover as identified in the Brigalow Conservation Advice and Draft Recovery Plan as at *section 5.1.3*, and and competition food sources and inappropriate habitat as per the Conservation	Keep the introduction, establishment and spread of non-native weeds including Declared Pest Plants listed under the *Land Protection (Pest and Stock Route Management) Act 2002* (Qld) to less than 10% weed cover in the offset area. Control existing infestations of non-native weeds including declared pest plants under the *Land Protection (Pest and Stock Route Management) Act 2002* (Qld) to ensure that	Throughout the offset area	Weed control will be undertaken as early as practicable within the natural regeneration process throughout the offset areas and then periodically as required to treat the weeds at the optimum time in their life cycles to control and minimise the	Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder. Trigger for remedial action and reassessment of the management actions detailed: pest plants are present/cover more	Quarterly inspections will be conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder to observe and record the presence of weeds and success of previously applied weed control measures. The inspection will include before and after photos of the weed control area. The field data sheets provided in Appendix A may assist with	Upon being notified or becoming aware of pest plants being present in greater than 10% of the offset area, the Pastoral Manager is to implement pest control measures within one month. These measures may include, and are not limited to: • foliar spraying; • basal bark spraying; • stem injection; • cut stump;

Management action	How the action will be carried out	Where the action will be carried out	When the action will be carried out	Who will be carrying out the action	Progress/ measurable outcomes	Comments/ corrective actions
Advice for the Squatter Pigeon (Southern) at *section 5.1.4*	the non-native weeds cover less than 10% of the offset area (e.g., Parthenium). Buffel Grass is recognised as being a threat to the vegetation communities and habitat in the offset area however is not referred to as a weed as it is not declared in *the Land Protection (Pest and Stock Route Management) Act 2002* (Qld). Control measures such as grazing and increasing canopy cover of vegetation are included in this plan to decrease the extent of Buffel Grass over time. Control of Buffel Grass is best managed via grazing during the dry season and increasing tree canopy cover. Spot spraying of patches of Parthenium is permitted.		spread of the existing weed species.	than 10% of the offset area	documenting weed presence and control measures. Quarterly inspections will be conducted by the Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder to record the minimum grass cover in the offset area. The following grass cover is to be present at the end of the dry season as a minimum: • Brigalow communities 60% groundcover or 1500kg/ha pasture biomass • Eucalypt Communities 60% groundcover or 850kg/ha pasture biomass. *Note that groundcover is used to accommodate the change in the structure of the community over time from pasture to a reginal ecosystem*	• cut and swab; • stem scraper; and • wick applicators. The Offset Area Report will document the weed presence, weed control measures and extent of grass cover during the reporting period and the correlating responsive actions. **Residual Risk: Low**

6 MONITORING AND REPORTING

In alignment with the Caval Ridge Offset Monitoring Program, a Before and After Control Intervention (**BACI**) design is recommended for condition monitoring to enable comparison of changes in vegetation condition against baseline data collected on the offset site.

This will measure changes affected by interventions and the variability due to climatic conditions to prove a useful management measure of the amount and need for intervention measures. Given the length of management, an adaptive management approach will be used to provide a suitable level of management based on the monitoring outcomes. Management activities will be adjusted based on monitoring outcomes of the measured criteria.

BMC will report on the offset area management and submit the reports to the Commonwealth and State administering authorities every 2 years for the first 4 years for the life of this plan and thereafter each 5 years, starting at year 5 (2020), for the life of this plan (i.e. until 2031) The schedule of Monitoring and Reporting is as at ***Table 9***.

Table 9: Schedule of Monitoring and Reporting

Monitoring	Attributes monitored	Frequency	Method	Location/s
Surveys undertaken by Ecologists				
Baseline assessment	Refer 'ecological condition' below	Completed in 2016 and is an input into the OAMP	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 (version 1.1 December 2014)* (DEHP, 2014)*	Sites listed at *Table 10* of the OAMP.
Ecological condition	Recruitment of woody perennial species in EDL	Every five years to, and including, year 2031 (i.e. 2021, 2026 and 2031); reported every 5 years	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 (version 1.1 December 2014)* (DEHP, 2014)*. Data for each of the ecological condition attributes monitored will be collected at each site listed in *Table 10* of the OAMP and reported on and presented in a sequential manner (including previous data collected) to quantify change from the benchmark collected in 2015. This will record the change in each attribute measured and hence the condition of the ecological community and habitat, thus enabling a statistical comparison to previous years' data and the progression of the offset site condition and EPBC Offset Assessment Guide Calculator inputs.	Sites listed at *Table 10* of the OAMP.
	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			

Monitoring	Attributes monitored	Frequency	Method	Location/s
	Coarse woody debris			
	Non-native plant cover			
Landholder/Pastoral Manager/Authority Holder Records ***Record keeping commences within three months of the Queensland Government approving the voluntary declaration***				
Photo points	General vegetation condition	Every November in Year 2, Year 4, and Year 5 (i.e. 2018, 2020 and 2021) and then every five years to (and including) year 2031	Pastoral Manager, Landholder or suitable qualified person appointed by the Landholder will undertake quarterly inspections of the offset area to observe and record grass cover levels, pest plants, accessibility (i.e. condition of fencing), signage, evidence of fire and evidence of pest animal incursion. The inspection records will serve as the primary data source for the Offset Area Report. Photo points to be undertaken as per the method described in the *Land Manager's Monitoring Guide* (DERM, 2010) (or any subsequent published version of this document) provided at Attachment 2 of the OAMP.	Sites listed at *Table 10* of the OAMP.
Grazing	Stocking rates Grass cover Pugging of the soil by livestock	Monitored monthly during grazing periods and reported in reporting detailed above.		Within offset areas
Fire	Occurrence, control measures implemented, timing and result of the control measures	Monitored as required by fire events (at least annually) and activity reported in reporting detailed above.		
Pest plants	Occurrence, control measures implemented, timing and the result of the control measures	Monitored in conjunction with photo point monitoring and reported in reporting detailed above.		
Pest animals	Occurrence, control measures implemented, timing and the result of the control measures	Monitored quarterly and reported in reporting detailed above.		
Access and signage	Condition and functionality of fences and signage	Monitored quarterly and reported in reporting detailed above.		

*A methodology for assessing ecological condition published subsequently to the *Guide to determining terrestrial habitat quality – a toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy (version 1.1 December 2014)* (DEHP, 2014) that captures the required scope of information may be used.

7 GOVERNANCE ARRANGEMENTS

The site will be managed as per the Offset Area Management Plan as attached at ***Schedule 1***. The key risks and corresponding management and corrective actions from the management plan are detailed at Section 4 of the OAMP. The Monitoring and Reporting as detailed previously will be undertaken to verify the management actions have been undertaken and that the offset site is improving. The OAMP is attached to the title of the property via the Voluntary Declaration under the *Vegetation Management Act 1999 (Qld)* which gives the State legislative powers to oversee the offset's implementation.

LIST OF ABBREVIATIONS

Abbreviation	Description
AU	Assessment Unit
BD	Biodiversity (class)
BMA	BHP Billiton Misubishi Alliance
BMC	BHP Billiton Mitsui Coal
BAMM	Biodiversity Assessment and Mapping Methodology
BVG	Broad Vegetation Group
DERM	Department of Environment and Resource Management (Qld) (now DEHP)
DEHP	Department of Environment and Heritage Protection (Qld)
DoEE	Department of the Environment and Energy
DNRM	Department of Natural Resources and Mines
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities (now DoEE)
EEM	Ecological Equivalence Methodology
EOP	*Environmental Offsets Policy (2012)* – EPBC Act
EOA	*Environmental Offsets Act 2014 (Qld)*
EPBC Act	*Environment Protection & Biodiversity Conservation Act 1999 (Cth)*
GRM	Goonyella Riverside mine
ha	Hectares
km	Kilometres
LZ	Land Zone
m	Metres
ML	Mining Lease
MNES	Matters of National Environmental Significance
MR Act	*Mineral Resources Act 1989 (Qld)*
MSES	Matters of State Environmental Significance
OAMP	Offset Area Management Plan
PMAV	Property Map of Assessable Vegetation
RE	Regional Ecosystem
SPRAT	Species Profile and Threats Database
SSBV	State Significant Biodiversity Values
SWC	South Walker Creek mine
TEC	Threatened Ecological Community
TSSC	Threatened Species Scientific Committee
VM	Vegetation management (class)

SCHEDULE 1: OFFSET AREA MANAGEMENT PLAN

Offset Area Management Plan – "Croydon Station"

Please see pdf file supplied separately.

SCHEDULE 2: TITLE SEARCH – CROYDON STATION

CURRENT STATE TENURE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 24439076
Search Date: 11/10/2016 12:41 **Title Reference: 17668167**
Date Created: 21/10/1995

DESCRIPTION OF LAND

Tenure Reference: PH 35/4777

Lease Type: ROLLING TERM LEASE

LOT 4 CROWN PLAN KL210
Local Government: ISAAC

Area: 58900.000000 Ha. (ABOUT)

No Land Description

No Forestry Entitlement Area

Purpose for which granted:
NO PURPOSE DEFINED

TERM OF LEASE

Term and day of beginning of lease

Term: 30 years commencing on 01/04/1968

Expiring on 31/03/1998

Extended to 31/12/2046

REGISTERED LESSEE

Dealing No: 716501923 19/05/2015

JENNIFER ALISON ACTON PERSONAL REPRESENTATIVE
UNDER INSTRUMENT 716501923

CONDITIONS

Page 1/6

CURRENT STATE TENURE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 24439076
Search Date: 11/10/2016 12:41 **Title Reference: 17668167**
Date Created: 21/10/1995

CONDITIONS

A126 SPECIFIED CONDITIONS FOR: Term Lease
PURPOSE: Rolling term lease - pastoral

STATUTORY CONDITIONS:

Statutory conditions are the general mandatory conditions of a lease and binds the lessee in accordance with Part 2 Division 1 of the Land Act.

1. Permitted Use: The lessee must use the land only for the purpose for which the tenure was issued under the Land Act 1994.
2. Duty of Care: The lessee has the responsibility for a duty of care, for the land under the Land Act 1994.
3. Rent/Instalment: The lessee must pay the annual rent/instalment in accordance with the Land Act 1994 and the Land Regulation 2009.
   For further information on how annual rent is determined, refer to the department's website at www.dnrm.qld.gov.au.
4. Noxious plants: The lessee must keep noxious plants on the land under control. If the lessee does not comply with this condition, the Minister may bring the noxious plants under control, the cost of which will be recovered from the lessee.
5. Information to Minister: The lessee must give the Minister administering the Land Act 1994, information the Minister asks for about the tenure.
6. Monies for Improvements: No money for improvements is payable by the State on the forfeiture, surrender or expiry of this lease but money may be payable if the State receives payment from an incoming lessee or buyer for the improvements on the land. However, the previous lessee may apply to the Minister to remove the improvements that belong to the lessee, within a period of 3 months from the date of the forfeiture, surrender, or expiry of this lease. The lessee may only undertake the removal of the improvements in the presence of an authorised representative of the department, if required by the Minister. The lessee may only remove those improvements if all monies due from the lessee to the department under this lease have been paid.

REGULATORY-CONDITIONS:----------

A regulatory condition relates to a lease , in accordance with the Land Regulation.

1. Indemnity: The lessee indemnifies and agrees to keep indemnified the Minister, and the State of Queensland and its Representatives, (the "Indemnified parties") against all liability, costs, loss and expenses including claims in negligence (including any claims, proceedings or demands bought by any third party, and any legal fees, costs and disbursements on a solicitor and client basis) ("Claim") arising from or incurred in connection with:
   a. the granting of this lease to the lessee;

CONDITIONS

b. the lessee 's use and occupation of the land; or
c. personal injury (including sickness and death) or property damage or loss in connection with the performance (or attempted purported performance or non-performance) of the lease or a breach of the lease by the lessee .

The lessee hereby releases and discharges to the full extent permitted by law, the Indemnified parties from all actions, claims, proceedings or demands and in respect of any loss, death, injury, illness or damage (whether personal or property and whether special, direct, indirect or consequential financial loss) arising out of the use and occupation of the lease.
To the full extent permitted by law, the Minister, the State of Queensland and their Representatives will not be liable to the lessee for any special, indirect or consequential damages, including consequential financial loss arising out of the use and occupation of the lease.

2. Public Liability: The lessee must effect a public liability insurance policy with an insurer authorised under the Insurance Act 1973 (Commonwealth) or, if not so authorised then only with the Minister's approval, which can be given or withheld in the Minister's sole discretion, naming the lessee as the insured covering legal liability for any loss of, or damage to any property and for the injury (including death) to any person arising out of anything done or omitted on or about the land or any improvements thereon and against all claims, demands, proceedings, costs, charges, and expenses whatsoever (including claims in negligence) Such policy must:
   a. be for an amount of not less than $20,000,000.00 and have no per event sublimit or such higher amounts as the Minister may reasonably require.
   b. be effected on a "claims occurring" basis; and
   c. be maintained at all times during the currency of the lease, and upon receipt of any notice of cancellation, the lessee must immediately effect another public insurance policy in accordance with the terms of the lease .

   The lessee must, as soon as practicable, inform the Minister, in writing, of the occurrence of any event that the lessee considers is likely to give rise to a claim under the policy of insurance effected and must ensure that the Minister is kept fully informed of subsequent actions and developments concerning the claim.
   The lessee must renew such policy, at the lessee's expense, each year during the currency of this lease.
   The condition will be satisfied if the lessee is the State of Queensland or a statutory authority eligible for cover under the Queensland Government Insurance Fund and is insured and continues to be insured by the Queensland Government Insurance Fund.
   This condition will be satisfied if the lessee is the Commonwealth of Australia or a statutory authority eligible for cover under the Comcover Insurance Fund and is insured and

CONDITIONS

continues to be insured by Comcover.

3. Access: The provision of access, further access or services to the land will not be the responsibility of the State.
4. Survey Costs: If the land needs to be surveyed or re-surveyed the lessee must do this at their own cost under the Survey and Mapping Infrastructure Act 2003. This survey plan must be lodged in the land registry within the specified time.
5. Extension: The lease is subject to the extensions of rolling term leases provision of the Land Act 1994 and the Minister must grant an extension of the term of a rolling term lease if the lessee makes an application in the approved form. The extension will be for the original term of the lease and may be given subject to condition changes.
6. Jurisdiction: The lessee is subject to the Land Act 1994 and all other relevant Queensland and Commonwealth legislation.
7. Compliance with Laws - the lessee must comply with all lawful requirements of the -
   a. Local Government; and
   b. any department within the Queensland or Commonwealth governments (including the department administering the Land Act 1994), local authority or statutory instrumentality having jurisdiction over the land, or the development, use and occupation of the land, in regard to its use, occupation and development of the land.

SPECIAL-CONDITIONS:----------

These conditions relate to this lease.

Improvements or development on or to the land

1. The lessee must during the whole term of the lease, to the satisfaction of the relevant authorities, maintain existing improvements and boundary fencing on the land in a good and substantial state of repair.

Quarry material

1. The lessee must allow any person authorised under the Forestry Act 1959 access to the leased land for the purpose of cutting and removing timber or removing other forest products, or quarry material, or other material from the leased land.
   Except as hereinafter provided the lessee must not interfere with any forest products or remove any quarry material (including any stone, gravel, sand, earth, soil, rock, guano or clay which is not a mineral within the meaning of the Mineral Resources Act 1989) or other material upon the leased land without the permission of the Minister administering the Land Act 1994 except under the authority of and in compliance in every respect with the requirements or a permit, licence, agreement or contract granted or made under the Forestry Act 1959.

CURRENT STATE TENURE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 24439076
Search Date: 11/10/2016 12:41 **Title Reference: 17668167**
Date Created: 21/10/1995

ENCUMBRANCES AND INTERESTS

1. Rights and interests reserved to the Crown by
   Lease No. 17668167

2. EASEMENT No 602806195 (A921) 15/06/1976
   EASEMENT IN PURSUANCE OF AN AGREEMENT DATED THE 29TH DAY OF
   SEPTEMBER 1975 BETWEEN THE LESSEE OF THE WITHINDESCRIBED
   HOLDING AND THE
   QUEENSLAND ELECTRICITY COMMISSION
   FOR PURPOSES AS DEFINED IN SUCH AGREEMENT

3. TRANSFER No 709859272 17/08/2006 at 12:06
   EASEMENT: 602806195 (A921)
   QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
   A.C.N. 078 849 233

4. EASEMENT IN GROSS No 710181514 13/12/2006 at 14:29
   burdening the land
   QUEENSLAND ELECTRICITY TRANSMISSION CORPORATION LIMITED
   A.C.N. 078 849 233
   over
   EASEMENTS J, K AND L ON SP193787

5. AMENDMENT OF LEASE CONDITIONS No 716402297 31/03/2015 at 08:16
   THE CONDITIONS OF THE WITHIN TENURE ARE HEREBY AMENDED.

6. MORTGAGE No 716624070 13/07/2015 at 15:32
   NATIONAL AUSTRALIA BANK LIMITED A.B.N. 12 004 044 937

7. MORTGAGE No 716624162 13/07/2015 at 15:49
   AUSTRALIAN CATTLE AND BEEF COMPANY PTY LTD A.C.N. 163 966
   514

8. SUB LEASE No 716936515 07/12/2015 at 13:36
   AUSTRALIAN CATTLE AND BEEF HOLDINGS PTY LTD A.C.N. 606 490
   475
   OF THE WHOLE OF THE LAND
   TERM: 28/09/2015 TO 30/06/2020 OPTION 5 YEARS

ADMINISTRATIVE ADVICES

Dealing	Type	Lodgement Date	Status
716537913	VEG NOTICE VEGETATION MANAGEMENT ACT 1999	04/06/2015 14:25	CURRENT
717076324	ADMIN NOTING SEE DEALING FOR RELEVANT LEGISLATION	18/02/2016 09:08	CURRENT

UNREGISTERED DEALINGS - NIL

CURRENT STATE TENURE SEARCH

DEPT OF NATURAL RESOURCES AND MINES, QUEENSLAND

Request No: 24439076
Search Date: 11/10/2016 12:41

Title Reference: 17668167
Date Created: 21/10/1995

Caution - Charges do not necessarily appear in order of priority

** End of Current State Tenure Search **

Information provided under section 34 Land Title Act(1994) or
section 281 Land Act(1994)

Requested By: D-ENQ QLD GLOBE

SCHEDULE 3: EPBC OFFSET ASSESSMENT GUIDE RESULTS

Schedule 3A: Ornamental Snake

Ornamental Snake - Regrowth

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Ornamental Snake
EPBC Act status	Vulnerable
Annual probability of extinction 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	52.44	Hectares	
			Quality	7	Scale 0-10	
			Total quantum of impact	36.71	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 roadkills 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	36.71	Adjusted hectares	41.1	Time over which loss is averted (max. 20 years)	20	Start area (hectares)	41.1	Risk of loss (%) without offset	90%	Risk of loss (%) with offset	2%	36.17	90%	32.55	31.28	22.96	62.55%	No	
									Future area without offset (adjusted hectares)	4.1	Future area with offset (adjusted hectares)	40.3								
					Time until ecological benefit	20	Start quality (scale of 0-10)	6	Future quality without offset (scale of 0-10)	4	Future quality with offset (scale of 0-10)	7	3.00	90%	2.70	2.59				
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 roadkills 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	36.708	22.96	62.55%	No	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Ornamental Snake
EPBC Act status	Vulnerable
Annual probability of extinction 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**	52.44	Hectares	
			Quality	7	Scale 0-10	
			Total quantum of impact	36.71	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 roadkills 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	36.71	Adjusted hectares	213.5	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	213.5	**Risk of loss (%) without offset**	10%	**Risk of loss (%) with offset**	2%	17.08	90%	15.37	14.77	45.05	122.72%	Yes	
									Future area without offset (adjusted hectares)	192.2	**Future area with offset (adjusted hectares)**	209.2								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	7	**Future quality without offset (scale of 0-10)**	6	**Future quality with offset (scale of 0-10)**	8	2.00	90%	1.80	1.73				
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 roadkills 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	36.708	45.05	122.72%	**Yes**	$0.00	N/A	$0.00
Area of community	0				$0.00		$0.00
					$0.00	**$0.00**	**$0.00**

Yakka Skink - Regrowth

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Yakka Skink
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**	105.6	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	63.38	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 roadkills 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	63.38	Adjusted hectares	86.6	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	86.6	**Risk of loss (%) without offset**	90%	**Risk of loss (%) with offset**	2%	76.21	90%	68.59	65.90	77.51%	No		
									Future area without offset (adjusted hectares)	8.7	**Future area with offset (adjusted hectares)**	84.9				49.13				
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	5	**Future quality without offset (scale of 0-10)**	3	**Future quality with offset (scale of 0-10)**	7	4.00	90%	3.60	3.46				
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 roadkills 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	63.378	49.13	77.51%	**No**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Yakka Skink - Remnant

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Yakka Skink
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**	105.6	Hectares	
			Quality	**6**	Scale 0-10	
			Total quantum of impact	63.38	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**		**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	63.38	Adjusted hectares	159.2	**Time over which loss is averted (max. 20 years)**	20	**Start area (hectares)**	159.2	**Risk of loss (%) without offset**	10%	**Risk of loss (%) with offset**	2%	12.74	90%	11.46	11.01	33.59	53.00%	No	
									Future area without offset (adjusted hectares)	143.3	**Future area with offset (adjusted hectares)**	156.0								
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	7	**Future quality without offset (scale of 0-10)**	6	**Future quality with offset (scale of 0-10)**	8	2.00	90%	1.80	1.73				
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	63.378	33.59	53.00%	**No**	$0.00	#DIV/0!	#DIV/0!
Area of community	0				$0.00		$0.00
					$0.00	**#DIV/0!**	**#DIV/0!**

Schedule 3C: Brigalow

Brigalow - Regrowth

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Brigalow
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**	9.73	Hectares	
			Quality	7	Scale 0-10	
			Total quantum of impact	6.81	Adjusted hectares	
Threatened species habitat						
Area of habitat	No		**Area**			
			Quality	7		
			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. 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	Yes	6.81	Adjusted hectares	86.6	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	86.6	**Risk of loss (%) without offset**	90%	**Risk of loss (%) with offset**	2%	76.21	90%	68.59	54.03	38.43	564.30%	Yes		
									Future area without offset (adjusted hectares)	8.7	**Future area with offset (adjusted hectares)**	84.9									
					Time until ecological benefit	20	**Start quality (scale of 0-10)**	6	**Future quality without offset (scale of 0-10)**	6	**Future quality with offset (scale of 0-10)**	7	1.00	90%	0.90	0.71					
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)**	5	**Future quality without offset (scale of 0-10)**	4	**Future quality with offset (scale of 0-10)**	7									
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	0				$0.00		$0.00
Area of community	6.811	38.43	564.30%	Yes	$0.00	N/A	$0.00
					$0.00	**$0.00**	**$0.00**

Offsets Assessment Guide

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

This guide relies on Macros being enabled in your browser.

