

BM Alliance Coal Operations Pty Ltd

Dysart Road and Associated Infrastructure Relocation Project

Moranbah, QLD

Offset Management Plan

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1 BACKGROUND

1.1 DESCRIPTION OF PROJECT

BM Alliance Coal Operations Pty Ltd (BMA) is proposing to relocate part of Dysart Road and associated infrastructure within the existing road corridor that passes through the Peak Downs Mine Mining Lease. Dysart Road is a public road which connects the towns of Dysart and Moranbah in the Bowen Basin, Queensland. It is an important piece of regional infrastructure providing a public road link between the two towns and the surrounding properties and mining operations in the area. Approximately 16 km of Dysart Road and a Telstra fibre optic cable is proposed to be relocated from ML1775 to the eastern boundary of adjoining MLA70411. The relocation is necessary to maintain connectivity between Dysart and Moranbah as mining activities proceed on ML1775.

1.2 COMMONWEALTH APPROVAL

The Dysart Road and Associated Infrastructure Relocation Project (the Project) was referred to the Commonwealth Department of the Environment (DoE; formerly the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC)) on 17 May 2013 for assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Project (EPBC 2013/6868) was determined to be a controlled action subject to the controlling provision of listed threatened species and communities (Section 18 and 18A) on 19 June 2013. The DoE also advised at this time that assessment would be by preliminary documentation, and assessment commenced with a request for additional information on 20 June 2013.

Preliminary documentation for the Project addressed the additional information requested and facilitated an assessment under the EPBC Act. The preliminary documentation detailed the impacts of the Project to matters of national environmental significance (MNES) and the avoidance, mitigation, management and offset measures that have been or will be undertaken to reduce impacts to MNES. Decision on approval subject to the implementation of conditions was received on 5 November 2013.

1.3 PURPOSE OF OFFSET MANAGEMENT PLAN

This offset management plan has been prepared to address the Project's residual significant impacts to MNES identified in the preliminary documentation. The Project offsets 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 management plan includes:

- Description of the Project's residual significant impacts to MNES;
- Description of the Project's offsets, including values, existing condition and threatening processes;
- Demonstration of the Project's compliance with the *Environment Protection and Biodiversity Conservation Act 1999* Environmental Offsets Policy (October 2012) (herein referred to as the Offsets Policy);

- Assessment of the offsets and process established to meet the offset requirements of the Project in accordance with the Offsets Policy and associated Offsets Assessment Guide (herein referred to as the OAG); and
- Determination of the overall suitability of and environmental outcome provided by the Project offsets.

The Offset Management Plan is supported by two Offset Area Management Plans, which outline the management actions, monitoring and reporting schedule for the Project's offset areas. The Offset Area Management Plans are targeted at the on-ground management of the Project's offset areas to assist in the delivery of the environmental outcomes described in the Offset Management Plan. These plans are provided in **Appendix A** and **Appendix B** of this document.

This Plan, plus the two Offset Area Management Plans, constitute the 'Offset Management Plan' for the purposes of Condition 3 of the EPBC Act approval (EPBC 2013/6868). Refer to Section 2.2 for further details.

1.4 REVIEW OF OFFSET MANAGEMENT PLAN

A review of the Offset Management Plan will be undertaken following the scheduled January pre-clearance survey of the impact area for *Dichanthium queenslandicum* (King Bluegrass) and *Digitaria porrecta* (Finger Panic Grass). The Offset Management Plan will be amended to include the necessary offsets for the species if any residual significant impacts are identified within the Project's alignment. The revised Offset Management Plan will include:

- Detailed descriptions of how enhanced conservation outcomes for the affected MNES will be achieved;
- Timeframes and key milestones for implementation of offsets;
- Mechanisms for monitoring and reporting of offset milestones and outcomes;
- Mechanisms to ensure that offsets are maintained for the duration of the impacts; and
- A textual description and map to clearly define the location and boundaries of the offset area/s.

2 OFFSET COMPLIANCE

2.1 PROJECT IMPACTS

After measures to avoid, mitigate and manage the Dysart Road Project impacts are implemented, residual significant impacts are considered likely for 10.4 ha of Ornamental Snake (*Denisonia maculata*) habitat and 10.2ha of the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin Threatened Ecological Community (Natural Grassland TEC).

Ornamental Snake habitat within the Dysart Road realignment includes *Acacia harpophylla* (Brigalow) regrowth, gilgai mounds and woodland areas surrounding an ephemeral creek (Pebblestone Creek). While the species has not been recorded within the alignment, the habitat is of similar composition and structure to adjacent habitat areas where two sightings of Ornamental Snake were recorded (Aurecon Hatch 2012). As such removal of habitat within the alignment will reduce the area of occupancy and possibly fragment an existing important population.