Matter of National Environmental Significance	
Name	Brigalow
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**	9.7	Hectares	
			Quality	7	Scale 0-10	
			Total quantum of impact	6.79	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. 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 roadkills per year	No					
Number of individuals e.g. Individual plants/animals	No					

Offset calculator

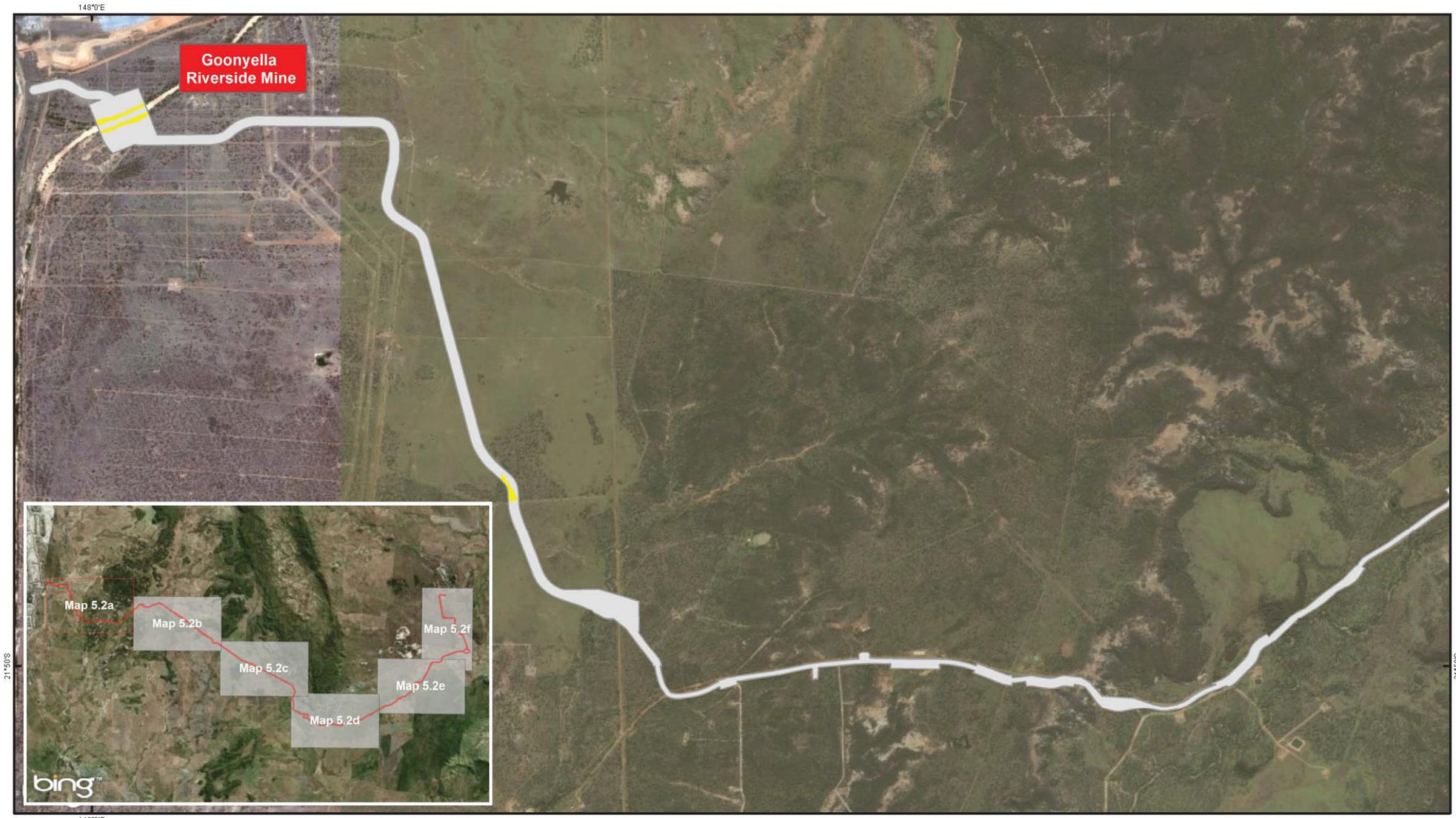
Protected matter attributes	Attribute relevant to case?	Total quantum of impact	Units	Proposed offset	Time horizon (years)		Start area and quality		Future area and quality without offset		Future area and quality with offset		Raw gain	Confidence in result (%)	Adjusted gain	Net present value (adjusted hectares)		% of impact offset	Minimum (90%) direct offset requirement met?	Cost ($ total)	Information source
Ecological Communities																					
Area of community	Yes	6.79	Adjusted hectares	27.1	**Risk-related time horizon (max. 20 years)**	20	**Start area (hectares)**	27.1	**Risk of loss (%) without offset**	10%	**Risk of loss (%) with offset**	2%	2.17	90%	1.95	1.54	5.13	75.50%	No		
									Future area without offset (adjusted hectares)	24.4	**Future area with offset (adjusted hectares)**	26.6									
					Time until ecological benefit	10	**Start quality (scale of 0-10)**	7	**Future quality without offset (scale of 0-10)**	6	**Future quality with offset (scale of 0-10)**	8	2.00	90%	1.80	1.60					
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)**	6	**Future quality without offset (scale of 0-10)**	5	**Future quality with offset (scale of 0-10)**	7									
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 roadkills 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	6.79	5.13	75.50%	**No**	$0.00	#DIV/0!	#DIV/0!
					$0.00	**#DIV/0!**	**#DIV/0!**

APPENDIX A: IMPACT AREA MAPPING

Appendix A1: Impact Area Mapping – Ornamental Snake



Notes:
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Data Source: Image from ArcGIS Online Bing Maps data (c) 2010 Microsoft Corporation and its data suppliers. Regional Ecosystems V7 and RE Waterways sourced from QLD Government 2012.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Ornamental Snake Habitat
- Essential Habitat
- Unlikely Habitat

- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 20-Sep-16

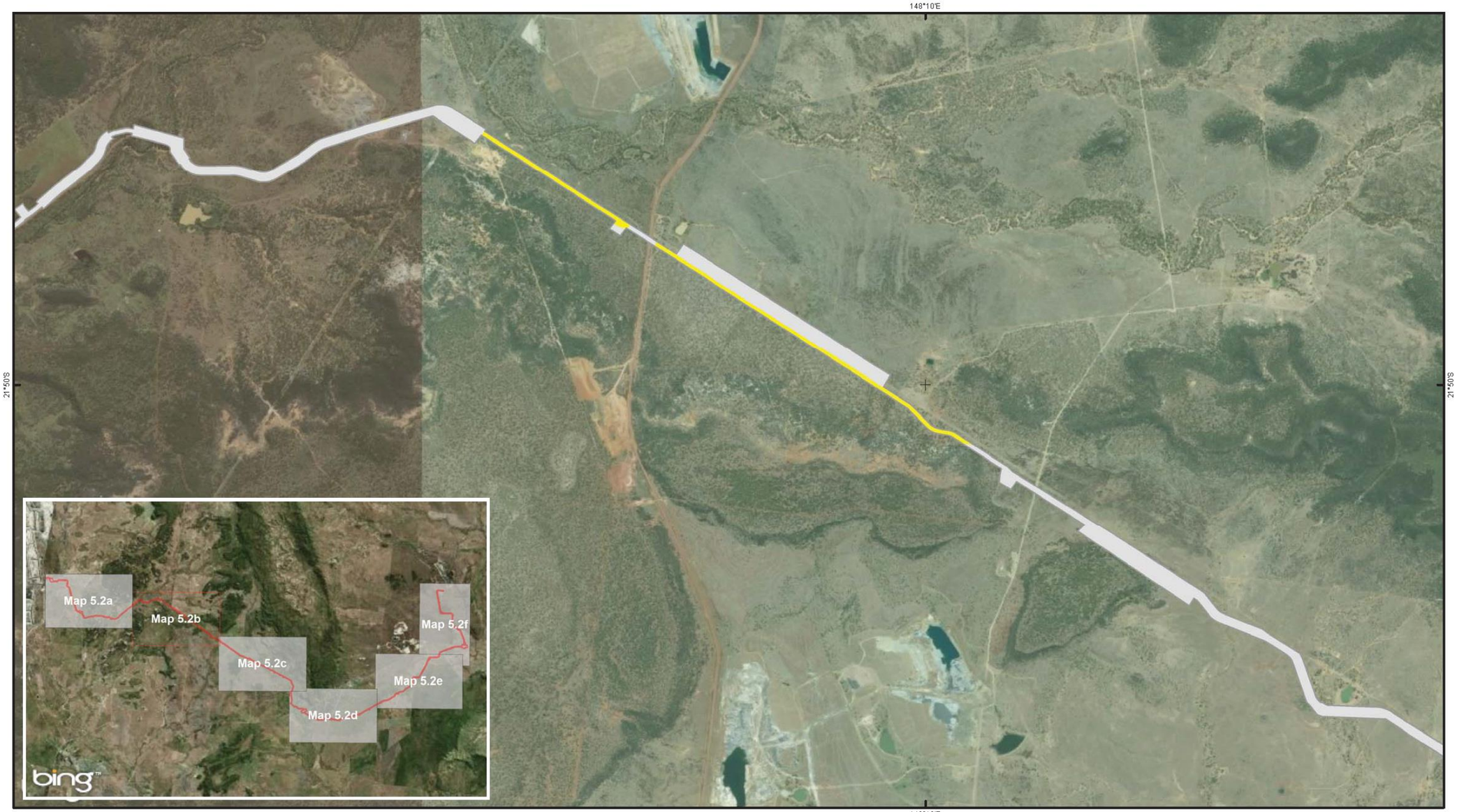
Document Location: C:\Users\Diemer\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxd Date: 20-Sep-16 11:16:24 PM

Figure:	5.2a
Title:	Modelled and ground-truthed Ornamental Snake habitat within the Dragline Route
Project:	BMC Dragline Move Project Terrestrial Ecology MNES Assessment
Client:	Advisian

BAAM ECOLOGICAL CONSULTANTS

148°10'E

21°50'S



148°10'E

Notes:
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Data Source: Image from ArcGIS Online Bing Maps data (c) 2010 Microsoft Corporation and its data suppliers. Regional Ecosystems V7 and RE Waterways sourced from QLD Government 2012.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Ornamental Snake Habitat
- Essential Habitat
- Unlikely Habitat
- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 20-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxd Date: 20-Sep-16 11:16:24 PM

Figure: 5.2b
Title: Modelled and ground-truthed Ornamental Snake habitat within the Dragline Route

Project: BMC Dragline Move Project
Terrestrial Ecology MNES Assessment

Client: Advisian

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Data Source: Image from ArcGIS Online Bing Maps data (c) 2010 Microsoft Corporation and its data suppliers. Regional Ecosystems V7 and RE Waterways sourced from QLD Government 2012.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Ornamental Snake Habitat
- General Habitat
- Unlikely Habitat

- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 20-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxd Date: 20-Sep-16 11:16:24 PM

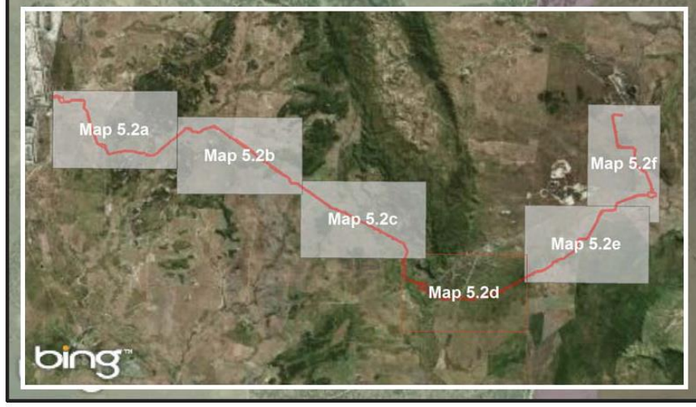
Figure: 5.2c
Title: Modelled and ground-truthed Ornamental Snake habitat within the Dragline Route

Project: BMC Dragline Move Project
Terrestrial Ecology MNES Assessment

Client: Advisian

BAAM ECOLOGICAL CONSULTANTS

148°20'E



148°20'E

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Data Source: Image from ArcGIS Online Bing Maps data (c) 2010 Microsoft Corporation and its data suppliers. Regional Ecosystems V7 and RE Waterways sourced from QLD Government 2012.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Ornamental Snake Habitat

- Core Habitat
- Essential Habitat
- General Habitat
- Unlikely Habitat

- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 20-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxd Date: 20-Sep-16 11:16:24 PM

Figure: 5.2d
Title: Modelled and ground-truthed Ornamental Snake habitat within the Dragline Route

Project: BMC Dragline Move Project
Terrestrial Ecology MNES Assessment

Client: Advisian

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Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Ornamental Snake Habitat
- Essential Habitat
- General Habitat
- Unlikely Habitat

- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 20-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxd Date: 20-Sep-16 11:16:24 PM

Figure:	5.2e
Title:	Modelled and ground-truthed Ornamental Snake habitat within the Dragline Route
Project:	BMC Dragline Move Project Terrestrial Ecology MNES Assessment
Client:	Advisian

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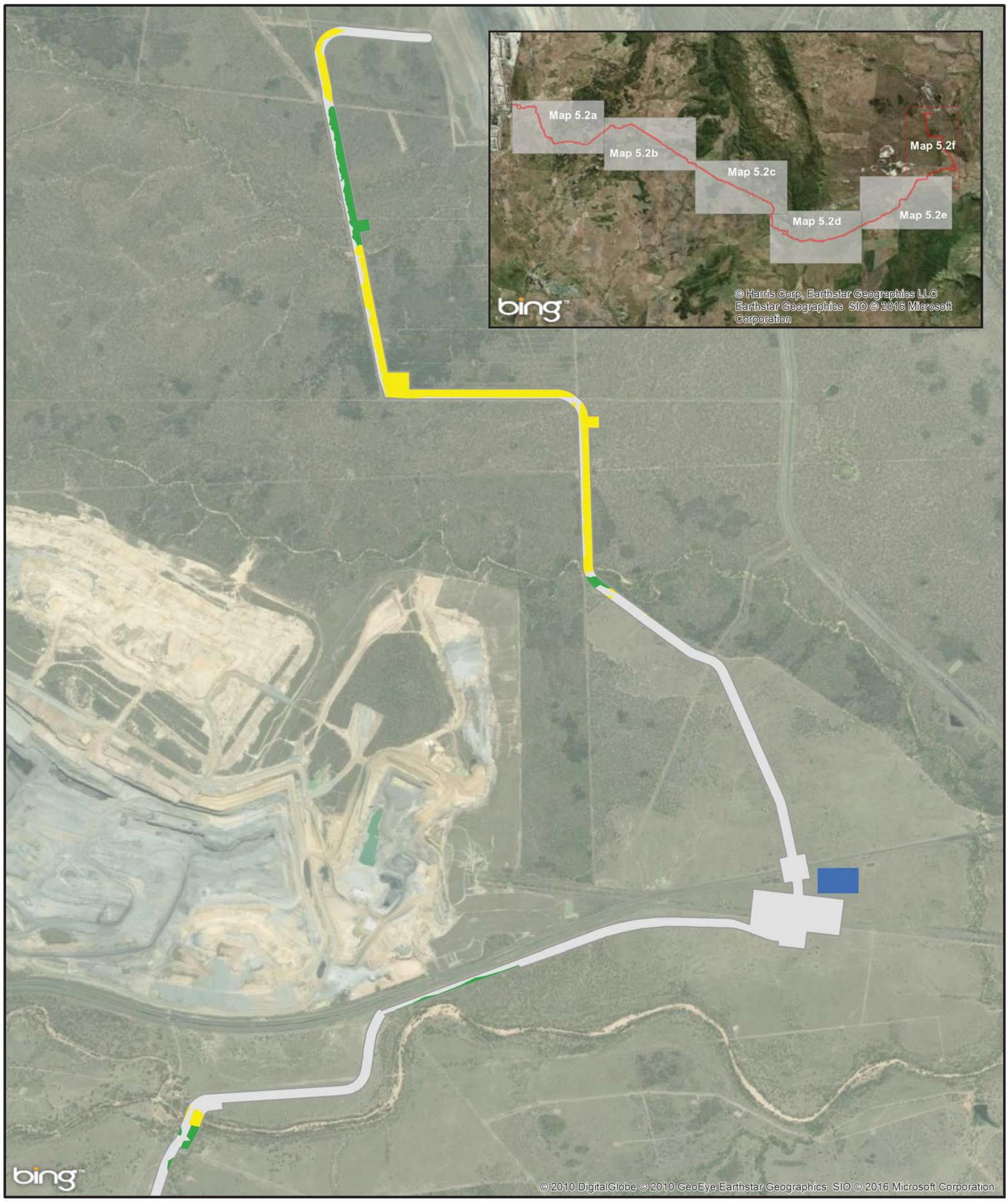

Notes:

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 0.15 0.3 0.6 0.9 1.2 Kilometers

Legend

Ornamental Snake Habitat

- Essential Habitat
- General Habitat
- Unlikely Habitat

- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 21-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Portrait_dragline.mxdDate: 21-Sep-16 1:00:30 AM

Figure:	5-2f
Title:	Modelled and ground-truthed Ornamental Snake habitat within the Dragline Route
Project:	BMC Dragline Move Project Terrestrial Ecology MNES Assessment
Client:	Client LOGO or name

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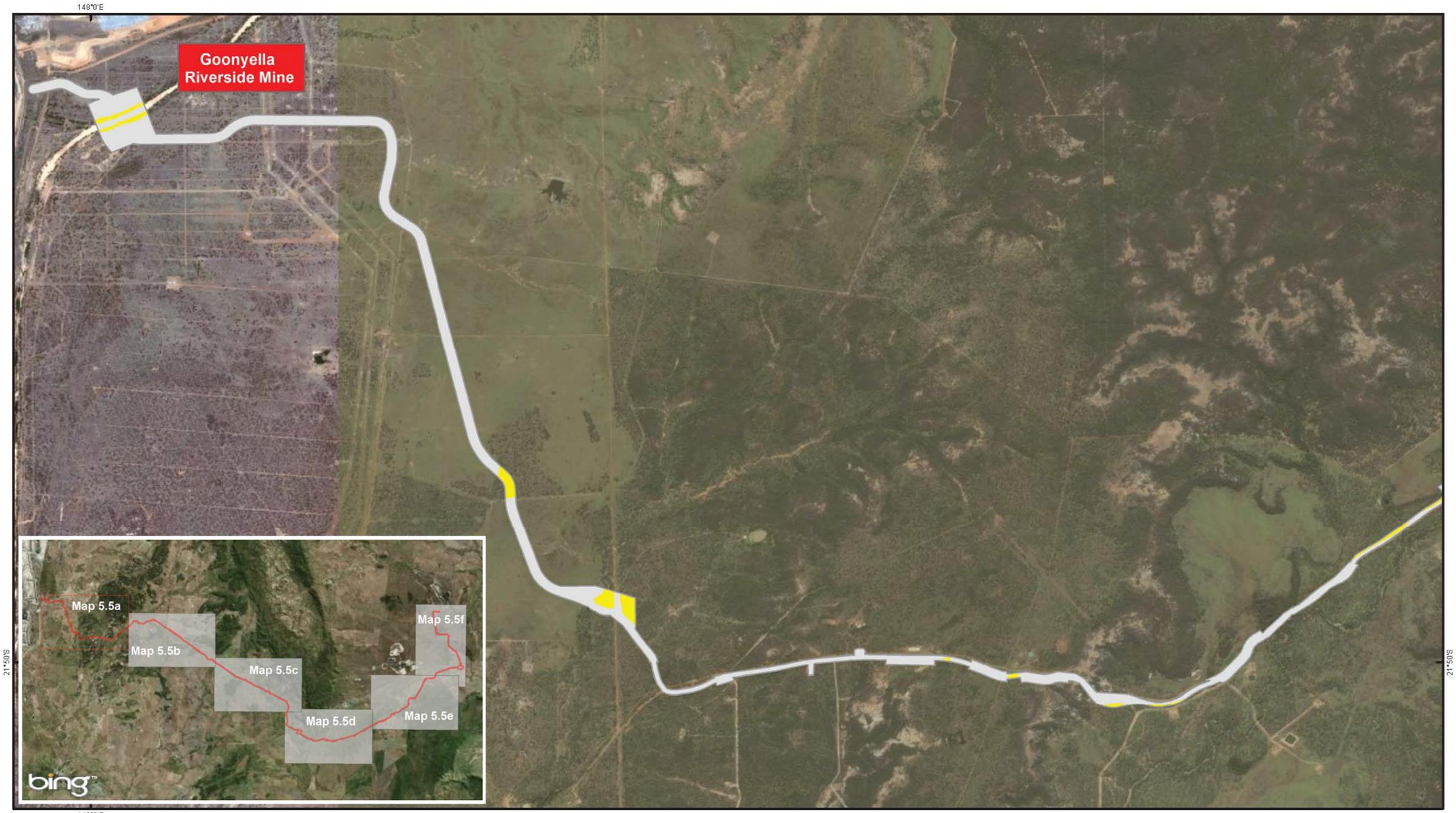
Appendix A2: Impact Area Mapping – Yakka Skink



148°10'E

21°50'S

Map 5.5a
Map 5.5b
Map 5.5c
Map 5.5d
Map 5.5e
Map 5.5f

bing

148°10'E

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Data Source: Image from ArcGIS Online Bing Maps data (c) 2010 Microsoft Corporation and its data suppliers. Regional Ecosystems V7 and RE Waterways sourced from QLD Government 2012.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Yakka Skink
- Essential Habitat
- Unlikely Habitat

- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 21-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxd Date: 21-Sep-16 12:10:23 AM

Figure: 5.5b
Title: Modelled and ground-truthed Yakka Skink habitat within the Dragline Route

Project: BMC Dragline Move Project
Terrestrial Ecology MNES Assessment

Client: Advisian

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Data Source: Image from ArcGIS Online Bing Maps data (c) 2010 Microsoft Corporation and its data suppliers. Regional Ecosystems V7 and RE Waterways sourced from QLD Government 2012.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Yakka Skink

Essential Habitat

Unlikely Habitat

Dragline Corridor Revision C

Drawn By: MG Reviewed by: AC Date: 21-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxdDate: 21-Sep-16 12:10:23 AM

Figure: 5.5c
Title: Modelled and ground-truthed Yakka Skink habitat within the Dragline Route

Project: BMC Dragline Move Project
Terrestrial Ecology MNES Assessment

Client: Advisian

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148°20'E

148°20'E

Notes:
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Data Source: Image from ArcGIS Online Bing Maps data (c) 2010 Microsoft Corporation and its data suppliers. Regional Ecosystems V7 and RE Waterways sourced from QLD Government 2012.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Yakka Skink

- Essential Habitat
- General Habitat
- Unlikely Habitat
- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 21-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxd Date: 21-Sep-16 12:10:23 AM

Figure: 5.5d
Title: Modelled and ground-truthed Yakka Skink habitat within the Dragline Route

Project: BMC Dragline Move Project
Terrestrial Ecology MNES Assessment

Client: Advisian

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Data Source: Image from ArcGIS Online Bing Maps data (c) 2010 Microsoft Corporation and its data suppliers. Regional Ecosystems V7 and RE Waterways sourced from QLD Government 2012.

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 165 330 660 990 1,320 Meters

LEGEND

Yakka Skink

- Essential Habitat
- Unlikely Habitat
- Dragline Corridor Revision C

Drawn By: MG Reviewed by: AC Date: 21-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Landscape_series_Dragline.mxd Date: 21-Sep-16 12:10:23 AM

Figure:	5.5e
Title:	Modelled and ground-truthed Yakka Skink habitat within the Dragline Route
Project:	BMC Dragline Move Project Terrestrial Ecology MNES Assessment
Client:	Advisian

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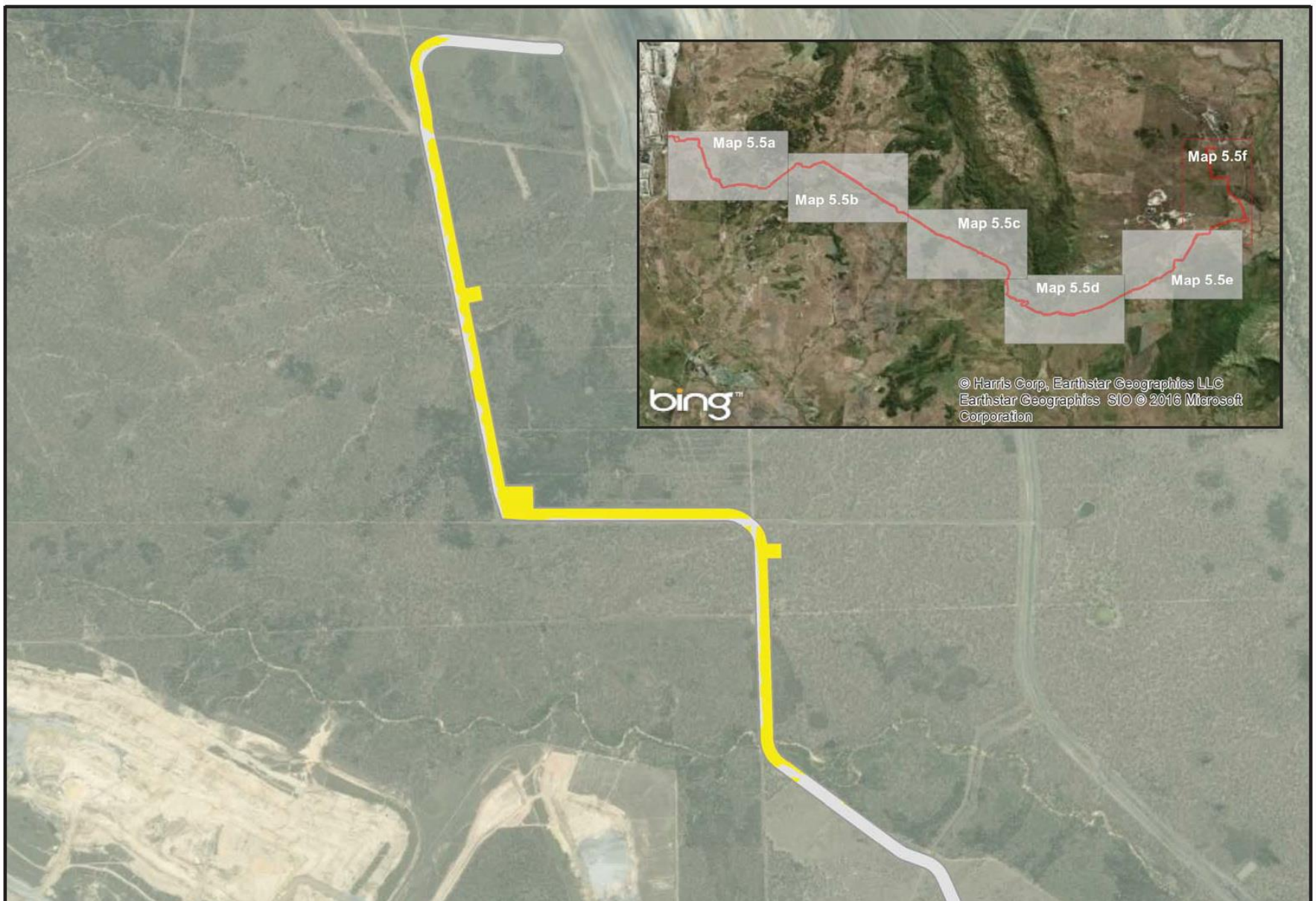

Notes:

Coordinate System: GCS GDA 1994
Datum: GDA 1994
Units: Degree

1:30,000 at A4
0 0.15 0.3 0.6 0.9 1.2 Kilometers

Legend

Yakka Skink

- Essential Habitat
- Unlikely Habitat
- Dragline Corridor Revision C
- Temporary Shutdown Areas

Drawn By: MG Reviewed by: AC Date: 21-Sep-16

Document Location: C:\Users\Owner\Documents\Clients\BAAM\Dragline\BAAM_A3_Portrait_dragline.mxdDate: 21-Sep-16 1:49:00 AM

Figure:	5-5f
Title:	Modelled and ground-truthed Yakka Skink habitat within the Dragline Route
Project:	BMC Dragline Move Project Terrestrial Ecology MNES Assessment
Client:	Client LOGO or name

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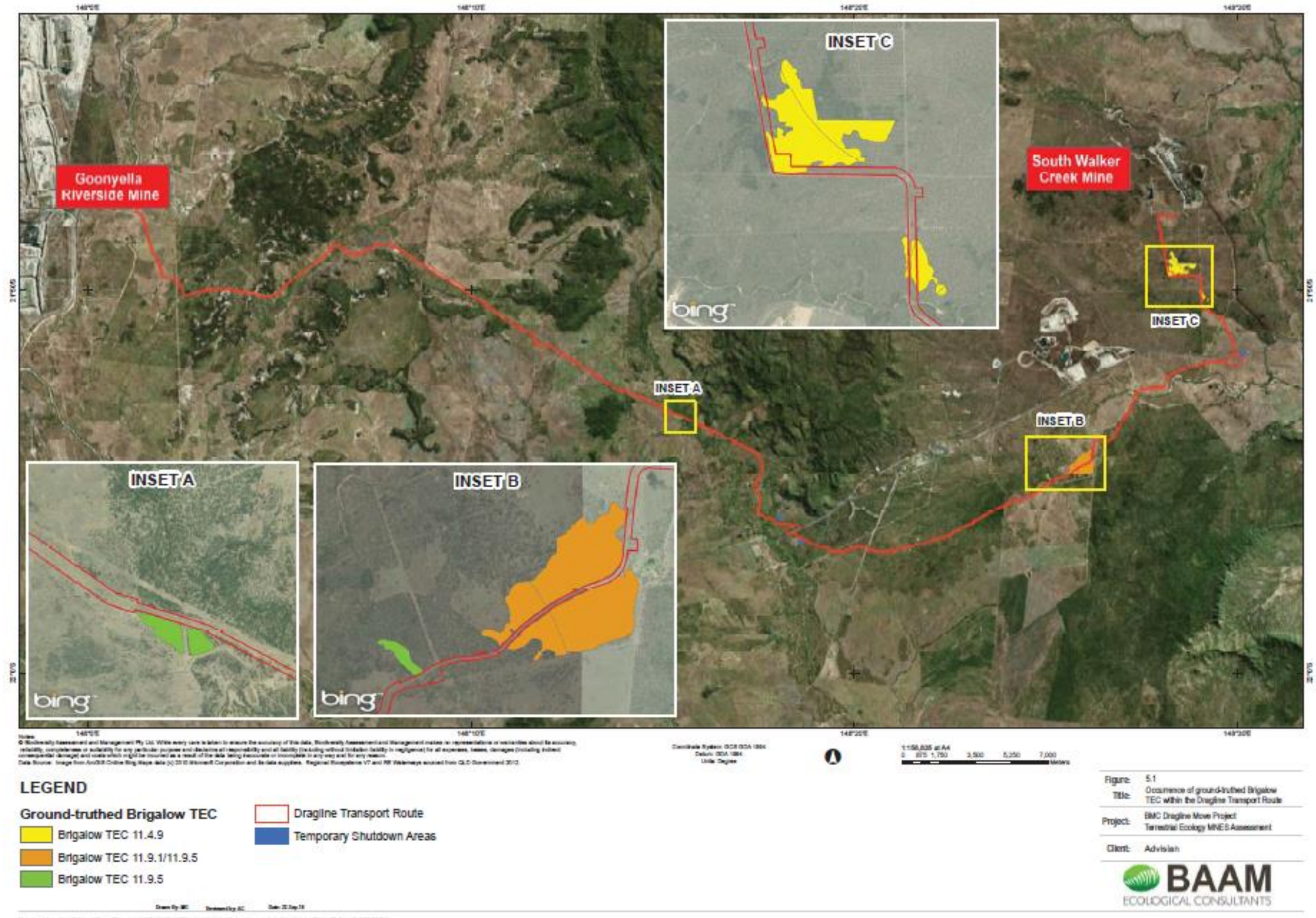
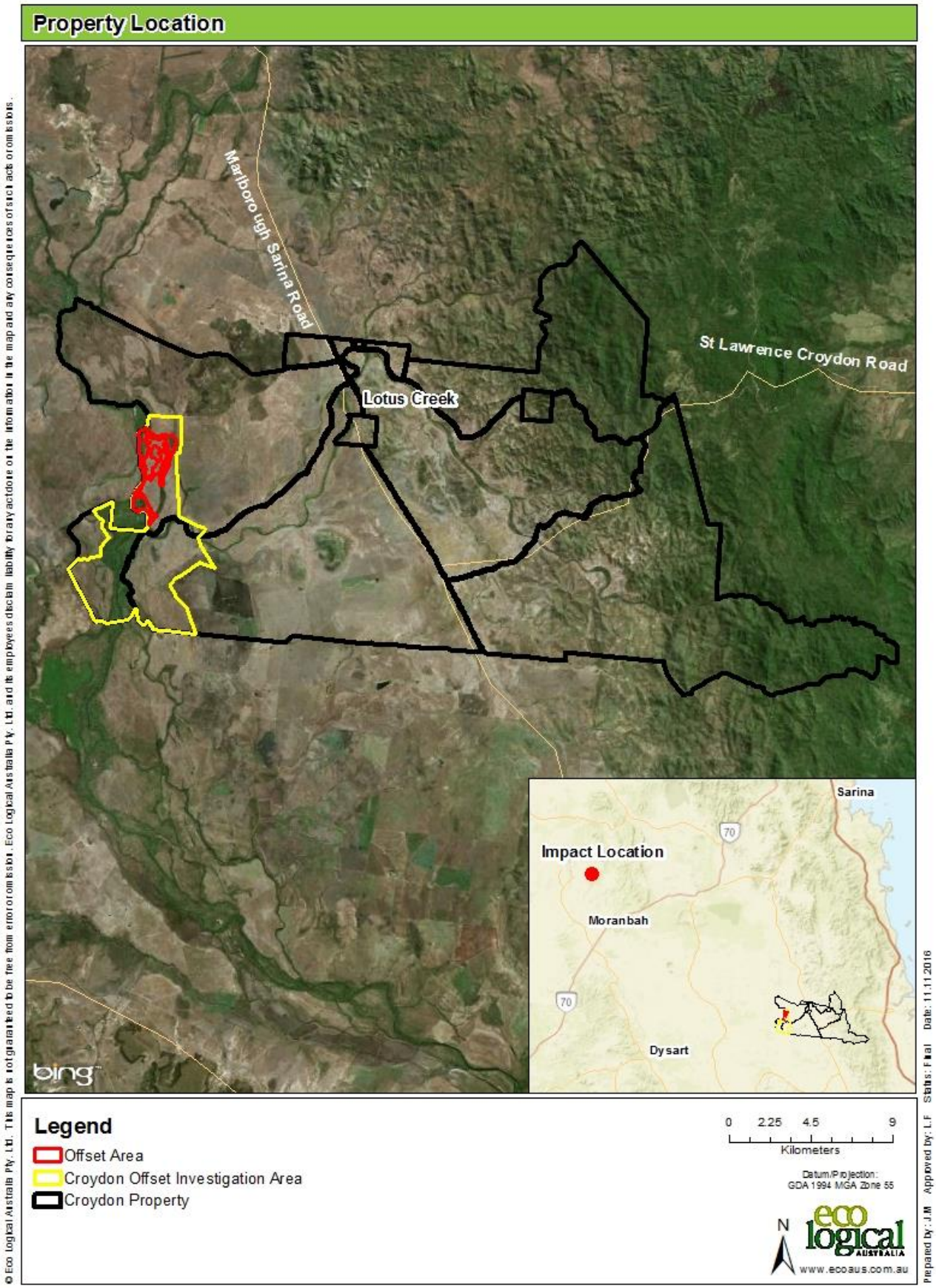
Appendix A3: Impact Area Mapping – Brigalow TEC