Natural Grasslands TEC within the Dysart Road realignment qualify as 'good quality' condition (as per listing advice [TSSC 2008a]) in accordance with the following key diagnostic features:

- Patch size is approximately 10.2 ha;
- Three native perennial grass indicator species - *Dichanthium sericium*, *Panicum queenslandicum* and *Paspalidium globoideum*;
- Over 200 native grass tussocks (per 50 m x 20 m plot) were recorded;
- Total projected canopy cover of shrubs is less than 50%; and
- Perennial non-woody introduced species comprise less than 30% of the total projected perennial plant cover.

Whilst the extent of the community within the alignment represents a small proportion in a regional context, the residual loss of 10.2ha is considered a significant impact to the community and the associated ecological functions and values these communities provide.

The Dysart Road Relocation project is also considered to pose cumulative impacts on Ornamental Snake and Natural Grassland TEC. Incremental impacts of the Project when combined with other past, present or reasonably foreseeable actions in the region are considered to be of significance.

2.2 OFFSET APPROVAL CONDITIONS

Project approval has been granted by DoE subject to conditions that address the residual significant impacts. The conditions of approval as specified in the EPBC Act Decision on the Dysart Road and Associated Service Infrastructure Relocation Project, Queensland (EPBC 2013/6868) that are relevant to this offset management plan are detailed below:

3. The person taking the action must provide the Environmental Offsets Plan to the Minister prior to the commencement of the action. Commencement of the action cannot occur until the Environmental Offsets Plan has been approved by the Minister in writing. The approved Environmental Offsets Plan must be implemented.

- i. The Environmental Offsets Plan must include offsets for:
 - a) the loss of 10.4 ha of habitat critical to the survival of the listed vulnerable Ornamental Snake; and*
 - b) the loss of 10.2 ha of the listed endangered Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin community.**
- ii. The Environmental Offsets Plan must include the commitment to the monitoring and management measures described in the Assessment Documentation. The Environmental Offsets plan must demonstrate consideration to the Priority Actions identified in any approved Conservation Advice or Threat Abatement Plan relevant to the matter to be protected.*
- iii. Measures to be implemented on the offset site for Ornamental Snake must include:
 - a) control of weed species and pest animals;*
 - b) control of access to the protected land;*
 - c) no grazing or other stock animal access during the wet season.**
- iv. Measures to be implemented on the offset site for the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin community must include:
 - a) management of grazing;*
 - b) the exclusion of Leucaena from the offset site;*
 - c) control of exotic weeds to increase the condition and quality of the Natural Grasslands of the Queensland Central Highlands and the Northern Fitzroy Basin community within the offset site.**
- v. Any residual significant impact to King Blue-grass and Finger Panic Grass that is determined through the pre-clearance surveys prior to commencement as approved by the Minister in Condition 2 above. The Environmental Offsets Plan must include:
 - a) detailed descriptions of how enhanced conservation outcomes for the affected MNES will be achieved;*
 - b) timeframes and key milestones for implementation of offsets;*
 - c) mechanisms for monitoring and reporting of offset milestones and outcomes;*
 - d) mechanisms to ensure that offsets are maintained for the duration of the impacts; and*
 - e) a textual description and map to clearly define the location and boundaries of the offset area/s. This must be accompanied with the offset attributes and a shapefile.**

2.3 PROJECT OFFSETS SUMMARY

2.3.1 ORNAMENTAL SNAKE

Residual significant impacts to Ornamental Snake habitat will be offset on BMA's Terang property. There are two components provided as part of the offset package to address impacts to known Ornamental Snake habitat arising from the Dysart Road relocation project. These include:

1. Approximately 57 ha of suitable habitat confirmed through ground-truthing within BMA's Terang property (**Site 1**).
2. Approximately 44 ha of additional land within the Terang property to protect an area surrounding a known record for the species (**Site 2**).

Site 1 contains a mix of remnant and non-remnant woodland vegetation surrounding an ephemeral creek line and comprising of essential microhabitat features for Ornamental Snake. Site 2, is included in the package as it protects an area in which the Ornamental Snake has been sighted and therefore is considered to provide a direct compensatory link to the loss of known habitat at the impact site. It is a supplementary offset to Site 1.

The objective of the offset sites is to deliver tangible and measurable conservation gain by protecting existing habitat and increasing the available area of occupancy through improving condition and increasing connectivity.

A detailed description of the Ornamental Snake habitat offset is provided in **Section 3.0** of this Offset Management Plan. A complete outline of management measures is contained in the corresponding Terang Offset Area Management Plan (Appendix A).

Offset sites will be secured via the Queensland Government's Voluntary Declaration under the provisions of the *Vegetation Management Act 1999* (VMA). As per the requirements of this, the Terang Offset Area Management Plan have been completed in the prescribed template.

2.3.2 NATURAL GRASSLANDS TEC

Residual significant impacts to Natural Grasslands TEC will be offset on the third party owned property known as Inderi. The Natural Grasslands TEC offset site is 137.2 ha in size, containing 67.7 ha of validated Natural Grasslands TEC.

The objective of the offset site is to deliver tangible and measurable conservation gain by protecting an existing area of the TEC and maintaining its ecological values and functions through ongoing management to maintain and improve condition.

A detailed description of the Natural Grassland TEC offset is provided in **Section 4.0** of this Offset Management Plan. A complete outline of management measures is contained in the corresponding Inderi Offset Area Management Plan (Appendix B).

The offset site will be secured via the Queensland Government's Voluntary Declaration under the provisions of the VMA. As per the requirements of this, the Inderi Offset Area Management Plan have been completed in the prescribed template.

2.3.3 THREATENED GRASS SPECIES

Additional targeted surveys of the Project's impact site will be undertaken during optimal survey time and pre-construction to confirm presence/absence of King Bluegrass and Finger Panic Grass within the alignment (refer to Section 5 in accordance with approval conditions in Section 2.2). This survey has been scheduled to occur in January 2014. Results of the survey will be provided to the DoE and used to inform/update this Offset Management Plan to ensure that impacts are suitably compensated, if necessary.

In undertaking the above steps, BMA is committed to providing a suitable offset for threatened grass species if found. This offset will be provided in accordance with the EPBC Act Offset Policy. In doing this, the offset will deliver a conservation outcome that will maintain or improve the viability of King Bluegrass and Finger Panic Grass, if required.

2.4 EPBC ACT ENVIRONMENTAL OFFSET POLICY PRINCIPLES

The Offsets Policy sets out eight key overarching principles that must be applied in determining the suitability of offsets. The Project offsets compliance with these principles is described below.

1. Deliver an overall conservation outcome that improves or maintains viability.

The Project offsets are tailored to directly target the affected attribute of the MNES i.e. Ornamental Snake habitat availability and connectivity and an area of Natural Grassland TEC. In doing so, the proposed protection mechanisms and enhancement measures will both maintain and improve the viability beyond status quo of the protected matters being impacted.

2. Be built around direct offsets but may include other compensatory measures.

Direct land based offset measures fulfil 100% of the Project's offset requirements and will address the key priority actions outlined in the recovery plans for the MNES. This will provide tangible and measurable conservation gain.

3. Be in proportion to the level of statutory protection that applies.

Project offsets meet the calculation requirements in the OAG (refer to Section 3.3 and 4.3) and as such are in proportion to the level of statutory protection that applies to the impacted protected matters.

4. Be of a size and scale proportionate to the residual impacts on the protected matter.

Project offsets meet the calculation requirements in the OAG (refer to Section 3.3 and 4.3) and as such are of a size and scale proportionate to the residual impacts on the protected matters.

5. Manage the risks of the offset not succeeding.

The Project offsets are considered to be low risk as they are direct compensatory measures that are tangible and measurable. Project offsets protect an area that is 7 to 10 times greater than the area of residual impact, and directly target the affected attribute of the

MNES i.e. Ornamental Snake habitat availability and connectivity and an area of Natural Grassland TEC.

This conservation gain will be legally secured through the Queensland Government's Voluntary Declaration under the provisions of the VMA to ensure commitment to the purposes of the offset site.

Offset Area Management Plans have been prepared to adaptively manage and guide the on-ground activities towards to desired conservation outcomes (refer to Appendix A and B). Devised management actions for the offsets are based off the key priority actions outlined in the recovery plans for the MNES. Project offsets will be regularly monitored against measurable targets to track success.

6. Be additional to what is already required.

Project offsets administer a level of environmental protection that is additional to what is already required or present across the offset area. This will be done through the Queensland Government's Voluntary Declaration under the provisions of the VMA. As part of this declaration Offset Area Management Plans have been prepared that stipulate extra management requirements that are currently not mandatory for the offset sites. These requirements involve additional on-ground actions to improve ecological condition.

7. Be efficient, effective, timely, transparent, scientifically robust and reasonable.

The Project offsets effectively target the affected MNES. Based on ecological condition data collected during field surveys, time until ecological benefit is anticipated within 10 years. Offset Area Management Plans have been prepared to efficiently and effectively deliver these conservation outcomes in a timely manner.

8. Have transparent governance arrangements.

Project offsets will be secured via the Queensland Government's Voluntary Declaration under the provisions of the VMA. As per the requirements of this, Offset Area Management Plans have been prepared that outlined the monitoring and reporting schedule of the Project offsets (refer to Appendix A and B). Reports detailing the progress of Project offsets will be submitted to the administering authority.

3 TERANG PROPERTY - ORNAMENTAL SNAKE HABITAT OFFSET

3.1 PROPERTY DESCRIPTION

3.1.1 LOCATION

Terang is located approximately 15 km south west of the town of Blackwater and approximately 160 km south of the Dysart Road relocation project in the Bowen Basin, Queensland (Figure 3-1). The property is situated in the Central Highlands Regional Council local government area and zoned rural under the planning scheme. The total area of the property is approximately 31,480 ha (Table 3-1).

Table 3-1: Terang property details

Property Name	Lot on Plan	Tenure	Local Government Area	Total Area (ha)
Terang	12 SP185512	Lands Lease	Central Highlands Regional Council	31,480

3.1.2 REGIONAL CONTEXT

The Terang property has landscape connectivity with Amaroo State Forest to the west and Blackdown Tableland National Park is approximately 20 km to the east. The Terang property is within the Brigalow Belt North biogeographic region, the same biogeographic region as the Project.