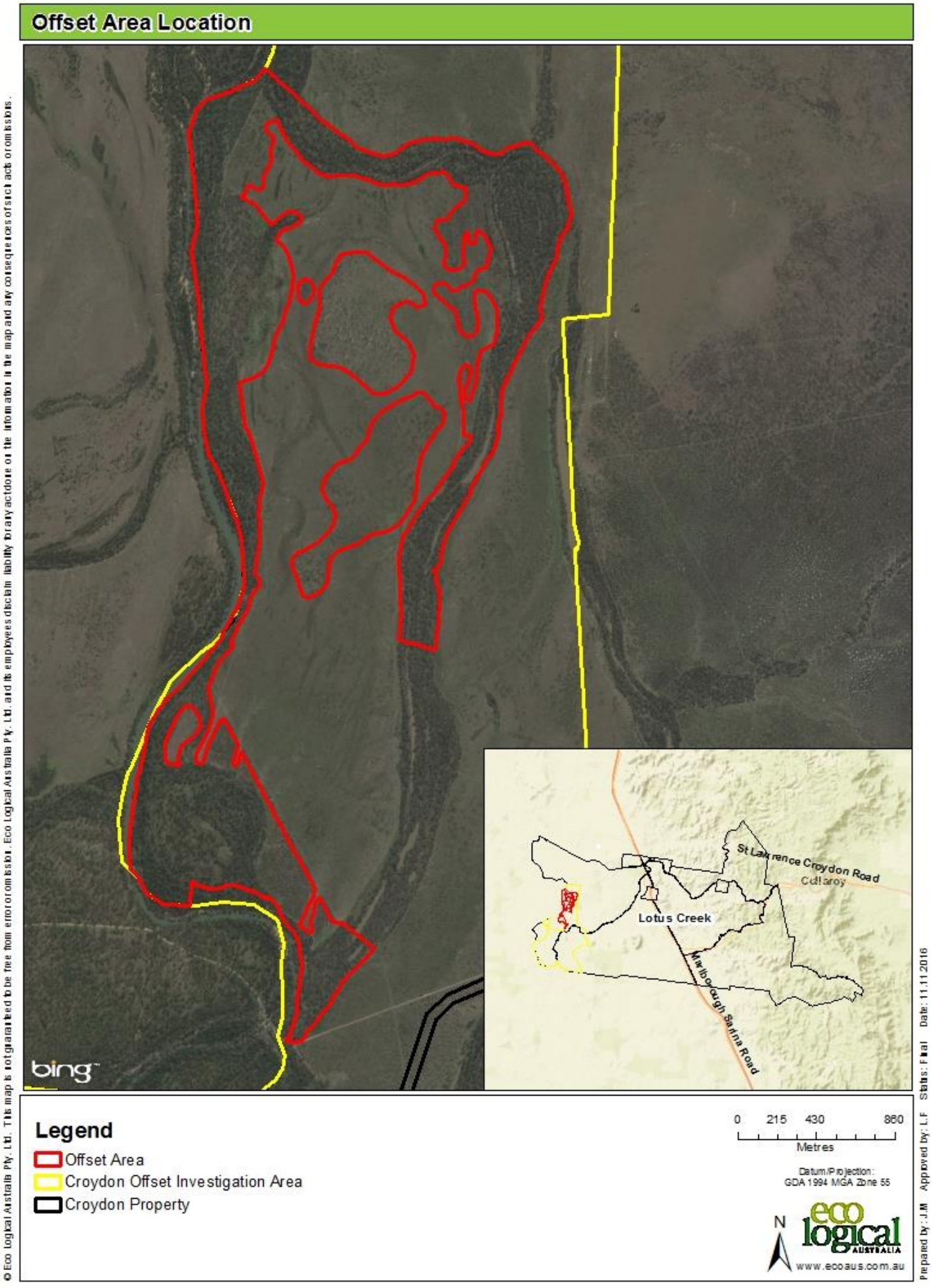


APPENDIX B: OFFSET AREA MAPPING

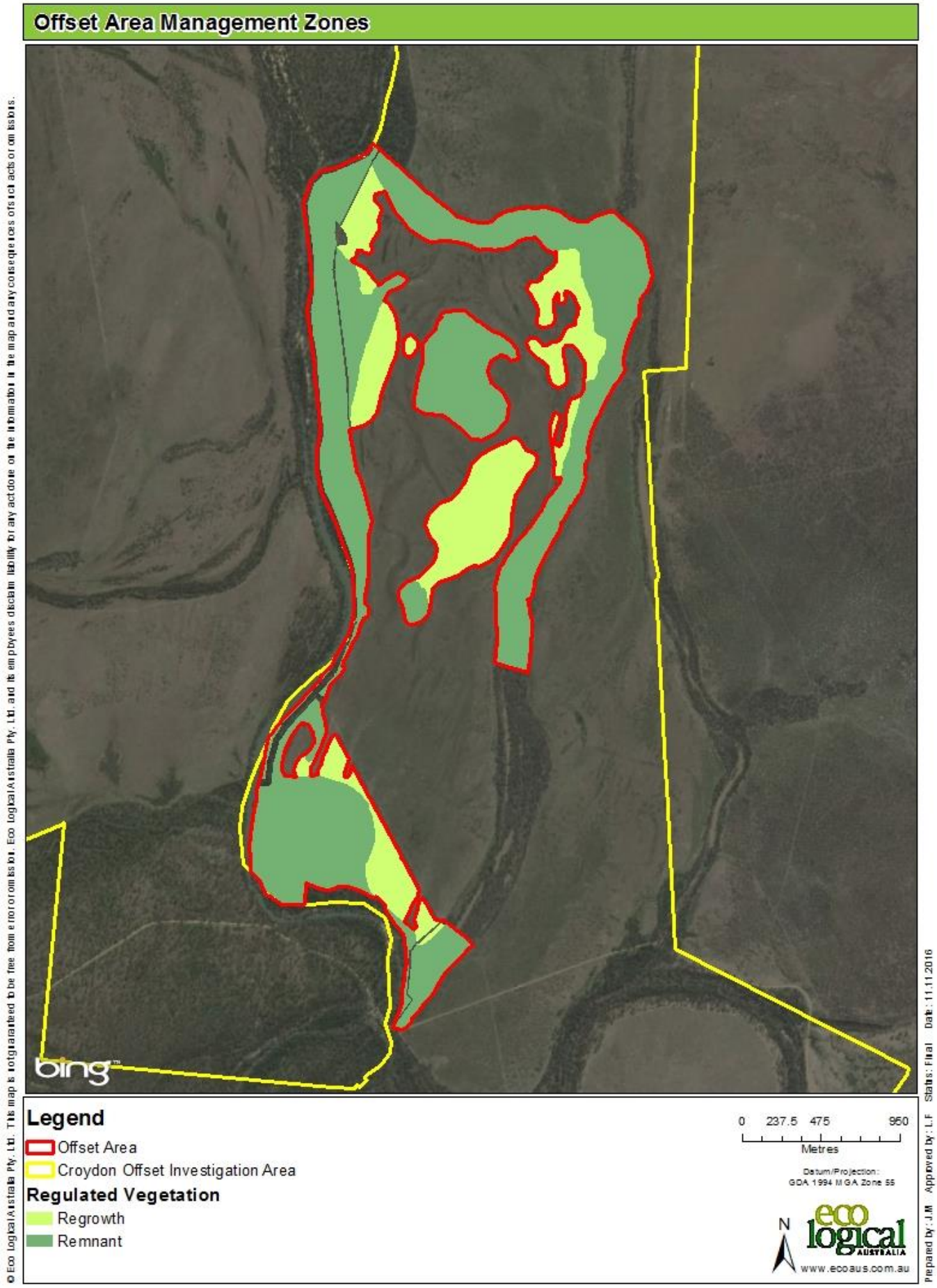
Offset Property Location



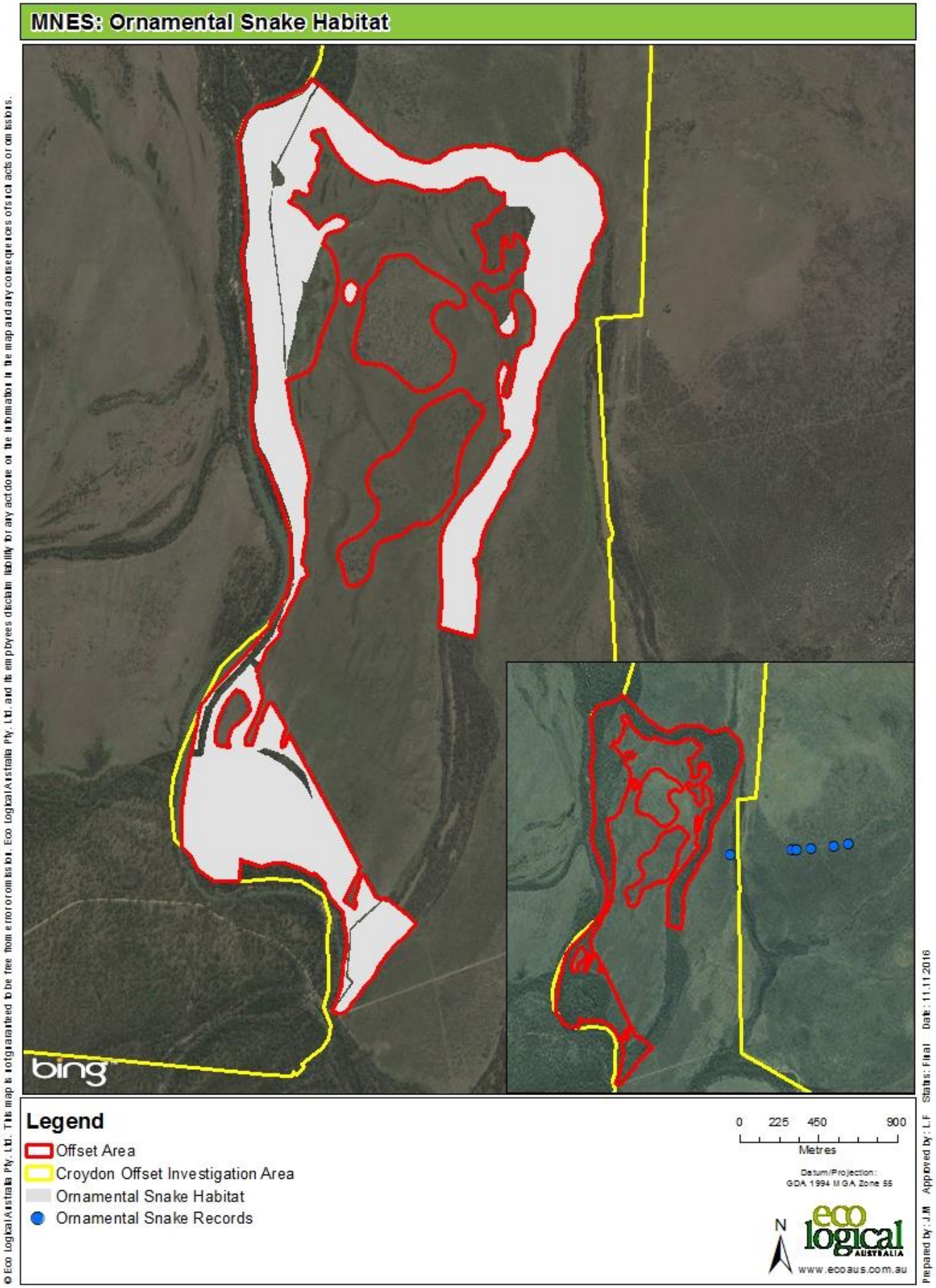
Offset Area Location



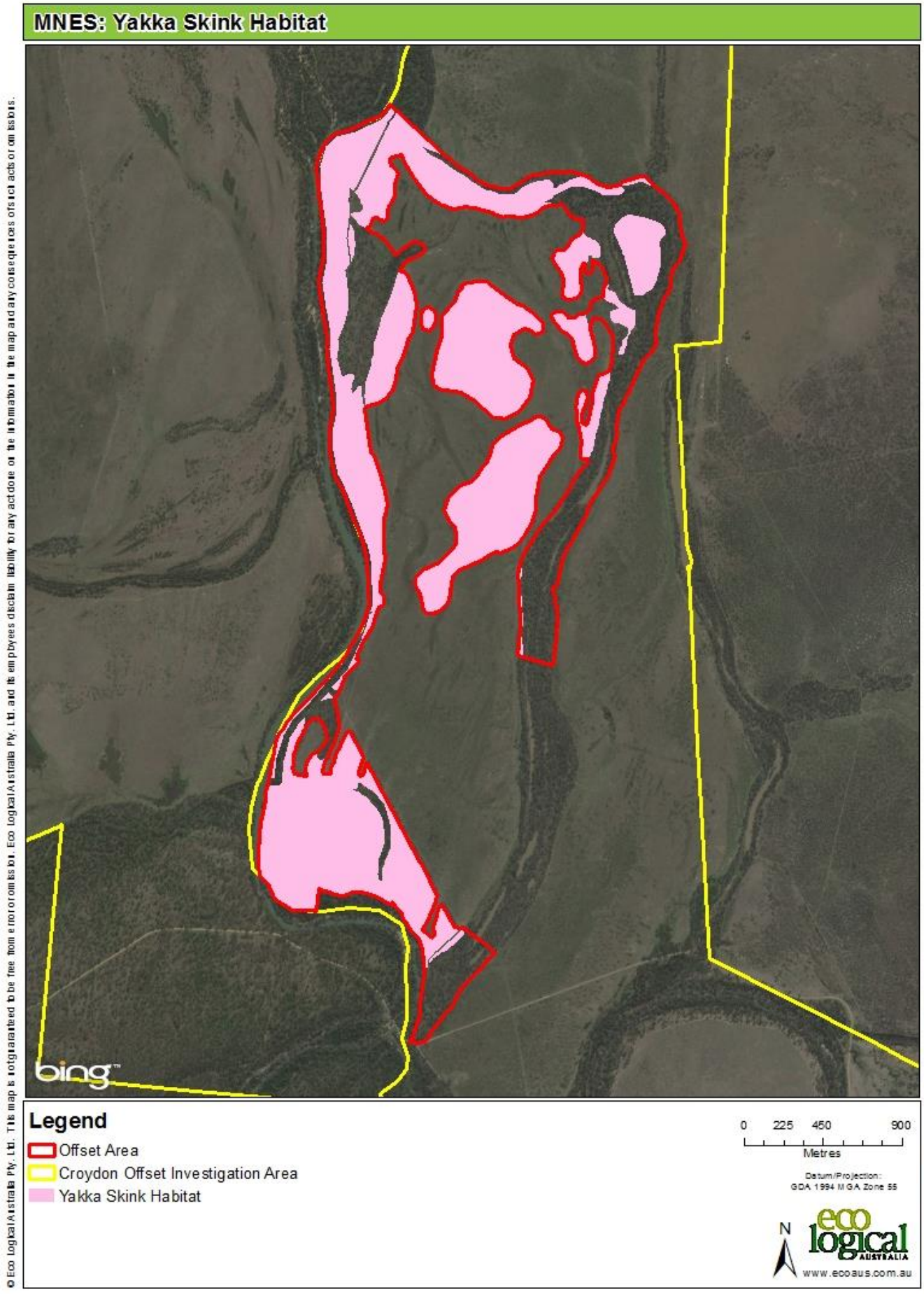
Offset Area Management Zones



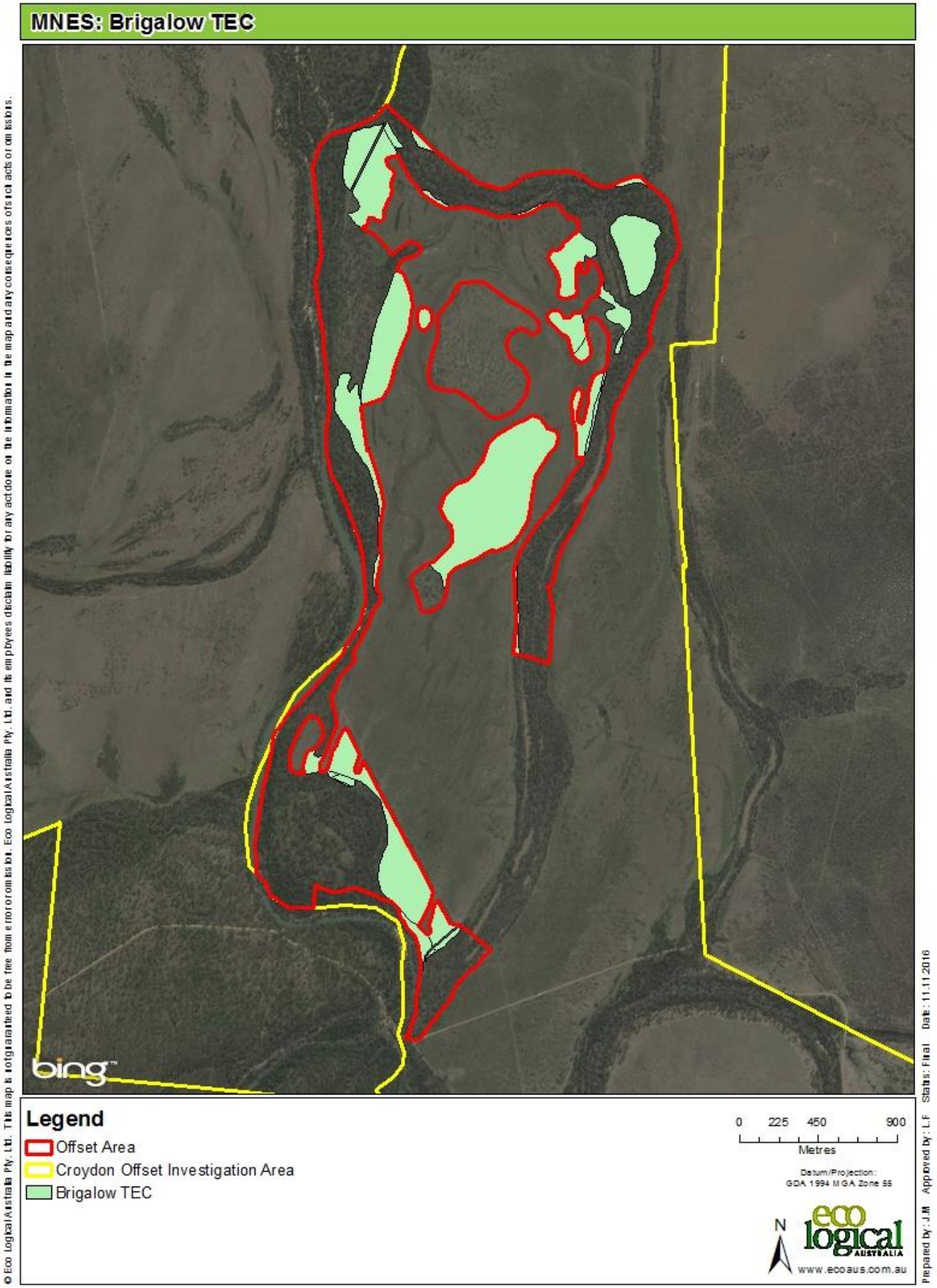
Offset Area – MNES Values – Ornamental Snake



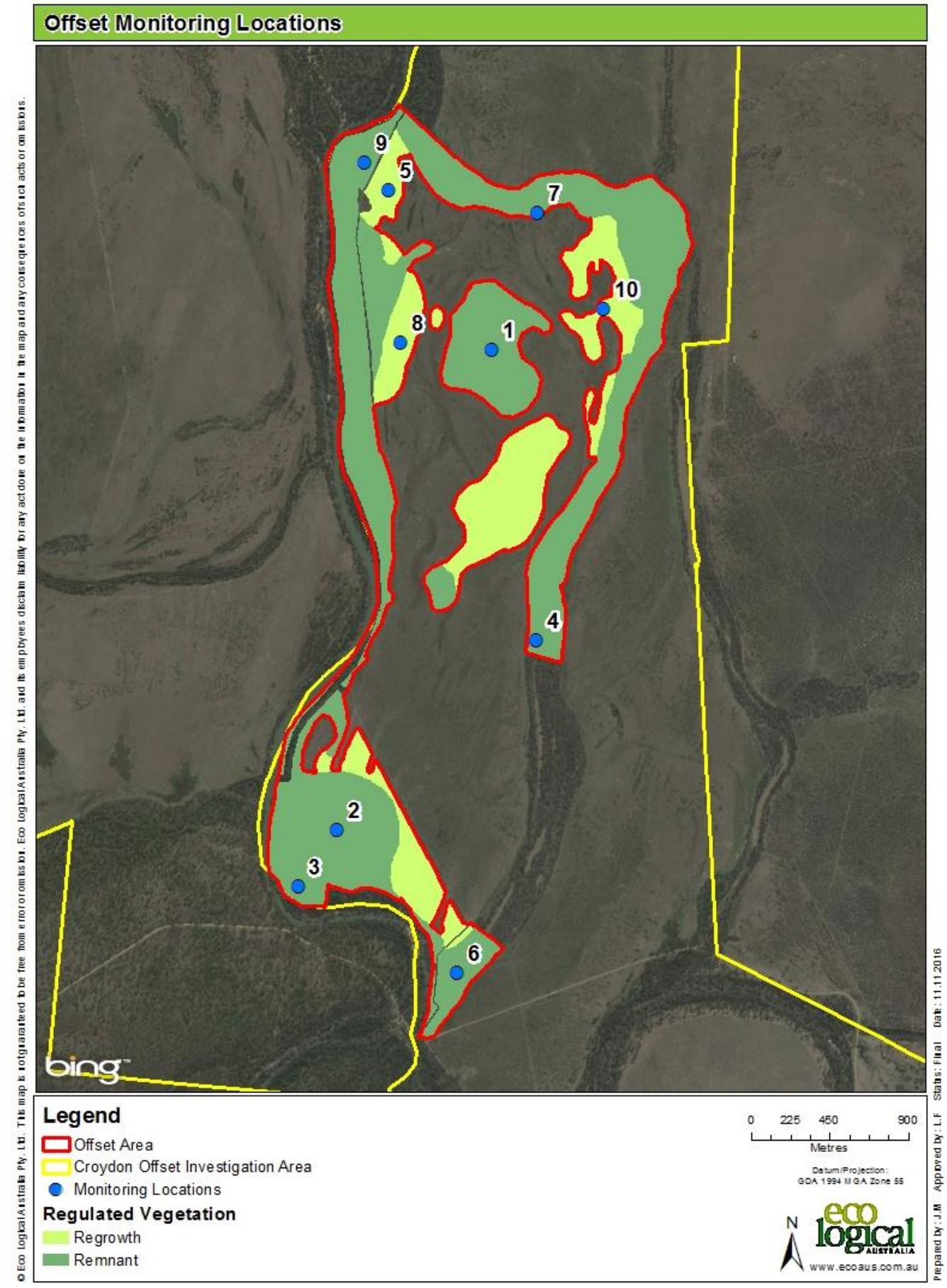
Offset Area – MNES Values – Yakka Skink



Offset Area – MSES Values – Brigalow



Offset Area – Monitoring Locations



APPENDIX C: OFFSET FIELD SURVEY DATA

Appendix C1: Supporting Technical Information - Offset Site

1. SURVEY METHODOLOGY

The BMC Dragline move Offset Site is a sub-area of a larger offset investigation area for the BMA Red Hill Project. A full field survey report of the offset area will be prepared for this larger area (circa 4,000ha) in early 2017. This Appendix is a summary of the methodologies and findings in this sub-area for use with the BMC Dragline Project.

The offset field assessments carried out at Croydon by ELA in March/April 2016 consisted of several methodologies including MNES habitat assessment, *BioCondition Assessment*, the *Guide to determining terrestrial habitat quality* and Ornamental Snake surveys.

A summary of these methodologies is provided below.

1.1 MNES habitat assessment

The likelihood of occurrence of threatened flora and fauna along with their habitats were assessed through searches of likely habitat as well as opportunistic searches during foot and vehicular traverses. Offset areas for MNES were assessed with reference to the respective guidelines[3], the EPBC Act EOP [4] and using the EPBC Act Offset Assessment Guide to calculate the offset area required for each MNES.

1.2 BioCondition Assessment

BioCondition is a condition assessment framework for Queensland that provides a measure of how well a terrestrial ecosystem is functioning for biodiversity values.[5] It is a site-based, quantitative and therefore repeatable assessment procedure that can be used in any vegetative state, and provides a numeric score that can be summarised as a condition rating of 1, 2, 3 or 4, or functional through to dysfunctional condition for biodiversity. In BioCondition,'condition' refers to the degree to which the attributes of a patch of vegetation differ from the attributes of the same vegetation in its reference state.

In BioCondition, the reference state refers to the natural variability or range in attributes of an ecosystem that is relatively unmodified since European settlement, or 'best on offer'.

51 BioCondition surveys were undertaken across the Croydon offsets area to assess the existing condition of habitat within these areas. Six of these surveys occurred within the proposed dragline offset area. These surveys collect data on 13 attributes including:

1. Recruitment of woody perennial species in the Ecological Dominant Layer
2. Native plant species richness for trees

---

[3] Ornamental Snake, Yakka Skink: see *Survey guidelines for Australia's threatened reptiles – Guidelines for detecting reptiles listed as threatened under the* Environment Protection and Biodiversity Conservation Act 1999, *Department of Sustainability, Environment, Water, Population and Communities (2011)* found at http://www.environment.gov.au/system/files/resources/eba674a5-b220-4ef1-9f3a-b9ff3f08a959/files/survey-guidelines-reptiles.pdf. Squatter Pigeon: see *Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the* Environment Protection and Biodiversity Conservation Act 1999, *Department of the Environment, Water, Heritage and the Arts, 2010*, found at http://www.environment.gov.au/system/files/resources/107052eb-2041-45b9-9296-b5f514493ae0/files/survey-guidelines-birds.pdf

[4] Environment Protection and Biodiversity Conservation Act 1999 *Environmental Offsets Policy, Department of Sustainability, Environment, Water, Population and Communities, October 2012, found at* http://www.environment.gov.au/system/files/resources/12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-policy_2.pdf

[5] *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland - Assessment Manual, Queensland Herbarium, Department of Science, Information Technology and the Arts, version 2.2, February 2015,* found at https://www.qld.gov.au/environment/assets/documents/plants-animals/biodiversity/biocondition-assessment-manual.pdf

3. Native plant species richness for shrubs
4. Native plant species richness for grasses
5. Native plant species richness for forbs
6. Tree canopy height
7. Tree canopy cover
8. Shrub canopy cover
9. Native perennial grass cover
10. Organic litter
11. Large trees
12. Coarse woody debris
13. Non-native plant cover

1.3 Guide to determining terrestrial habitat quality

Habitat quality is assessed through a strategic combination of indicators that measure the overall viability of the site and its capacity to support a prescribed environmental matter. The process for assessing habitat quality is designed in a simple and repeatable way.[6] The process includes mapping, field measurements and simple calculations to score the indicators. The assessment must measure habitat quality at the impact site and the offset site in order to quantify and compare scores. Each of the three indicators are scored, then summed and translated to a final score out of 10.

The key indicators for determining habitat quality of a land based impact site or an offset site are:

- site condition: a general condition assessment of vegetation compared to a benchmark;
- site context: an analysis of the site in relation to the surrounding environment; and
- species habitat index: the ability of the site to support a species.

The variance in structure, function and quality of habitat on an impact or offset site is accounted for by delineating sites into 'assessment units' based on broad condition state and distinct regional ecosystems. Once the habitat quality of an offset site has been determined it is then assessed based on its ability to improve and provide a conservation outcome for the impacted matter.

1.4 Ornamental Snake surveys

Targeted surveys for Ornamental Snake were undertaken over four days and nights across the larger offset investigation area for the Red Hill project. These surveys consisted of active nocturnal searches as well as snake funnels set up along drift fences.

Habitat Values

Habitat values for Ornamental Snake were assessed by the presence of critical habitat factors as listed in the SPRAT and survey guidelines. Critical habitat factors such as gilgai, cracking clay, fallen woody debris and close proximity to water were all factored into the assessment.

Results- Ornamental Snake surveys

Ornamental Snake was confirmed as occurring within the Croydon offset area with 22 individuals recorded. None of these were located within the proposed dragline offsets however there are numerous records in close proximity. No targeted surveys were undertaken in the proposed dragline offset area.

[6] *Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy, version 1.1, December 2014*, Department of Environment and Heritage Protection, found at http://www.ehp.qld.gov.au/assets/documents/pollution/management/offsets/habitat-quality-assessment-guide.pdf

Proposed offsets for the Ornamental Snake consist of the following vegetation and REs:

- 11.3.1 (remnant and non-remnant);
- 11.3.3 (remnant and non-remnant);
- 11.3.4 (remnant);
- 11.3.25 (remnant);
- 11.3.27 (remnant);
- 11.4.9 (remnant and non-remnant); and
- Non-remnant vegetation consisting of gilgai habitat

1.5 Yakka Skink

Targeted surveys and habitat assessments were not undertaken for Yakka Skink during the surveys for the Red Hill project as this was not one of the required MNES. Therefore the offset assessment has been based on RE associations with suitable Yakka Skink habitat such as Eucalypt and Acacia dominated woodlands on substrates consisting of rock, loam, sand or clay (in particular landzones 3, 4, 5, 7 and 10). Where the information was available from other MNES habitat assessments, features such as fallen timber and log/rock piles were considered.

Proposed offsets for the Yakka Skink consist of the following REs:

- 11.3.1 (remnant and non-remnant);
- 11.3.4 (remnant);
- 11.3.25 (remnant);
- 11.4.9 (remnant and non-remnant); and
- 11.5.3 (remnant)

2. START QUALITY SCORE

The start quality of threatened species habitat across the offset site was calculated in accordance with the Queensland Guide to Determine Terrestrial Habitat Quality. This included:

- assessing field collected BioCondition data against the appropriate benchmark values to provide a site condition score as per the prescribed guideline;
- undertaking GIS analysis of patch size, adjacency and connectivity of all identified habitat areas to provide a site context score in accordance with the guideline; and
- assessing field collected habitat assessment data against the following species habitat index attributes to provide a species habitat index score:
    - threats to species;
    - quality and availability of food and foraging habitat;
    - quality and availability of shelter;
    - species mobility capacity; and
    - role of site location to species overall population in the state.

The overall habitat quality score, which was used as the start quality was calculated by combining the site condition, site context and species habitat index scores together for each mapped habitat area. Scores were weighted by patch size of mapped habitat areas within the offset area.

3. HABITAT MAPPING

To identify and map out areas of threatened species habitat on the offset site the following approach was undertaken:

- Field observation, BioCondition data and rapid quaternary survey site data was used in combination to Aerial Photographic Interpretation (API) to map and classify vegetation communities across the offset investigation area. Vegetation community classification was based on RE type and condition;
- Threatened species known to be associated with RE types were attributed to mapped RE polygons accordingly; and
- This mapping was validated by targeted habitat assessment data collected across the Croydon offset investigation area for each identified RE. This ensured that the mapped RE supported or had the potential to support (through future management) the necessary habitat features required by the species.

A total of 51 BioCondition sites, 25 Ornamental Snake habitat assessment sites and 125 quaternary sites were recorded across the Red Hill project offset investigation area.

4. LOSS OF HABITAT

The inclusion of degradation processes in assessing risk of loss for both reptile species is of particular relevance due to the fact that both species can persist in relatively cleared environments (as stated in SPRAT profiles). Vegetation clearing in both cases does not necessarily equate to loss of species and is not the definitive way of assessing presence/absence, or in this case retention/loss. Degradation processes such as cattle grazing, fire, pasture improvement can lead to a loss of the critical microhabitat features that the species require to persist such as fallen woody debris, logs, soil cracks and gilgai supporting quality habitat for frog species. Without these features the species would not be able to survive regardless of the presence of a canopy layer. It is therefore pertinent in this case to include degradation processes in assessing risk of loss for these species as this is a key cause in loss in habitat.

5. EXISTING ENVIRONMENT

***Acacia harpophylla* open forest on alluvial plains**

The vegetation community occurs in a large patch in the north-eastern corner and in several smaller patches throughout the offset area. The tall canopy layer is dominated by Brigalow (*Acacia harpophylla*) with Coolibah (*Eucalyptus coolabah*) and Yellow-wood (*Terminalia oblongata*) also present.

The understorey contains both a mid-storey and shrub layer. The mid-storey is dominated by Yellow-wood, Brigalow and Red Bauhinia (*Lysiphyllum carronii*) with Sally Wattle (*Acacia salicina*) and Whitewood (*Atalaya hemiglauca*) also occurring. The shrub layer consists of a mixture of species including juvenile Brigalow and Yellow-wood, Currant Bush (*Carissa ovata*), Lolly Bush (*Clerodendrum floribundum*), Leichhardt Bean (*Cassia brewsteri*) and Scrub Boonaree (*Alectryon diversifolius*).
The ground layer is dominated by a mixture of native and exotic grasses, including the exotic species Buffel Grass (*Cenchrus ciliaris*) and Sabi Grass (*Urochloa mosambicensis*) and native species, including Brigalow Grass (*Paspalidium caespitosum*), Queensland Bluegrass (*Dichanthium sericeum*) and Native Millet (*Panicum decompositum*).

The vegetation community has a high native species richness with only minor weed incursion in the ground layer. The canopy layer is mature and a high availability of habitat resources such as fallen woody debris and leaf litter are present within the community. Overall, based on site condition assessment this community was determined to be in moderate-high condition.

This community falls within the Broad Vegetation Group (BVG) 25a, is in remnant condition (i.e. >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.3.1, which has a Vegetation Management Act 1999 Status (VM class) and Biodiversity Status under the VMA (BD status) of “Endangered”.

***Acacia harpophylla* regrowth on alluvial plains**

The vegetation community occurs in two large and several smaller patches, predominantly in the north of the offset area. The low (4 - 6m) canopy layer is dominated by Brigalow and Coolabah, with Red Bauhinia, Sally Wattle and Poplar Box

(*Eucalyptus populnea*) also occurring. The mid-storey is dominated by Brigalow and Sally Wattle with Yellow-wood also occurring.

The sparse shrub layer consists of a mixture of species including Brigalow, Red Bauhinia, Desert Lime (*Citrus glauca*), Leichhardt Bean and *Capparis* sp. The ground layer is dominated by exotic grasses such as Buffel and Sabi Grass with some native species such as Brigalow Grass, Fairy Grass (*Sporobolus caroli*) and Forest Bluegrass (*Bothriochloa bladhii*) occasionally occurring. Scattered native forbs present within the ground layer include Ruby Saltbush (*Enchylaena tomentosa*) and Fine Sida (*Sida filiformis*). A number of exotic forbs including the declared weeds Parthenium (*Parthenium hysterophorus*) and Harrisia Cactus (*Harrisia sp.*) also occur.

The vegetation community is in an immature state and has not reached the canopy height or cover of a remnant community. The community has moderate native species richness and weed incursion within the ground layer ranges from moderate to high. The community does however contain high availability of habitat resources including wood debris and leaf litter. Overall based on site condition assessment, this community was determined to be in moderate condition.

This vegetation community is analogous to RE 11.3.1, however, due to the level of previous disturbance, it is currently of non-remnant status.

***Acacia harpophylla* with *Terminalia oblongata* shrubby woodland on clay plains**

The vegetation community occurs in three patches located in the north, centre-west and south portions of the offset area. Brigalow dominates the canopy and mid-storey, with Yellow-wood also present in the mid-storey. The sparse shrub layer is dominated by Yellow-wood, Currant Bush and Scrub Boonaree.

The ground layer is dominated by a mix of native and exotic grasses. Exotic grasses include Buffel Grass, Sabi Grass and Guinea Grass occur, as well as the native species Native Millet, Fairy Grass and Brigalow Grass. Scattered forbs including native Sesbania Pea (*Sesbania cannabina*), Budda Pea (*Aeschynomene indica*) and exotic Noogoora Burr (*Xanthium occidentale*) also occur. Various native sedges and cyperus species were noted within low lying areas of the community.

The vegetation community has a canopy height and cover consistent with a remnant community, however, it has a low species richness, particularly tree and shrub species. Habitat resources such as fallen woody debris and organic litter cover are relatively low; however deep gilgai formations and soil cracks are present. Weed incursion is high (average 70% of total ground cover). Overall, this community was determined to be in low-moderate condition.

This community falls within BVG 25a, is in remnant condition (i.e. >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.4.9, which has a VM class and BD status of “Endangered”.

***Acacia harpophylla* with *Terminalia oblongata* regrowth on clay plains**

The vegetation occurs primarily in two patches, one in the north east corner and one in the south of the offset area. A relatively small isolated occurrence of the community is located near the centre of the northern portion of the offset area.

The low (3 – 5 m) canopy and mid-storey layers are dominated by a mixture of Brigalow, Red Bauhinia, Coolabah, Whitewood and Yellow-wood. The shrub layer is dominated by Brigalow, with Stuart’s Desert Rose (*Gossypium stuartianum*) also occurring.

The ground layer is dominated by native grasses including Fairy Grass, Brigalow Grass and *Aristida* sp. Native forbs including Fine Sida, Ruby Saltbush, Nepine (*Capparis lasiantha*) and Pink Tongues (*Rostellularia adscendens*) also commonly occur. Declared weed species including Harrisia Cactus and Parthenium were also occasionally recorded within the community. The vegetation community lacks the canopy height and cover of a remnant community due to historical land uses involving the clearing of mature vegetation. The immature state of the community means it lacks other remnant community characteristics such as the presence of large mature trees and availability of habitat resources such as fallen woody debris and organic litter. However deep gilgai formations and soil cracks are present. Moderate weed incursion occurs in the ground layer. Overall based on site condition assessment, this community was determined to be in low-moderate condition. The community is associated with RE 11.4.9, however due to the level of previous disturbance it is currently of non-remnant status.

***Eucalyptus tereticornis* woodland on alluvial plains**

The vegetation community occurs on alluvial plains associated with the Connors River, occurring as a large patch in the south and along the northern and western edges of the offset area. The tall canopy (18 – 20 m) and mid-storey layers are dominated by Queensland Bluegum (*Eucalyptus tereticornis*), Coolabah and Moreton Bay Ash (*Corymbia tessellaris*). An emergent layer containing Queensland Bluegum and Moreton Bay Ash is occasionally present.

When present, the sparse shrub layer is dominated by Dysentery Bush (*Grewia latifolia*), Coffee Bush (*Breynia oblongifolia*) and Quinine Bush *(Petalostigma pubescens*). The ground layer comprises a mixture of native forbs and grasses. Native forb species present include Native Basil (*Ocimum spp.*), Native Sensitive Plant (*Neptunia gracilis*) and Wombat Berry (*Eustrephus latifolius*) and native grasses include Spiny-head Mat-rush (*Lomandra longifolia*), Queensland Bluegrass and Forest Bluegrass. Several weed species including Balloon Cotton Vine (*Gomphocarpus physocarpus*), Noogoora Burr, Sabi Grass and Red Natal (*Melinis repens*) are patchily distributed within the ground layer.

The vegetation community has a mature canopy layer, and has moderate native species richness and high availability of habitat resources such as fallen woody debris and leaf litter. Weed incursion is ranges from moderate to high. Overall, based on site condition assessment, this community was determined to be in moderate condition.

This community falls within BVG 16c, is in remnant condition (i.e. >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.3.4, which has a VM class and BD status “of concern”.

***Eucalyptus coolabah* woodland on alluvial plains**

The vegetation community occurs in several patches near the boundary of the offset area, particularly in the north-eastern corner and eastern edge where braided portions of Connors River traverse. The canopy layer and mid-storey are dominated by Coolibah, with Queensland Bluegum occurring occasionally in the canopy layer.

A shrub layer is often absent or very sparse. When present, the shrub layer is dominated by species including Sally Wattle and Dysentery Bush. The exotic shrub species Mimosa Bush (*Vachellia farnesiana*) is also common.

The ground layer is primarily dominated by native grasses, including Native Millet, Black Spear Grass (*Heteropogon contortus*) and *Paspalidium spp.* Native forbs including Native Sensitive Plant, Native Basil, Fine Sida and *Vittadinia spp*. are also present. Various native sedges and cyperus species were noted within low lying areas of the community.

The vegetation community has a mature canopy layer and has a moderate native species richness and high availability of habitat resources such as fallen woody debris and leaf litter. Weed incursion is Moderate. Overall, based on site condition assessment, this community was determined to be in moderate condition.

This community falls within BVG 16c, is in remnant condition (i.e. >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.3.3, which has a VM class and BD status “of concern”.

***Eucalyptus coolabah* regrowth on alluvial plains**

The vegetation community occurs in two patches in the north of the offset area, adjacent to larger areas of remnant Coolibah woodland. The low (5 -7.5 m) canopy layer is dominated by Coolibah and Sally Wattle. The mid-storey is dominated by Red Bauhinia, with Coolibah, Yellow-wood and Leichardt Bean also occurring. Whitewood and Black Tea-tree (*Melaleuca bracteata*) occur in the mid-storey occasionally.