3.1.3 TENURE AND OWNERSHIP

Terang is adjacent to BMA’s Blackwater mine. The property was purchased by BMA as it provides a land buffer for neighbours and the community. This approach is applied more broadly across BMA’s coal Mining Leases. As a result, BMA holds land and compensation agreements in relation to their mining lease areas and adjacent buffer areas covering over 100,000 ha in Central Queensland.

Given the large land ownership and access areas involved, it is necessary to ensure that BMA’s land is well managed. The primary way that BMA achieves this is by licencing back the land to the previous landowner where such land is not required for mining activities. These licence arrangements are typically agreed as part of the contract of purchase and vendors have accepted such arrangements in almost all land purchases.

BMA also looks for opportunities to use land which is not required for mining activities as biodiversity offsets, where suitable values and outcomes can be achieved. Following an internal audit and investigation of BMA land holdings in Central Queensland, the Terang property was identified as having good potential as an offset site based on the following factors:

- It is a large property (31,000 ha) that has a range of significant ecological values.
- There is a history of environmental management and monitoring on this property.
- The majority of the property is timbered apart from a small area which was cleared around 30 years ago.

- The site is considered to have high potential for threatened species and riparian offsets.
- The land has limited direct value from a mining perspective, with no known underlying coal or gas resources. This is an important and highly relevant factor in delivering conservation security in Central Queensland.

At the end of mine life or as mining moves into different areas of a mining lease, BMA generally divests itself of the land holdings buffering its mining operations. In most cases the current agistment lessee is given a first option to purchase the property. As such, it is anticipated that Terang will be sold when mining is completed at Blackwater mine (noting that the current expected remaining life of the Blackwater mine is in excess of 30 years). Unless areas have been secured as offsets within Terang, there will be no requirement on future landholders for the protection and management of biodiversity values.

The Mining Lease for the Blackwater mine encroaches over the eastern portion of the Terang property (Figure 3-2). No other mineral or petroleum tenures occur over the property. Mineral Development Licences for the Blackwater mine as well as Togara North occur directly adjacent to the property as well as within a 10km radius. Petroleum Pipeline Licence (PPL) for the Australian Pacific LNG (Origin) gas pipeline also occurs 25km south-west of the property.

3.1.4 EXISTING USE

Terang is currently managed as a cattle grazing property with licence terms allowing for BMA to control designated areas as necessary.

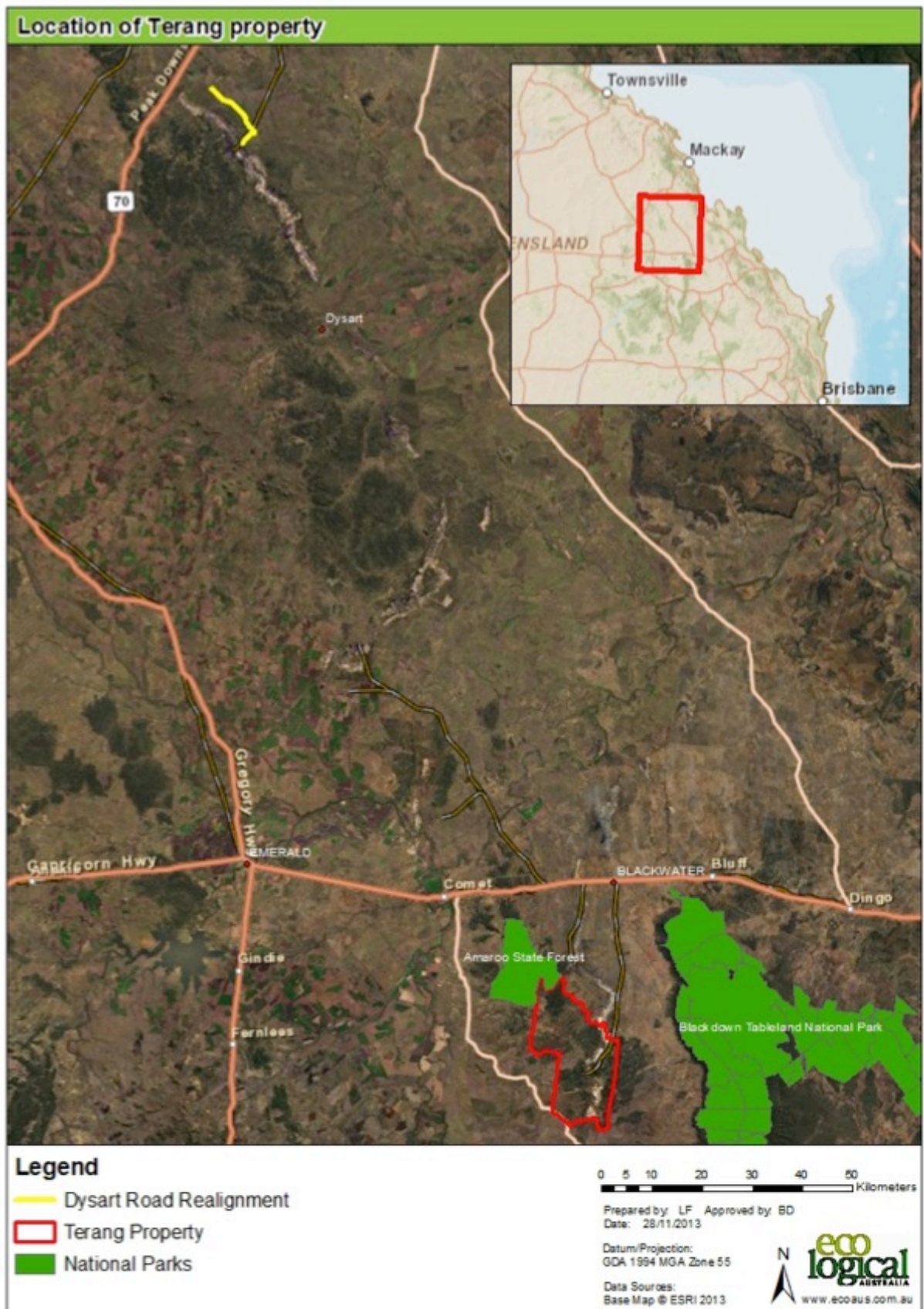


Figure 3-1: Location of Terang property

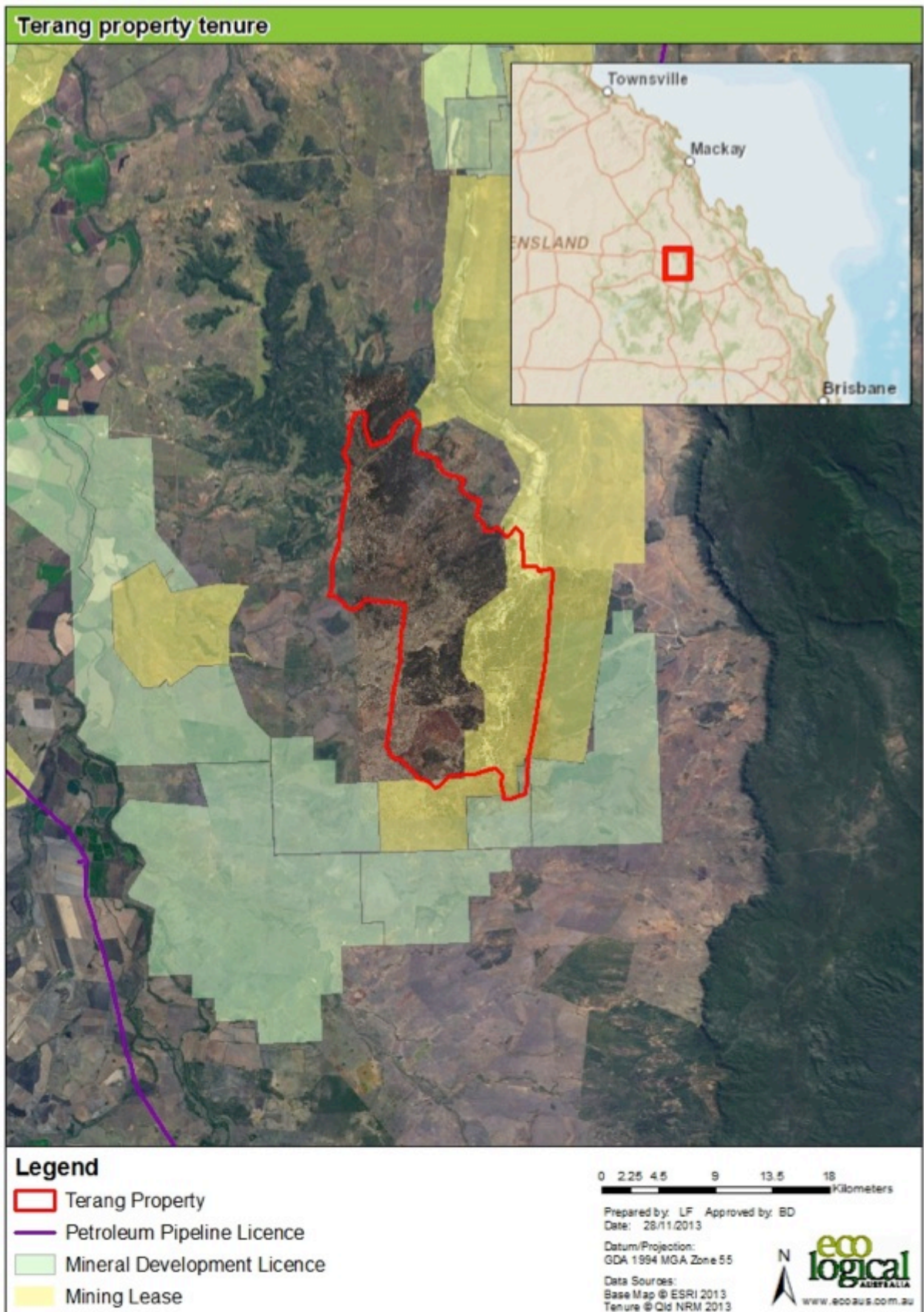


Figure 3-2: Terang property tenure

3.2 OFFSET SITE 1 DESCRIPTION

3.2.1 LOCATION AND SIZE

The Ornamental Snake offset Site 1 is located to the eastern portion of the Terang property and is approximately 57 ha in size (Figure 3-3).