The sparse shrub layer is dominated by a mixture of species, including Brigalow, Whitewood, Sally Wattle, Currant Bush and Scrub Boonaree. The ground layer is dominated by exotic grasses, including Buffel Grass and Sabi Grass. Native grasses including Forest Bluegrass, Native Millet and Brigalow Grass also occur, along with the native forbs Nepine, Native Basil and Native Sensitive Plant. Noogoora Burr and the declared weed Parthenium were also occasionally recorded within the community.

The vegetation community has a dense canopy cover but lacks the height of a remnant community due to historical land uses involving the clearing of mature vegetation. The immature state of the community means it lacks other remnant community characteristics such as the presence of large mature trees. Weed incursion is high (average 70 % of total

ground cover). Overall based on site condition assessment, this community was determined to be in low-moderate condition. The community is associated with RE 11.3.3, however due to the level of previous disturbance it is currently of non-remnant status.

***Eucalyptus tereticornis* +/- *Eucalyptus camaldulensis* woodland fringing drainage lines**

The vegetation community occurs fringes the banks of the Connors River, along the northern and western boundaries of the offset area. The tall (28 – 36 m) canopy layer is dominated by Queensland Bluegum with Weeping Paperbark (*Melaleuca leucadendra*) and Coolibah also occurring. The mid-storey ranges from dense to open and is dominated by a mixture of Coolibah, Sally Wattle, Queensland Bluegum, Sandpaper Fig (*Ficus opposita*) and Red Kamala (*Mallotus philippensis*).

The very sparse shrub layer is dominated by Yellow-wood, Red Kamala, Sandpaper Fig and Red Bauhinia. The ground layer is dominated by native grasses, including Native Millet, Spiny-head Mat-rush and *Paspalidium spp.*, and a variety of native forbs, including *Phyllanthus spp*. Wombat Berry, Native Sensitive Plant, Native Basil, Wandering Jew (*Commelina diffusa*) and Lesser Joyweed (*Alternanthera denticulata*). Weeds including, Noogoora Burr and Eyebane (*Euphorbia prostrata*) were also occasionally recorded within the community.

The vegetation community has an abundance of large trees supporting a mature canopy layer and a high native species richness. The community has a high availability of habitat resources such as fallen woody debris and leaf litter and a moderate to low weed incursion. Overall, based on site condition assessment, this community was determined to be in high condition.

This community falls within BVG 16a, is in remnant condition (i.e. >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.3.25, which has a VM class of “least concern” and BD status “of concern”.

Freshwater wetlands

The vegetation community occurs along the eastern boundary of the offset area and is associated with the anabranch, billabongs and depressions that occur on the Connors River floodplain. The canopy is dominated by Queensland Bluegum and Coolabah with Moreton Bay Ash also occurring. The mid-storey is dominated by similar canopy species as well as Sally Wattle. A shrub layer is typically absent.

The ground layer is dominated by native grasses including Forest Bluegrass, Silky Browntop (*Eulalia aurea*) and *Bothriochloa spp*. and sedges such as *Eleocharis spp*. Native forbs such as *Phebalium spp.*, Native Basil and Nardoo (*Marsilea drummondii*) also occur.

The vegetation community has a mature canopy layer, a high native species richness and high availability of habitat resources such as large hollow-bearing trees. Other habitat resources such as fallen woody debris and leaf litter are moderately abundant. Weed incursion is generally very low except for occasional occurrences of exotic forbs. Overall, based on site condition assessment, this community was determined to be in high condition.

This community falls within BVG 34d, is in remnant condition (i.e. >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.3.27, which has a VM class of “least concern” and BD status “of concern”.

***Eucalyptus populnea* woodland on sand plains**

The vegetation occurs in two patches in the central northern portion of the offset area and has a canopy layer and mid-storey dominated by Poplar Box. The mid-storey also contains Dallachy’s Gum (*Corymbia dallachiana*), Supplejack (*Ventilago viminalis*) and Emu Apple (*Owenia acidula*). A very sparse shrub layer is dominated by Leichhardt Bean, Ironwood (*Acacia excelsa*) and Emu Apple.

The ground layer is dominated by Buffel Grass and Sabi Grass, with the native grasses Forest Bluegrass and Black Spear Grass (*Heteropogon contortus*) occasionally occurring. Native forbs including Fine Sida and *Indigofera linifolia* are present in the ground layer. The declared weed Parthenium is also present within the community.

The vegetation community has a mature canopy layer and moderate canopy cover, however, native species richness is low and weed incursion is high (average 62.5 % of total ground cover). Overall based on site condition assessment, this community was determined to be in moderate condition.

This community falls within BVG 17a, is in remnant condition (i.e. >50% canopy cover and 70% height of the undisturbed community) and is analogous with RE11.5.3, which has a VM class of "least concern" and BD status "no concern at present".

6. MNES VALUES & OFFSET SUITABILITY

6.1 Brigalow TEC

The proposed offset area provides 113.7 ha of Brigalow dominated vegetation that is consistent with the Brigalow (*Acacia harpohylla* dominant and co-dominant) TEC diagnostic characteristics as outlined in the conservation advice. These areas can be described as woodland and regrowth communities with a canopy layer dominated by Brigalow and analogous to Brigalow listed RE11.3.1 and RE11.4.9.

The woodland communities within the offset area are in remnant condition and for the majority of these areas, currently meets the condition threshold criteria to be classified as the Brigalow TEC. Patches are greater than 0.5 ha, highly connected with surrounding vegetation, exotic perennial grass cover is generally below 50% and structural complexity and species diversity is high. Habitat quality assessments found these communities to be in moderate condition.

The regrowth communities within the offset area vary in age within only a small portion comprising the mature structure and low exotic perennial grass cover to meet the condition threshold criteria to be classified as the Brigalow TEC. Nonetheless, areas not currently meeting the condition thresholds have the potential to be returned to TEC status through active management. Habitat quality assessments found these communities to be in poor to moderate condition.

Suggested attribute values for use in the Commonwealth OAG have been generated and are provided below (see ***Table 1*** and ***Table 2***). These values are based on field data collected at both the impact site and proposed offset area, including observations of threatening processes.

As demonstrated in the calculations below, the proposed offset area directly offsets more than 100% of anticipated significant residual impacts on Brigalow TEC. Notably, the area offsets approximately five times the impacts, providing an additional 100 ha of Brigalow TEC that is above the Offsets Policy requirements. Given this, the offset is considered to provide a substantial net conservation gain by improving both current condition and protected extent of the TEC. The proposed offset area will deliver a conservation outcome that will maintain and improve the viability of the affected MNES.

Table 1. Commonwealth OAG values for Brigalow TEC at the impact site

Attribute	Score	Rationale
Area (ha)	9.7 ha	Significant residual impact identified by BAMM (2016)
Condition	7	Average condition score calculated from field assessment conducted by BAMM (2016)
Total quantum of impact	6.79	As per OAG

Table 2. Commonwealth OAG values for Brigalow TEC within proposed offset area

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Area (ha)	27.1	86.6	Area verified in field assessments conducted by ELA (2016)	Area verified in field assessments conducted by ELA (2016)
Quality				
Start quality	7	6	Site condition is moderate with species diversity, recruitment levels and structural complexity generally resembling an undisturbed community. However, weed incursion varies from low to high, canopy cover has been disturbed and the community lacks large mature trees. Site context is generally high due to high connectivity to surrounding vegetation resulting in a large contiguous vegetation patch. All areas are situated within a mapped ecological corridor.	Site condition is poor to moderate due to moderate weed incursion, disturbed canopy layer and the lack of large mature trees. However, species diversity and recruitment levels were recorded at moderate levels. Site context is generally moderate due to reduced connectivity to surrounding vegetation resulting in smaller and isolated vegetation patches. However, all areas are situated within a mapped ecological corridor.
Future quality without offset	6	6	Potential for future thinning activities has the potential to reduce structural complexity within the community and increase weed incursion. Continued presence of cattle can also reduce site condition through reducing groundcover and promoting exotic perennial grass growth.	Regrowth communities are generally on a trajectory of improvement. However with the continued presence of cattle grazing, other parameters of site condition can become further degraded. This includes native groundcover complexity, abundance and diversity through increase weed incursion levels. The potential of further clearing can also reduce site context through reduced patch sizes and connectivity.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Future quality with offset	8	7	Protection and management of this area can improve current condition, particularly existing weed incursion and canopy height and cover.	Regrowth communities are generally on a trajectory of improvement. With active management such as reduced cattle grazing, weed management and selective thinning, this improvement can be accelerated. Removal of stock will limit vegetation trampling and in turn allow native shrubs and ground covers to regenerate reducing the abundance of exotic pasture species. This can be further supplemented with weed management. Selective thinning can reduce Brigalow thickets and promote understorey growth and diversity. Protection from clearing will also allow for continued natural regeneration, increase canopy height and cover. Patch size and connectivity will also increase.
Time until ecological benefit	10	20	Remnant areas currently in good condition, with degradation occurring in only a few condition parameters. Estimated time is for understorey native species to regenerate and replace exotic pasture species.	Estimated time for native species to regenerate, canopy layer to mature and shade out exotic pasture species.
Confidence in quality scores	75%	70%	Removal of cattle and active management exotic weeds are effective measures in improving current degraded condition parameters	Improvement in vegetation structure is reliant on natural regeneration and therefore natural processes. However active management can effectively improve other degraded condition parameters such as weed levels, groundcover complexity, diversity and abundance.
Raw gain	2	1	As per OAG	
Adjusted gain	1.5	0.7	As per OAG	
Risk of Loss				

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Risk of loss without offset	15%	90%	Thinning activities are permitted under State legislation within remnant communities, which could impact on a portion of the area without triggering a significant impact under Commonwealth legislation. Thinning activities could reduce structural complexity, promote grazing and increase exotic pasture incursion that would result in a loss of Brigalow TEC status.	As the areas have been historically cleared there is a high chance that the area is periodically cleared for pasture activities. Only a small proportion of regrowth could potentially trigger Commonwealth assessment as the Brigalow TEC.
Risk of loss with offset	5%	5%	The offset area will be legally secured and clearing activities will be prohibited. Stochastic events such as natural fires and flooding will still pose a risk to the offset area. Management actions and remediation activities will be in place to assist in reducing these risks or the severity of outcomes.	
Time over which loss is averted	20	20	Maximum of 20 years.	
Confidence in risk scores	90%	90%	The offset area will be legally secured and clearing activities will be prohibited. This will effectively reduce risk of loss.	
Raw gain	2.71	73.61	As per OAG	
Adjusted gain	2.44	66.25	As per OAG	
Results				
Net present value	4.41	37.01	As per OAG	
% impact offset	67.80%	545.05%	As per OAG	
TOTAL % impact offset	612.85%		Proposed offset area substantially offsets significant residual impacts on Brigalow TEC	

6.2 Ornamental Snake

The proposed offset area provides 254.6 ha of Ornamental Snake habitat that contains the preferred habitat structure, resources and essential microhabitat features that are species requirements outlined in the Commonwealth species profile and threat database. This habitat can be described as woodland and regrowth communities analogous to RE11.3.1 and RE11.4.9 that support gilgai and soil cracks. Woodland and regrowth communities within close proximity to wetlands or large waterway systems (stream order >4) are also areas of identified Ornamental Snake habitat within the offset area, which includes communities analogous to RE11.3.25, RE11.3.3, RE11.3.4 and RE11.3.27.

The woodland communities within the offset area are in remnant condition and contain aquatic habitat suitable to support the species preferred prey of frogs. Habitat on clays plains were found to contain a variety of shallow to deep gilgai that could retain soil moisture as well as large pools of water suitable for use as breeding habitat for frog species. Based on the presence and condition of aquatic habitat, foraging resources were verified during field surveys to be abundant within remnant habitat areas. In addition, remnant habitat areas were found to contain an abundance of coarse woody debris, deep leaf litter and/or soil cracks that could provide sufficient shelter habitat for the species. Habitat quality assessments found these remnant areas to be in moderate to high condition.

The regrowth communities within the offset area were also found to contain suitable aquatic habitat and therefore foraging resources for Ornamental Snake. The abundance of shelter habitat was not as high as remnant habitat areas; however deep soils cracks were present throughout regrowth areas. Habitat quality assessments found regrowth habitat to be in poor to moderate.

The proposed offset area occurs in the lower catchment of the Connors River, which consists of a series of braided channels, lagoon wetland systems and floodplains, all land form types where the species is often found in greatest numbers. Species presence has been confirmed within the area and species abundance was found to be high during fauna surveys within suitable habitat areas, which includes areas of regrowth habitat. This recorded presence is now the most eastern known population for the species. The proposed offset area and surrounding suitable habitat is therefore considered important in maintaining the population of Ornamental Snake in the region.

Suggested attribute values for use in the Commonwealth OAG have been generated and are provided below (see ***Table 3*** and ***Table 4***). These values are based on field data collected at both the impact site and proposed offset area, including observations of threatening processes.

As demonstrated in the calculations below, the proposed offset area directly offsets more than 100% of anticipated significant residual impacts on Ornamental Snake. Notably, the area offsets approximately one and a half times the impacts, providing an additional 55 ha of Ornamental Snake habitat that is above the Offsets Policy requirements. Given this, the offset is considered to provide a substantial net conservation gain by improving both current condition and protected extent of Ornamental Snake habitat. The proposed offset area will deliver a conservation outcome that will maintain and improve the viability of the affected MNES.

Table 3. Commonwealth OAG values for Ornamental Snake at the impact site

Attribute	Score	Rationale
Area (ha)	52.33 ha	Significant residual impact identified by BAMM (2016)
Condition	7	Average condition score calculated from field assessment conducted by BAMM (2016)
Total quantum of impact	36.63	As per OAG

Table 4. Commonwealth OAG values for Ornamental Snake within proposed offset area

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Area (ha)	213.5	41.1	Area verified in field assessments conducted by ELA (2016)	Area verified in field assessments conducted by ELA (2016)
Quality				
Start quality	7	5	Site condition is moderate with recruitment levels and structural complexity generally resembling an undisturbed community. However, weed incursion and therefore species diversity varies from low to high, canopy and shrub cover has been disturbed and in some areas there is a lack of large mature trees. Site context is ranges from moderate to high due to varying levels of connectivity to surrounding vegetation. Some areas form large contiguous vegetation patches, whilst other a more fragmented and isolated. All areas are situated within a mapped ecological corridor. Habitat quality for Ornamental Snake is high due to moderate existing threats and the abundance of foraging and sheltering resources. These areas within the offset area are likely to play an important role in the maintenance of the species in the region.	Site condition is poor to moderate due to high weed incursion, disturbed canopy layer and the lack of large mature trees. However, species diversity and recruitment levels were recorded at moderate levels. Site context is generally moderate due to reduced connectivity to surrounding vegetation resulting in smaller and isolated vegetation patches. However, all areas are situated within a mapped ecological corridor. Habitat quality for Ornamental Snake is moderate due to the presence of existing threats and reduced sheltering resources such as fallen woody debris. However, foraging resources are still moderate to abundant.
Future quality without offset	6	3	Potential for future thinning activities has the potential to reduce structural complexity within the ground layer and associated sheltering resources. Continued presence of cattle can also compact soils and reduce soil cracks that provide shelter habitat for the species. Grazing can also lead to erosion and sedimentation of wetlands, waterways and gilgai areas impacting negatively on frog populations, which are a key prey item for the Ornamental Snake.	Continued presence of cattle can also compact soils and reduce soil cracks that provide shelter habitat for the species. Grazing can also lead to erosion and sedimentation of wetlands, waterways and gilgai areas impacting negatively on frog populations, which are a key prey item for the Ornamental Snake. The potential of further clearing can also reduce habitat extent and connectivity, impacting on the species ability to disperse.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Future quality with offset	8	7	Protection and management of this area can improve current condition, particularly existing weed and pest species incursion. It can also further enhance habitat quality by ensuring continued natural succession and development of mature features such as logs and dense leaf litter.	Regrowth communities are generally on a trajectory of improvement. With active management such as reduced cattle grazing and pest management, this improvement can be accelerated. Removal of stock will decrease soil compaction, limit understorey trampling and improve water quality of frog habitat. This will in turn improve the quality and abundance of foraging and sheltering resources. Control of pest species will also reduce potential threats to Ornamental Snake. Protection from clearing will increase connectivity and patch size, which in turn would increase the area's ability to sustain viable populations.
Time until ecological benefit	20	20	Estimated time for weed and pest reduction, further development of features such as logs and for increase in Ornamental Snake abundance and breeding success (due to better quality habitat and more prey items).	Estimated time for canopy layer to mature and provide leaf litter and fallen woody debris for sheltering habitat. This timeframe also accommodates for an increase in Ornamental Snake abundance and breeding success (due to better quality habitat and more prey items).
Confidence in quality scores	70%	70%	Improvement in quality and abundance of sheltering habitat is reliant on natural succession. However active management can effectively improve other degraded condition parameters such as weed levels and pest species presence.	
Raw gain	2	4	As per OAG	
Adjusted gain	1.4	2.8	As per OAG	
Risk of Loss				

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Risk of loss without offset	15%	90%	Continuation of cattle grazing or thinning with the potential to intensify cattle grazing in areas of Ornamental Snake habitat could degrade essential habitat features that are critical to supporting the species. This includes soil cracks, fallen woody debris and quality prey habitat. The loss of these habitat requirements would result in the loss of suitable habitat.	As the areas have been historically cleared there is a high chance that the area is periodically cleared for pasture activities. Only a small proportion of regrowth could potentially trigger Commonwealth assessment as the Brigalow TEC. However, the majority of Ornamental Snake habitat is at risk of being cleared or grazed to the extent that essential habitat features for the species are lost.
Risk of loss with offset	5%	5%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be managed. Stochastic events such as natural fires and flooding will still pose a risk to the offset area. Management actions and remediation activities will be in place to assist in reducing these risks or the severity of outcomes.	
Time over which loss is averted	20	20	Maximum of 20 years.	
Confidence in risk scores	90%	90%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be undertaken for fire management purposes. This will effectively reduce risk of loss.	
Raw gain	19.22	34.94	As per OAG	
Adjusted gain	18.46	31.44	As per OAG	
Results				
Net present value	39.18	22.25	As per OAG	
% impact offset	106.96%	60.75%	As per OAG	
TOTAL % impact offset	167.71%		Proposed offset area offsets significant residual impacts on Ornamental Snake	

6.3 Yakka Skink

The proposed offset area provides 245.8 ha of Yakka Skink habitat that is dominated by preferred vegetation type, substrate and essential microhabitat features that are species requirements outlined in the Commonwealth species profile and threat database. This habitat can be described as woodland and regrowth communities analogous to RE11.3.1, RE11.4.9, RE11.5.3, RE11.3.25 and RE11.3.4.

The woodland communities within the offset area are in remnant condition and occur on the soil substrates that are preferential for the species. In some portions, this habitat is also dominated by a canopy often associated with the species including Brigalow and Poplar Box. Both structural complexity and floristic diversity within remnant habitat was found to be moderate to high, providing an array of habitat niches for the species food source such as invertebrates. Based on this habitat condition, foraging resources were verified during field surveys to be abundant within remnant habitat areas. In addition, remnant habitat areas were found to contain an abundance of coarse woody debris, deep leaf litter in some areas, large logs, which provide sufficient shelter habitat for the species. Habitat quality assessments found these remnant areas to be in moderate condition.

The regrowth communities within the offset area were also found to occur on preferential soil substrates and contain associated canopy species. However, due to the degraded condition of these habitat types, both foraging and sheltering resources were found to be limited. Habitat quality assessments found regrowth habitat to be in poor to moderate.

Similar to the impact area, the offset area occurs in northern areas of the Brigalow Belt where populations of Yakka Skink are scattered and fragmented. Targeted searches for the species were not undertaken during field assessments; however previous records of the species occur within 106 km of the offset area. This is similar to the impact area where closest records of the species to the impact site are 190 km away.

Suggested attribute values for use in the Commonwealth OAG have been generated and are provided below (see ***Table 7*** and ***Table 8***). These values are based on field data collected at both the impact site and proposed offset area, including observations of threatening processes.