3.2.2 OFFSET VALUES

Site 1 on the Terang property offers key habitat values for Ornamental Snake. In particular, it contains scattered woodland, fallen woody debris, an ephemeral creek line and ground depressions within clay soil, which provide water retention in wet periods. As a result, the area supports an abundance of frog species which are recognised prey for the Ornamental Snake.

Importantly, the site provides similar habitat features to those considered Ornamental Snake habitat within the Dysart Road realignment, including Brigalow regrowth and woodland areas surrounding an ephemeral creek.

The Ornamental Snake has been recorded on Terang approximately 10 km north-west of Site 1 (record from 1995, Atlas of Living Australia 2013) (Figure 3-4). This record occurs within Site 2 of the Terang offset package and is described further in **Section 3.2.5**. Ornamental Snake has also been recorded within the immediate region, particularly to the north and east of Terang.

An analysis of the site's suitability with reference to the species profile information available on the DoE's Species Profile and Threats (SPRAT) database is provided in Table 3-2. Combined with the previous species recorded both within and surrounding Site 1, the information presented below provides a strong indication of the likely use of habitat within Site 1 by the Ornamental Snake.

Table 3-2: Suitability of habitat within Terang property offset Site 1 with reference to the DoE's species profile information

SPRAT profile information	Relevance to offset Site 1
<p>The Ornamental Snake's preferred habitat is within, or close to, habitat that is favoured by its prey - frogs.</p> <p>The most commonly recorded frog species present where Ornamental Snakes occur include [amongst others] the Ornate Burrowing Frog (<i>Opisthodon ornatus</i>), the Broad-palmed Frog (<i>Litoria latopalmata</i>), the Wide-mouthed Frog (<i>Cyclorana novaehollandiae</i>) and the Green Tree Frog (<i>Litoria caerulea</i>)</p>	<p>Site 1 has been found to support an abundance of frogs. As part of monitoring undertaken by BMA of the property's fauna and flora values, the Ornate Burrowing Frog, the Broad-palmed Frog and the Wide-mouthed Frog have all been recorded within the offset area (Austecology, 2011).</p> <p>Rapid surveys by ELA (2013) also recorded the Green Tree Frog.</p> <p>This information indicates that the area provides good foraging resources for the species.</p>
<p>The species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions.</p>	<p>Site 1 contains important habitat features including ground depressions and an ephemeral creek line which provide water retention during wet periods.</p>

SPRAT profile information	Relevance to offset Site 1
	<p>The area contains Brigalow regrowth, woodland areas and fallen debris (similar to the impact site where the species was recorded).</p>
<p>The species is associated with Queensland Regional Ecosystem Land Zone 4. The most common RE's in which the species has been recorded is RE 11.4.3. Other common RE types where the species has been recorded are: 11.4.6, 11.4.8 and 11.4.9. The species has also been recorded in 11.3.3 and 11.5.16.</p>	<p>Site 1 is comprised of mapped RE 11.10.1 and RE 11.3.2/11.3.25 and a smaller area of non-remnant vegetation.</p> <p>While the area does not comprise Land Zone 4, the site is considered to provide likely habitat for the Ornamental Snake. Land Zone 3, the vegetation associated with 11.3.2/11.3.25 and surrounding areas of Brigalow regrowth within the offset site provide important confirmed microhabitat features for the Ornamental Snake including:</p> <ul style="list-style-type: none"> • clay soils which have the ability to hold water for longer periods of time (Austecology, 2011) and can provide shelter for the species; • woodland and Brigalow vegetation, with woody debris which may be used for shelter; • ephemeral creek and ground depressions supporting an abundance of recognised prey frog species. <p>In addition, a search of the Atlas of Living Australia on 13 September 2013 for records of the species across its range showed that the species is associated with a variety of land zones and REs:</p> <ul style="list-style-type: none"> • Most records (87%) within the Brigalow Belt North bioregion are associated with non-remnant habitat. • Those records that do occur within remnant habitat were associated with the following REs: <ul style="list-style-type: none"> ○ 11.11.13/11.3.10 ○ 11.11.15 ○ 11.12.6 ○ 11.3.25 ○ 11.3.27 ○ 11.3.4/11.3.25 ○ 11.5.3/11.3.2 ○ 11.5.3/11.4.8 ○ 11.5.3/11.7.2 ○ 11.5.9/11.5.3 ○ 11.7.2/11.5.18

SPRAT profile information	Relevance to offset Site 1
	<ul style="list-style-type: none"> ○ 11.8.5 <p>This suggests that the presence of suitable microhabitat features may be a more appropriate indicator of habitat suitability compared with RE types or land zones alone. Similarly, the impact site where the species was recorded was within non-remnant habitat containing similar features to those recorded within offset Site 1 (Brigalow regrowth, ground depressions, clay soils and frog habitat).</p>
<p>Important microhabitat features:</p>	
<p>The Ornamental Snake shelters in logs and under coarse woody debris and ground litter (Brigalow Belt Reptiles Workshop 2010).</p>	<p>Site 1 contains good woodland vegetation with associated woody debris.</p>
<p>They are located within the lowest part of the catchment. The Ornamental Snake has been found in greatest numbers in shallow water where some aquatic vegetation is present, or where fringing groundcover vegetation has been inundated, especially in flooded gilgais where the dominant aquatic macrophyte is <i>Monochoria cyanea</i> (Bog Hyacinth) (Agnew 2010 pers. comm.).</p>	<p>Site 1 is along an ephemeral creek line with fringing woodland vegetation. During and after wet periods, the creek and surrounding flood prone clay soils and ground depressions have good capacity to retain water.</p>
<p>They have diversity of gilgai size and depth (if deep, then broad with gently sloping gradients at the sides).</p>	<p>While no gilgai were recorded within Site 1, the necessary habitat features to support the species are present. In particular, good frog habitat, ground depressions and clay soils associated with RE 11.3.25 and woodland vegetation with debris.</p>
<p>There are soils of high clay content and deep-cracking characteristics. Water retention capacity increases with an increase in the fine clay particle fraction of soils. This, in turn, influences certain habitat conditions that are important for the Ornamental Snake and the frog species it preys upon. Cracking clays with higher sand and more sodic cracking clays, often associated with Brigalow / Belah-dominated communities, have a lower fine clay particle fraction and are likely to have lesser water retention capacity.</p>	<p>Site 1 contains RE11.3.2/11.3.25 and is characterized by clay soils confirmed on site (Austecology, 2011).</p>
<p>Ground timber is usually relatively common (especially piles adjacent to or close by to</p>	<p>Site 1 contains fallen woody debris and good</p>

SPRAT profile information	Relevance to offset Site 1
gilgais).	ground cover.
Where burrowing frogs (<i>Cyclorana</i> species) are abundant (see information on the feeding behaviour of the species).	An abundance of frogs have been recorded within Site 1, including the Ornate Burrowing Frog, the Broad-palmed Frog, the Wide-mouthed Frog and the Green Tree Frog, which are all characteristic prey species.
Habitat patches are typically greater than 10 hectares in area and are within, or connected, to larger areas of remnant vegetation.	Site 1 is 57 ha and well connected with remnant vegetation to the north, east and south.