As demonstrated in the calculations below, the proposed offset area directly offsets more than 100% of anticipated significant residual impacts on Yakka Skink. Notably, the area provides an additional 35 ha of Yakka Skink habitat that is above the Offsets Policy requirements. The proposed offset area will deliver a conservation outcome that will maintain and improve the viability of the affected MNES.

Table 7. Commonwealth OAG values for Yakka Skink at the impact site

Attribute	Score	Rationale
Area (ha)	99.35 ha	Significant residual impact identified by BAMM (2016)
Condition	7	Average condition score calculated from field assessment conducted by BAMM (2016)
Total quantum of impact	69.55	As per OAG

Table 8. Commonwealth OAG values for Yakka Skink within proposed offset area

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Area (ha)	159.2	86.6	Area verified in field assessments conducted by ELA (2016)	Area verified in field assessments conducted by ELA (2016)
Quality				
Start quality	7	5	Site condition is moderate with recruitment levels and structural complexity generally resembling an undisturbed community. However, weed incursion and therefore species diversity varies from low to high, canopy and shrub cover has been disturbed and in some areas there is a lack of large mature trees. Site context is ranges from low to high due to varying levels of connectivity to surrounding vegetation. Some areas form large contiguous vegetation patches, whilst other a more fragmented and isolated. All areas are situated within a mapped ecological corridor. Habitat quality for Yakka Skink is moderate due to limited existing threats and the moderate abundance of foraging and sheltering resources.	Site condition is poor to moderate due to high weed incursion, disturbed canopy layer and the lack of large mature trees. However, species diversity and recruitment levels were recorded at moderate levels. Site context is generally moderate due to reduced connectivity to surrounding vegetation resulting in smaller and isolated vegetation patches. However, all areas are situated within a mapped ecological corridor. Habitat quality for Yakka Skink is low to moderate due to the presence of existing threats and reduced foraging habitat and very limited sheltering habitat.
Future quality without offset	6	3	Potential for future thinning activities has the potential to reduce structural complexity within the ground layer and associated sheltering resources. Continued presence of cattle and pest species such as feral pigs can destroy the species' burrow systems.	Continued presence of cattle and pest species such as feral pigs can destroy the species' burrow systems. The potential of further clearing can remove shelter sites and reduce habitat extent and connectivity.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Future quality with offset	8	7	Protection and management of this area can improve current condition, particularly pest species incursion. It can also further enhance habitat quality by ensuring continued natural succession and development of mature features such as logs and dense leaf litter.	Regrowth communities are generally on a trajectory of improvement. With active management such as reduced cattle grazing and pest management, this improvement can be accelerated. Removal of stock will improve ground layer structure and complexity. Control of pest species will also reduce potential threats to Yakka Skink. Protection from clearing will increase connectivity and patch size, which in turn would increase the area's ability to sustain viable populations.
Time until ecological benefit	20	20	Estimated time for pest reduction and further development of features such as logs.	Estimated time for pest reduction and canopy layer to mature and provide leaf litter and fallen woody debris for sheltering habitat.
Confidence in quality scores	70%	70%	Improvement in quality and abundance of sheltering habitat is reliant on natural succession. However active management can effectively improve other degraded condition parameters such as pest species presence.	
Raw gain	2	4	As per OAG	
Adjusted gain	1.4	2.8	As per OAG	
Risk of Loss				
Risk of loss without offset	15%	90%	Continuation of cattle grazing or thinning with the potential to intensify cattle grazing in areas of Yakka Skink habitat could degrade essential habitat features that are critical to supporting the species. This includes fallen woody debris, logs and burrowing systems. The loss of these habitat requirements would result in the loss of suitable habitat.	As the areas have been historically cleared there is a high chance that the area is periodically cleared for pasture activities. Only a small proportion of regrowth could potentially trigger Commonwealth assessment as the Brigalow TEC. However, the majority of Yakka Skink habitat is at risk of being cleared.
Risk of loss with offset	5%	5%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be managed. Stochastic events such as natural fires and flooding will still pose a risk to the offset area. Management actions and remediation activities will be in place to assist in reducing these risks or the severity of outcomes.	

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Time over which loss is averted	20	20	Maximum of 20 years.	
Confidence in risk scores	90%	90%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be undertaken for fire management purposes. This will effectively reduce risk of loss.	
Raw gain	15.92	73.61	As per OAG	
Adjusted gain	14.33	66.25	As per OAG	
Results				
Net present value	29.22	46.89	As per OAG	
% impact offset	42.01%	67.42%	As per OAG	
TOTAL % impact offset	109.43%		Proposed offset area offsets significant residual impacts on Yakka Skink	

6.4 Squatter Pigeon

The proposed offset area provides 306.1 ha of Squatter Pigeon habitat that contains the preferred habitat structure, substrate and essential water resources that are species requirements outlined in the Commonwealth species profile and threat database. This habitat can be described as woodland and regrowth communities on alluvial or sand plains, which includes habitat analogous to RE11.3.1, RE11.3.25, RE11.3.4, RE11.3.3, RE11.3.27 and RE11.5.3.

The woodland communities within the offset area are in remnant condition and generally comprise the sandy or loamy, well-draining substrate that is required for the species to nest and forage. Portions of the remnant habitat also contain the preferred patchy native ground coverage (< 30% cover), which the species utilise to forage and dust-bathe. The mature canopy layer provides substantial sheltering habitat for the species. Based on the presence and condition of known habitat preferences for the species, both nesting and foraging habitat is abundant across the offset area. Habitat quality assessments found these remnant areas to be in moderate to high condition.

The regrowth communities within the offset area were also found to comprise the sandy or loamy, well-draining substrate but with often with high exotic ground coverage. The abundance of shelter habitat is lower than remnant habitat areas due to the lack of a mature canopy. Habitat quality assessments found regrowth habitat to be in poor to moderate condition.

The proposed offset area occurs in the lower catchment of the Connors River, which consists of a series of braided channels, lagoon wetland systems and floodplains. It provides the critical water resources necessary for the daily requirements of the species and within close proximity (<1 km) of suitable habitat. The offset area therefore provides potential breeding habitat for Squatter Pigeon. Whilst species presence was not confirmed during surveys, previous records of the species occur within 35 km of the offset area. The species has also been recorded 40 km downstream along the Connors River in adjacent regrowth habitat. The proposed offset area and surrounding suitable habitat is therefore considered important in maintaining the population of Squatter Pigeon in the region.

Suggested attribute values for use in the Commonwealth OAG have been generated and are provided below (see ***Table 5*** and ***Table 6***). These values are based on field data collected at both the impact site and proposed offset area, including observations of threatening processes.

As demonstrated in the calculations below, the proposed offset area directly offsets more than 100% of anticipated significant residual impacts on Squatter Pigeon. Notably, the area offsets approximately one and a half times the impacts, providing an additional 100 ha of Squatter Pigeon habitat that is above the Offsets Policy requirements. Given this, the offset is considered to provide a substantial net conservation gain by improving both current condition and protected extent of Squatter Pigeon habitat. The proposed offset area will deliver a conservation outcome that will maintain and improve the viability of the affected MNES.

Table 5. Commonwealth OAG values for Squatter Pigeon at the impact site

Attribute	Score	Rationale
Area (ha)	89.2 ha	Significant residual impact identified by BAMM (2016)
Condition	7	Average condition score calculated from field assessment conducted by BAMM (2016)
Total quantum of impact	62.44	As per OAG

Table 6. Commonwealth OAG values for Squatter Pigeon within proposed offset area

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Area (ha)	237.1	69	Area verified in field assessments conducted by ELA (2016)	Area verified in field assessments conducted by ELA (2016)
Quality				
Start quality	7	6	Site condition is moderate with recruitment levels and structural complexity generally resembling an undisturbed community. However, weed incursion and therefore species diversity varies from low to high, canopy and shrub cover has been disturbed and in some areas there is a lack of large mature trees. Site context is ranges from moderate to high due to varying levels of connectivity to surrounding vegetation. Some areas form large contiguous vegetation patches, whilst other a more fragmented and isolated. All areas are situated within a mapped ecological corridor. Habitat quality for Squatter Pigeon is moderate to high due to moderate levels of existing threats and the abundance of sheltering resources. Foraging habitat condition is variable, but critical water resources are present. These areas within the offset area are likely to play an important role in the maintenance of the species in the region.	Site condition is poor to moderate due to high weed incursion, disturbed canopy layer and the lack of large mature trees. However, species diversity and recruitment levels were recorded at moderate levels. Site context is generally moderate due to reduced connectivity to surrounding vegetation resulting in smaller and isolated vegetation patches. However, all areas are situated within a mapped ecological corridor. Habitat quality for Squatter Pigeon is moderate due to reduced foraging and sheltering habitat condition as a result of the lack of a mature canopy and high exotic grass cover.
Future quality without offset	6	4	Potential for future thinning activities and continued presence of cattle can promote exotic grass cover, reducing availability of foraging resources (native grasses) and foraging habitat condition (patchy groundcover).	The potential of further clearing can reduce habitat patch size and availability of foraging and nesting resources.

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Future quality with offset	8	7	Protection and management of this area can improve current condition, particularly existing weed and pest incursion.	Regrowth communities are generally on a trajectory of improvement. With active management such as reduced cattle grazing and pest management, this improvement can be accelerated. Removal of stock will assist in improving native ground coverage. Control of pest species will also reduce potential threats to Squatter Pigeon. Protection from clearing will increase sheltering habitat.
Time until ecological benefit	20	20	Estimated time for weed and pest reduction and restoration of a more dominant native ground layer.	Estimated time for canopy layer to mature and provide sheltering habitat. This timeframe also accommodates for weed and pest reduction.
Confidence in quality scores	70%	70%	Reduction of weed coverage within the offset area will require ongoing and active management due to its location in lower catchment areas. However, this management approach can effectively improve degraded condition parameters.	
Raw gain	2	3	As per OAG	
Adjusted gain	1.4	2.1	As per OAG	
Risk of Loss				
Risk of loss without offset	15%	90%	Continuation of cattle grazing or thinning could degrade habitat adjacent to essential water resources, resulting in the loss of suitable habitat including potential breeding habitat critical to supporting the species.	As the areas have been historically cleared there is a high chance that the area is periodically cleared for pasture activities. Regrowth areas are not currently protected from ongoing clearing activities.
Risk of loss with offset	5%	5%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be managed. Stochastic events such as natural fires and flooding will still pose a risk to the offset area. Management actions and remediation activities will be in place to assist in reducing these risks or the severity of outcomes.	
Time over which loss is averted	20	20	Maximum of 20 years.	

Attribute	Score		Rationale	
	Remnant	Regrowth	Remnant	Regrowth
Confidence in risk scores	90%	90%	The offset area will be legally secured, clearing activities will be prohibited and grazing will be undertaken for fire management purposes. This will effectively reduce risk of loss.	
Raw gain	23.71	58.65	As per OAG	
Adjusted gain	21.34	52.79	As per OAG	
Results				
Net present value	43.51	36.89	As per OAG	
% impact offset	69.69%	59.09%	As per OAG	
TOTAL % impact offset	128.78%		Proposed offset area offsets significant residual impacts on Squatter Pigeon	

7. MSES VALUES & OFFSET SUITABILITY

7.1 Regulated Vegetation - Endangered

The proposed offset area provides 113.7 ha of 'endangered' regulated vegetation, which comprises 27.1 ha in remnant condition and 86.6 ha in regrowth condition. Vegetation is analogous to RE11.3.1 and RE11.4.8, which falls under BVG 25a. Overall habitat quality scores for regrowth and remnant areas are six and seven out of ten, respectively.

Significant residual impacts on endangered regulated vegetation are anticipated to be 2.03 ha. As per the Queensland Government Land-based Offset Multiplier Calculator a multiplier of 3.67 or 7.5 ha of regrowth vegetation is required to sufficiently offset impacts. The extent of regrowth areas fulfils this requirement. Predicted habitat quality gain of regrowth areas is two, which equates to an increased overall habitat quality score of eight out of ten after 20 years.

Remnant areas within the offset area have not been used to offset significant residual impacts due to the current high habitat quality score and therefore the requirement to achieve a score of nine out of ten within 20 years.

7.2 Regulated Vegetation – Of Concern

The proposed offset area provides 162.2 ha of 'of concern' regulated vegetation, which comprises 153 ha in remnant condition and 9.2 ha in regrowth condition. Vegetation is analogous to RE11.3.3 and RE11.3.4, which falls under BVG 16c. Overall habitat quality scores for regrowth and remnant areas is six out of ten.

Significant residual impacts on of concern regulated vegetation are anticipated to be 5.07 ha. As per the Queensland Government Land-based Offset Multiplier Calculator a multiplier of 3.67 or 18.6 ha of regrowth vegetation is required to sufficiently offset impacts. For remnant communities a multiplier of 4 or 20.28 ha is required. The extent of regrowth areas alone do not fulfil this requirement. An additional 10.3 ha of remnant vegetation will be utilised to offset anticipated impacts. Predicted habitat quality gain of regrowth areas is two, which equates to an increased overall habitat quality score of eight out of ten after 20 years.

7.3 Regulated Vegetation – Watercourse

The proposed offset area provides 162.2 ha of regulated 'watercourse' vegetation analogous to RE11.3.1, RE11.3.3 and RE11.3.4, which falls under BVG 25a and 16c, respectively. All vegetation is associated with the Connors River and mapped tributaries.

Regulated watercourse vegetation from BVG 25a comprises 13.6 ha in remnant condition and 59.8 ha in regrowth condition. Overall habitat quality scores for regrowth and remnant areas are six and seven out of ten, respectively. Regulated watercourse vegetation from BVG 16c comprises 76.5 ha in remnant condition and 9.2 ha in regrowth condition. Overall habitat quality scores for regrowth and remnant areas is six out of ten.

Significant residual impacts on regulated watercourse vegetation are anticipated to be 0.56 ha (BVG 25a) and 1.1 ha (BVG 16c). As per the Queensland Government Land-based Offset Multiplier Calculator a multiplier of 3.67 or 2.1 ha (BVG 25a) and 4 ha (BVG 16c) of regrowth vegetation is required to sufficiently offset impacts. The extent of regrowth areas fulfils this requirement. Predicted habitat quality gain of regrowth areas is two, which equates to an increased overall habitat quality score of eight out of ten after 20 years.

Remnant areas of regulated watercourse vegetation from BVG 25a within the offset area have not been used to offset significant residual impacts due to the current high habitat quality score and therefore the requirement to achieve a score of nine out of ten within 20 years. Remnant areas of regulated watercourse vegetation from BVG 16c within the offset area have not been used to offset significant residual impacts as additional contribution is not required.

8. CURRENT THREATS

Value	Threat
Brigalow TEC	• Clearing of regrowth areas <15 years of age • Thinning of remnant communities to increase cattle grazing resulting in reduced ground layer diversity and structure, and an increase in exotic perennial grass cover
Ornamental Snake	• Clearing of regrowth habitat • Ongoing cattle grazing compacting soils, reducing soil cracks and degrading aquatic habitat • Thinning of remnant communities resulting in reduced ground layer structure • Ongoing pest incursion and predation on Ornamental Snake
Squatter Pigeon	• Clearing of regrowth habitat • Thinning of remnant communities & increase cattle grazing resulting in an increase in exotic perennial grass cover • Ongoing pest incursion and predation on Squatter Pigeon
Yakka Skink	• Clearing of shelter habitat within regrowth areas • Thinning of remnant communities resulting in reduced ground layer structure • Ongoing pest incursion (feral pigs) destroying potential burrowing systems
MSES	• Clearing of regrowth areas • Thinning in remnant communities • Degradation of understorey from weed incursion and cattle grazing

Appendix C2: Detailed Field Data and Assessment Units

Assessment Unit 1

BioCondition Scoring Sheet	Max Score	CB22 Site 1	CB30 Site 2	CB36 Site 3
Field based attributes				
Recruitment of woody perennial species	5	3	5	3
Native plant species richness				
Trees	5	5	5	5
Shrubs	5	5	5	5
Grasses	5	5	5	2.5
Forbs	5	5	5	5
Tree Canopy Height	5	5	5	5
Tree Canopy Cover	5	3	3	3
Shrub canopy cover	5	3	5	5
Native perennial grass cover	5	5	5	5
Organic litter cover	5	5	5	3
Large trees	15	5	5	5
Coarse woody debris	5	2	5	2
Weed cover	10	10	10	5
Total Field based attributes	80	61	68	53.5
GIS based attributes				
Fragmented - Patch size (input score manually)	10	10	10	10
Fragmented - Connectivity (l, m, h, or vh)	5	4	4	4
Fragmented - Context (input score manually)	5	4	2	4
Fragmented - Corridors	6	6	6	6
Total GIS attributes	26	24	22	24
Total BioCondition Score	**106**	**85**	**90**	**77.5**
Average Total BioCondition Score			84.17	

BioCondition Scoring Sheet	Max Score	CB21 Site 1	CB17 Site 2	CB24 Site 3	CB37 Site 4	CB38 Site 5
Field based attributes						
Recruitment of woody perennial species	5	5	5	5	5	5
Native plant species richness						
Trees	5	5	5	5	5	5
Shrubs	5	2.5	2.5	2.5	5	0
Grasses	5	5	5	5	5	5
Forbs	5	5	5	5	2.5	5
Tree Canopy Height	5	3	3	3	3	3
Tree Canopy Cover	5	5	2	2	2	2
Shrub canopy cover	5	5	3	5	5	3
Native perennial grass cover	5	5	3	5	5	5
Organic litter cover	5	5	5	3	5	3
Large trees	15	0	0	0	0	0
Coarse woody debris	5	0	0	0	0	0
Weed cover	10	5	3	3	0	5
Total Field based attributes	80	50.5	41.5	43.5	42.5	41
GIS based attributes						
Fragmented - Patch size (input score manually)	10	10	7	10	7	10
Fragmented - Connectivity (l, m, h, or vh)	5	2	2	2	4	2
Fragmented - Context (input score manually)	5	4	4	4	4	4
Fragmented - Corridors	6	6	6	6	6	6
Total GIS attributes	26	22	19	22	21	22
Total BioCondition Score	**106**	**72.5**	**60.5**	**65.5**	**63.5**	**63**
Average Total BioCondition Score				65.00		

BioCondition Scoring Sheet	Max Score	CB34 Site 1
Field based attributes		
Recruitment of woody perennial species	5	5
Native plant species richness		
Trees	5	2.5
Shrubs	5	2.5
Grasses	5	2.5
Forbs	5	2.5
Tree Canopy Height	5	5
Tree Canopy Cover	5	5
Shrub canopy cover	5	3
Native perennial grass cover	5	3
Organic litter cover	5	5
Large trees	15	0
Coarse woody debris	5	0
Weed cover	10	0
Total Field based attributes	80	36
GIS based attributes		
Fragmented - Patch size (input score manually)	10	10
Fragmented - Connectivity (l, m, h, or vh)	5	4
Fragmented - Context (input score manually)	5	2
Fragmented - Corridors	6	6
Total GIS attributes	26	22
Total BioCondition Score	**106**	**58**
Average Total BioCondition Score		58.00

BioCondition Scoring Sheet	Max Score	CB32 Site 1
Field based attributes		
Recruitment of woody perennial species	5	5
Native plant species richness		
Trees	5	5
Shrubs	5	0
Grasses	5	2.5
Forbs	5	2.5
Tree Canopy Height	5	3
Tree Canopy Cover	5	2
Shrub canopy cover	5	3
Native perennial grass cover	5	5
Organic litter cover	5	3
Large trees	15	0
Coarse woody debris	5	2
Weed cover	10	3
Total Field based attributes	80	36
GIS based attributes		
Fragmented - Patch size (input score manually)	10	10
Fragmented - Connectivity (l, m, h, or vh)	5	2
Fragmented - Context (input score manually)	5	2
Fragmented - Corridors	6	6
Total GIS attributes	26	20
Total BioCondition Score	**106**	**56**
Average Total BioCondition Score		56.00

BioCondition Scoring Sheet	Max Score	CB40 Site 2	CB41 Site 3
Field based attributes			
Recruitment of woody perennial species	5	3	5
Native plant species richness			
Trees	5	5	5
Shrubs	5	5	5
Grasses	5	2.5	2.5
Forbs	5	2.5	2.5
Tree Canopy Height	5	5	5
Tree Canopy Cover	5	3	3
Shrub canopy cover	5	0	0
Native perennial grass cover	5	3	5
Organic litter cover	5	5	5
Large trees	15	5	5
Coarse woody debris	5	5	5
Weed cover	10	0	5
Total Field based attributes	80	44	53
GIS based attributes			
Fragmented - Patch size (input score manually)	10	7	10
Fragmented - Connectivity (l, m, h, or vh)	5	0	5
Fragmented - Context (input score manually)	5	2	4
Fragmented - Corridors	6	6	6
Total GIS attributes	26	15	25
Total BioCondition Score	**106**	**59**	**78**
Average Total BioCondition Score		68.50	

Assessment Unit 6

BioCondition Scoring Sheet	Max Score	CB6 Site 1	CB49 Site 4
Field based attributes			
Recruitment of woody perennial species	5	0	5
Native plant species richness			
Trees	5	5	2.5
Shrubs	5	0	2.5
Grasses	5	2.5	2.5
Forbs	5	2.5	5
Tree Canopy Height	5	5	5
Tree Canopy Cover	5	5	5
Shrub canopy cover	5	3	3
Native perennial grass cover	5	3	3
Organic litter cover	5	3	5
Large trees	15	10	10
Coarse woody debris	5	0	2
Weed cover	10	3	5
Total Field based attributes	80	42	55.5
GIS based attributes			
Fragmented - Patch size (input score manually)	10	7	10
Fragmented - Connectivity (l, m, h, or vh)	5	4	2
Fragmented - Context (input score manually)	5	2	2
Fragmented - Corridors	6	6	6
Total GIS attributes	26	19	20
Total BioCondition Score	**106**	**61**	**75.5**
Average Total BioCondition Score		68.25	

Assessment Unit 7

BioCondition Scoring Sheet	Max Score	CB25 Site 1	CB27 Site 2	CB28 Site 3	CB29 Site 4
Field based attributes					
Recruitment of woody perennial species	5	3	5	5	5
Native plant species richness					
Trees	5	5	5	5	5
Shrubs	5	2.5	2.5	2.5	0
Grasses	5	2.5	2.5	2.5	0
Forbs	5	2.5	2.5	2.5	0
Tree Canopy Height	5	3	3	3	3
Tree Canopy Cover	5	5	5	5	5
Shrub canopy cover	5	5	3	3	5
Native perennial grass cover	5	5	3	5	1
Organic litter cover	5	5	5	5	5
Large trees	15	0	0	0	0
Coarse woody debris	5	2	0	2	2
Weed cover	10	0	0	0	0
Total Field based attributes	80	40.5	36.5	40.5	31
GIS based attributes					
Fragmented - Patch size (input score manually)	10	10	10	10	10
Fragmented - Connectivity (l, m, h, or vh)	5	2	2	2	2
Fragmented - Context (input score manually)	5	4	4	4	4
Fragmented - Corridors	6	6	6	6	6
Total GIS attributes	26	22	22	22	22
Total BioCondition Score	**106**	**62.5**	**58.5**	**62.5**	**53**
Average Total BioCondition Score			59.13		

BioCondition Scoring Sheet	Max Score	CB16 Site 1	CB23 Site 2	CB31 Site 3
Field based attributes				
Recruitment of woody perennial species	5	3	5	5
Native plant species richness				
Trees	5	5	5	5
Shrubs	5	5	5	5
Grasses	5	2.5	2.5	2.5
Forbs	5	2.5	2.5	5
Tree Canopy Height	5	5	5	5
Tree Canopy Cover	5	3	3	5
Shrub canopy cover	5	5	3	5
Native perennial grass cover	5	5	5	5
Organic litter cover	5	5	5	5
Large trees	15	15	15	5
Coarse woody debris	5	2	5	5
Weed cover	10	5	5	10
Total Field based attributes	80	63	66	67.5
GIS based attributes				
Fragmented - Patch size (input score manually)	10	10	10	5
Fragmented - Connectivity (l, m, h, or vh)	5	5	5	5
Fragmented - Context (input score manually)	5	4	4	2
Fragmented - Corridors	6	6	6	6
Total GIS attributes	26	25	25	18
Total BioCondition Score	**106**	**88**	**91**	**85.5**
Average Total BioCondition Score			88.17	

Assessment Unit 9

BioCondition Scoring Sheet	Max Score	CB7 Site 1	CB44 Site 2	
Field based attributes				
Recruitment of woody perennial species	5	5	3	
Native plant species richness				
Trees	5	5	5	
Shrubs	5	0	0	
Grasses	5	5	5	
Forbs	5	5	5	
Tree Canopy Height	5	5	5	
Tree Canopy Cover	5	5	5	
Shrub canopy cover	5	5	5	
Native perennial grass cover	5	5	3	
Organic litter cover	5	3	3	
Large trees	15	15	15	
Coarse woody debris	5	5	0	
Weed cover	10	10	10	
Total Field based attributes	80	73	64	
GIS based attributes				
Fragmented - Patch size (input score manually)	10	7	5	
Fragmented - Connectivity (l, m, h, or vh)	5	5	2	
Fragmented - Context (input score manually)	5	4	4	
Fragmented - Corridors	6	6	6	
Total GIS attributes	26	22	17	
Total BioCondition Score	**106**	**95**	**81**	
Average Total BioCondition Score		88.00		

BioCondition Scoring Sheet	Max Score	CB33 Site 1	CB35 Site 2
Field based attributes			
Recruitment of woody perennial species	5	5	3
Native plant species richness			
Trees	5	2.5	2.5
Shrubs	5	5	2.5
Grasses	5	2.5	5
Forbs	5	2.5	0
Tree Canopy Height	5	5	5
Tree Canopy Cover	5	2	5
Shrub canopy cover	5	5	5
Native perennial grass cover	5	5	5
Organic litter cover	5	5	5
Large trees	15	5	10
Coarse woody debris	5	5	5
Weed cover	10	0	0
Total Field based attributes	80	49.5	53
GIS based attributes			
Fragmented - Patch size (input score manually)	10	5	5
Fragmented - Connectivity (l, m, h, or vh)	5	0	2
Fragmented - Context (input score manually)	5	2	2
Fragmented - Corridors	6	6	6
Total GIS attributes	26	13	15
Total BioCondition Score	**106**	**62.5**	**68**
Average Total BioCondition Score		65.25	

Fauna Scores

	Remnant							Mature regrowth							Regrowth						
	Threats to species	Quality & availability of foraging habitat	Quality & availability of shelter	Species mobility capacity	Role of site	Total score		Threats to species	Quality & availability of foraging habitat	Quality & availability of shelter	Species mobility capacity	Role of site	Total score		Threats to species	Quality & availability of foraging habitat	Quality & availability of shelter	Species mobility capacity	Role of site	Total score
Ornamental Snake							Ornamental Snake							Ornamental Snake						
11.3.1	15	5	10	10	4	44	11.3.1	7	5	5	7	4	28	11.3.1	7	5	5	7	4	28
11.4.9	7	10	10	10	4	41	11.4.9	-	-	-	-	-	-	11.4.9	7	5	5	7	4	28
11.3.3	7	10	5	10	4	36	11.3.3	7	5	1	7	4	24	11.3.3	-	-	-	-	-	-
11.3.4	15	10	5	10	4	44	11.3.4	-	-	-	-	-	-	11.3.4	-	-	-	-	-	-
11.3.27	7	10	5	10	4	36	11.3.27	-	-	-	-	-	-	11.3.27	-	-	-	-	-	-
11.3.25	15	10	5	10	4	44	11.3.25	-	-	-	-	-	-	11.3.25	-	-	-	-	-	-
Squatter Pigeon							Squatter Pigeon							Squatter Pigeon						
11.3.3	7	5	10	10	4	36	11.3.3	7	5	1	10	4	27	11.3.3	-	-	-	-	-	-
11.3.27	7	5	10	10	4	36	11.3.27	-	-	-	-	-	-	11.3.27	-	-	-	-	-	-
11.3.25	7	10	10	10	4	41	11.3.25	-	-	-	-	-	-	11.3.25	-	-	-	-	-	-
11.3.1	15	1	10	10	4	40	11.3.1	7	1	5	10	4	27	11.3.1	7	1	1	10	4	23
11.3.4	7	5	10	10	4	36	11.3.4	-	-	-	-	-	-	11.3.4	-	-	-	-	-	-
11.5.3	7	10	10	10	4	41	11.5.3	-	-	-	-	-	-	11.5.3	-	-	-	-	-	-
Yakka Skink							Yakka Skink							Yakka Skink						
11.3.1	15	5	1	10	1	32	11.3.1	7	5	1	10	1	24	11.3.1	7	1	1	10	1	20
11.4.9	15	5	1	10	1	32	11.4.9	-	-	-	-	-	-	11.4.9	7	1	1	10	1	20
11.3.25	15	10	10	10	1	46	11.3.25	-	-	-	-	-	-	11.3.25	-	-	-	-	-	-
11.3.4	15	10	5	10	1	41	11.3.4	-	-	-	-	-	-	11.3.4	-	-	-	-	-	-
11.5.3	7	5	5	10	1	28	11.5.3	-	-	-	-	-	-	11.5.3	-	-	-	-	-	-

MNES Offset Area Scores

	AU 1			AU 2			AU 3			AU 4		
	11.3.1 rem			11.3.1 regrowth			11.4.9 remnant			11.4.9 regrowth		
	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score
Brigalow TEC	13.6	7.94339623	3.971698113	59.8	6.1320755	4.231132075	13.5	5.471698	2.735849057	26.8	5.283019	1.637735849
	11.3.1 rem			11.3.1 regrowth			11.4.9 remnant			11.4.9 regrowth		
Ornamental Snake	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score
	13.1	8.21794872	0.493076923	7.9	5.9615385	1.132692308	13.5	6.346154	0.380769231	26.8	5.384615	3.5
	11.3.1 rem			11.3.1 regrowth			11.4.9 remnant			11.4.9 regrowth		
Yakka Skink	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score
	13.6	7.44871795	0.670384615	59.8	5.5769231	3.848076923	13.5	5.769231	0.461538462	26.8	4.871795	1.51025641
	11.3.1 rem			11.3.1 regrowth								
Squatter Pigeon	Area	Score	Weighted Score	Area	Score	Weighted Score						
	13.6	7.96153846	0.477692308	59.8	5.7692308	5.019230769						

	AU 5			AU 6			AU 7			AU 8		
Brigalow TEC												
	11.3.4 rem			11.3.3 rem			11.3.3 mature regrowth			11.3.25 rem		
Ornamental Snake	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score
	75.3	7.21153846	2.524038462	76.4	6.6826923	2.405769231	6.4	5.328846	0.852615385	21.5	8.472436	0.84724359
	11.3.4 rem									11.3.25 rem		
Yakka Skink	Area	Score	Weighted Score							Area	Score	Weighted Score
	75.3	7.01923077	3.299038462							21.5	8.600641	1.204089744
	11.3.4 rem			11.3.3 rem			11.3.3 mature regrowth			11.3.25 rem		
Squatter Pigeon	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score	Area	Score	Weighted Score
	75.3	6.69871795	2.143589744	77.7	6.6826923	2.205288462	9.2	5.521154	0.71775	21.5	8.280128	0.745211538

	AU 9			AU 10		
Brigalow TEC						
	11.3.27 rem					
Ornamental Snake	Area	Score	Weighted Score			
	13.7	7.94871795	0.476923077			
				11.5.3 rem		
Yakka Skink				Area	Score	Weighted Score
				35.3	5.9775641	1.315064103
	11.3.27 rem			11.5.3 rem		
Squatter Pigeon	Area	Score	Weighted Score	Area	Score	Weighted Score
	13.7	7.94871795	0.476923077	35.3	6.8108974	1.021634615

Impact Site Scores

MNES value	Significant Residual Impact (ha)	Condition score
Ornamental Snake habitat	83.19	7
Yakka Skink habitat	99.35	7
Brigalow TEC	9.7	7
MSES value		
Endangered regulated vegetation (BVG 25a)	2.03	7
Of Concern regulated vegetation (BVG 17a)	2.16	7
Of Concern regulated vegetation (BVG 16c)	5.07	7
Watercourse regulated vegetation (BVG 25a)	0.56	7
Watercourse regulated vegetation (BVG 16c)	1.1	7
Watercourse regulated vegetation (BVG 17a)	4.83	7
Squatter Pigeon habitat	14.01	7

Impact vs Offset Summary

Offset value	Significant Residual Impact (ha)	Condition score	Offset (ha)	Condition		Calculation score		Total	Meets require-ments	Surplus (ha)
MNES values				Regrowth	Remnant	Regrowth	Remnant			
Ornamental Snake habitat	52.33	7	254.6	5	7	60.75%	106.96%	167.71%	✓	~55
Yakka Skink habitat	99.35	7	245.8	5	7	67.42%	42.01%	109.43%	✓	~35
Brigalow TEC	9.7	7	113.7	6	7	545.05%	67.80%	612.85%	✓	~100
Squatter Pigeon habitat	89.2	7	306.1	6	7	59.09%	69.69%	128.78%	✓	~100
MSES value										
Endangered regulated vegetation (BVG 25a)	2.03	7	113.7	6	7	x3.67	Not suitable	7.4501	✓	79.1499
Of Concern regulated vegetation (BVG 16c)	5.07	7	162.2	6	6	x3.67	x4	19.455	✓	142.72
Watercourse regulated vegetation (BVG 25a)	0.56	7	73.4	6	8	x3.67	Not suitable	2.0552	✓	57.7448
Watercourse regulated vegetation (BVG 16c)	1.1	7	162.2	6	6	x3.67	x4	4.037	✓	158.16

Appendix C3: Habitat Factors for Ornamental Snake

Vegetation Management Act 1999 – Extract from the essential habitat database—version 3

Essential habitat is required for assessment under the Regional Vegetation Management Codes.

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s on the accompanying essential habitat map.

The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.
Essential habitat is compiled from a combination of species habitat models and buffered species records.
The Department of Environment and Resource Management website (www.derm.qld.gov.au) has more information on how the layer is applied under the Regional Vegetation Management Codes.
Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.
Essential habitat, for protected wildlife, means an area of vegetation shown on the regional ecosystem map or remnant map as remnant vegetation—
(a) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or
(b) in which the protected wildlife, at any stage of its life cycle, is located.
Protected wildlife is native wildlife prescribed under the Nature Conservation Act 1994 (NCA) as endangered, vulnerable, rare or near threatened wildlife.

Label	Scientific Name	Common Name	NCA Status	Regional Ecosystems (this is a mandatory essential habitat factor, unless otherwise stated)	Vegetation Community	Altitude	Soils	Position in Landscape
483	Denisonia maculata	Ornamental Snake	V	9.3.1, 9.3.2, 9.3.3, 9.3.4, 9.3.5, 9.3.6, 9.3.7, 9.3.8, 9.3.9, 9.3.10, 9.3.11, 9.3.13, 9.3.14, 9.3.15, 9.3.16, 9.3.17, 9.3.18, 9.3.19, 9.3.20, 9.3.21, 9.3.22, 9.3.23, 9.3.24, 9.5.1, 9.5.3, 9.5.4, 9.5.5, 9.5.6, 9.5.7, 9.5.8, 9.5.9, 9.5.10, 9.5.11, 9.5.12, 9.5.13, 9.5.14, 9.7.1, 9.7.2, 9.7.3, 9.7.4, 9.7.5, 9.7.6, 9.8.1, 9.8.2, 9.8.4, 9.8.5, 9.8.6, 9.8.9, 9.8.10, 9.8.11, 9.8.12, 9.10.1, 9.10.3, 9.10.4, 9.10.5, 9.10.6, 9.10.7, 9.10.8, 9.10.9, 9.11.1, 9.11.2, 9.11.3, 9.11.4, 9.11.5, 9.11.7, 9.11.10, 9.11.11, 9.11.12, 9.11.13, 9.11.14, 9.11.15, 9.11.16, 9.11.17, 9.11.18, 9.11.19, 9.11.21, 9.11.22, 9.11.23, 9.11.24, 9.11.25,	Under litter/fallen timber and in wide soil cracks, in riparian woodland/open forest and shrub/woodland including Brigalow Acacia harpophylla.	100-450m.	Deep cracking clay and sandy loam substrates.	Near freshwater waterholes/creeks.

			9.11.26, 9.11.27, 9.11.28, 9.11.29, 9.11.30, 9.11.31, 9.11.32, 9.12.1, 9.12.2, 9.12.3, 9.12.4, 9.12.5, 9.12.6, 9.12.7, 9.12.10, 9.12.11, 9.12.12, 9.12.13, 9.12.14, 9.12.15, 9.12.16, 9.12.17, 9.12.18, 9.12.19, 9.12.20, 9.! 12.21, 9.12.22, 9.12.23, 9.12.24, 9.12.25, 9.12.26, 9.12.27, 9.12.28, 9.12.29, 9.12.30, 9.12.31, 9.12.32, 9.12.33, 9.12.35, 9.12.36, 9.12.37, 9.12.38, 9.12.39, 9.12.40, 9.12.43, 11.1.4, 11.2.1, 11.2.2, 11.2.5, 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.5, 11.3.6, 11.3.7, 11.3.8, 11.3.9, 11.3.10, 11.3.12, 11.3.13, 11.3.14, 11.3.15, 11.3.16, 11.3.17, 11.3.18, 11.3.19, 11.3.20, 11.3.23, 11.3.25, 11.3.26, 11.3.27, 11.3.28, 11.3.29, 11.3.30, 11.3.32, 11.3.33, 11.3.34, 11.3.35, 11.3.36, 11.3.37, 11.3.38, 11.3.39, 11.4.2, 11.4.3, 11.4.5, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.4.12, 11.4.13, 11.5.1, 11.5.2, 11.5.3, 11.5.4, 11.5.5, 11.5.7, 11.5.8, 11.5.9, 11.5.10, 11.5.11, 11.5.12, 11.5.13, 11.5.14, 11.5.16, 11.5.17, 11.5.18, 11.5.20, 11.5.21, 11.7.1, 11.7.2, 11.7.3, 11.7.4, 11.7.5, 11.7.6, 11.7.7, 11.8.1, 11.8.2, 11.8.4, 11.8.5, 11.8.7, 11.8.8, 11.8.9, 11.8.11, 11.8.12, 11.8.14, 11.8.15, 11.9.1, 11.9.2, 11.9.3, 11.9.5, 11.9.6, 11.9.7, 11.9.9, 11.9.10, 11.9.13, 11.9.14, 11.10.1, 11.10.2, 11.! 10.3, 11.10.4, 11.10.5, 11.10.6, 11.10.7, 11.10.9, 11.10.11, 11.10.12, 11.10.13, 11.11.1, 11.11.2, 11.11.3, 11.11.4, 11.11.6, 11.11.7, 11.11.8, 11.11.9, 11.11.10, 11.11.11, 11.11.12, 11.11.13, 11.11.14, 11.11.15, 11.11.16, 11.11.17, 11.11.19, 11.11.20, 11.12.1, 11.12.2, 11.12.3, 11.12.5, 11.12.6, 11.12.7, 11.12.8, 11.12.9, 11.12.10, 11.12.11, 11.12.12, 11.12.13, 11.12.14, 11.12.15, 11.12.16, 11.12.17, 11.12.18, 11.12.19, 11.12.20, 11.12.21			

APPENDIX D: WILDNET ONLINE REPORT – CROYDON STATION

Queensland Government

Wildlife Online Extract

Search Criteria:	Species List for a Specified Point
	Species: All
	Type: Native
	Status: Rare and threatened species
	Records: Confirmed
	Date: Since 1980
	Latitude: -22.3841
	Longitude: 148.999
	Distance: 10
	Email: alan.key@earthtrade.com.au
	Date submitted: Wednesday 26 Oct 2016 12:28:33
	Date extracted: Wednesday 26 Oct 2016 12:30:02

The number of records retrieved = 1

Disclaimer

As the DSITIA is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	*Dichanthium queenslandicum*			V	E	1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).
This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.