Figure 3-3: Terang Ornamental Snake habitat offset - Site 1

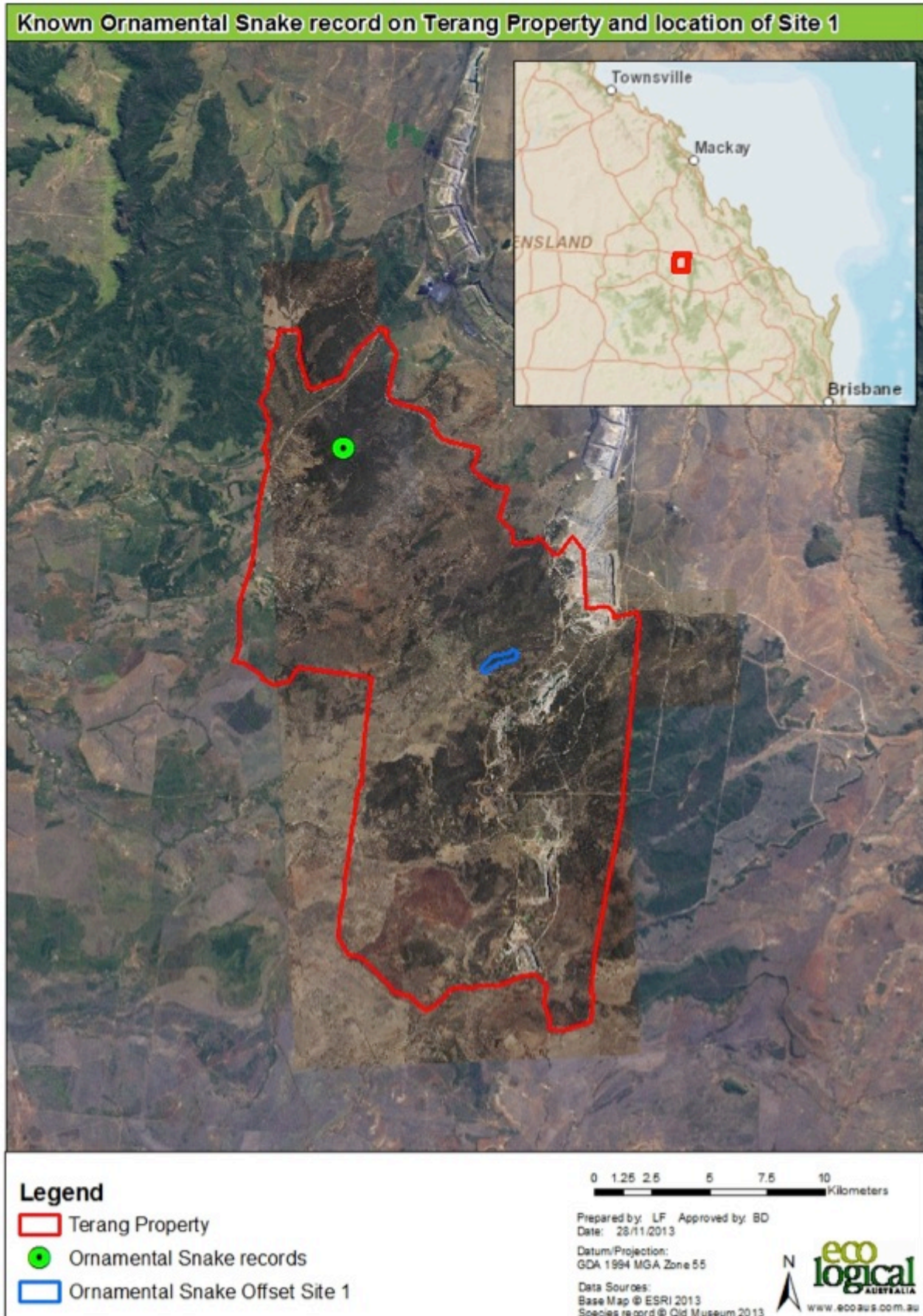


Figure 3-4: Known Ornamental Snake record on Terang property and location of Site 1

3.2.3 EXISTING CONDITION

A field survey involving rapid vegetation quadrats, broad visual vegetation and habitat assessments and target fauna searches was undertaken across the Terang property including Site 1 in May 2013. In addition to these surveys, BMA has undertaken a number of field assessments within areas of the Terang property to monitor its flora and fauna values (Austecology 2012). The May 2013 field survey results of Site 1 are detailed in **Appendix C** of this Offset Management Plan.

Site 1 consists of intact woodland communities dominated by *Eucalyptus populnea* (Poplar Box), *Eucalyptus cambageana* (Dawson Gum) and Brigalow (Photo Plate 3-1 and Photo Plate 3-2). Shrubs included *Alectryon diversifolius* (Holly Bush), *Geijera parviflora* (Wilga) and *Excoecaria dallachyana* (Scrub Poison Tree), and the dominant native ground-layer plants included *Aristida* spp. and *Chloris ventricose* (Plump Windmill Grass). Some areas of the woodland vegetation and creek habitat were degraded by cattle grazing and the presence of exotic *Cenchrus ciliaris* (Buffel Grass).

In the western section of the site the ephemeral creek line is surrounded by non-remnant areas consisting of scattered woodland trees. These degraded and non-remnant areas have the potential to be improved through management to provide additional habitat and connectivity along the ephemeral creek line (Photo Plate 3-3).



Photo Plate 3-1: *Acacia harpophylla* and *Eucalyptus cambageana* overstorey and understorey dominated by native shrubs and grasses in Site 1 of the Terang property



Photo Plate 3-2: Woodland dominated by Eucalyptus populnea adjacent to ephemeral creek line in Site 1 of the Terang property



Photo Plate 3-3: Ephemeral creek line in Site 1 of the Terang property

3.2.4 THREATENING PROCESSES

Existing processes currently operating within Site 1 and threatening existing Ornamental Snake habitat include:

- Grazing – continual grazing of the area, particularly during the wet season resulting in degradation of microhabitat features and alteration of water quality through sedimentation.
- Thinning activities – habitat loss through removal of vegetation and simplification of habitat structure.
- Invasive weeds – exotic coverage recorded at 20% - 60% within Site 1 and comprising *Cenchrus ciliaris* (Buffel Grass), *Harrisia spp.* (Harrisia Cactus), *Bryophyllum spp.* (Mother of Millions) and *Opuntia stricta* (Prickly Pear).
- Potential predation and contact with feral species – based on the condition of some disturbed areas within Site 1, the presence of pest animals including Cane Toads (*Bufo marinus*), Wild Dogs (*Canis familiaris*) and Pigs (*Sus scrofa*) is likely.
- Altered fire regimes – an increase in severity and frequency of fire can result in increased mortality rates; destroy, degrade and fragment habitat; and increase predation through reduced vegetation cover. Terang is heavily vegetated and has a higher bushfire risk.

3.2.5 ADDITIONAL VALUES

In addition, Site 1 provides potential offset values for other MNES, including Brigalow TEC and potential habitat for:

- Dunmall's Snake (*Furina dunmalli*);
- Yakka Skink (*Egernia rugosa*);
- Squatter Pigeon (*Geophaps scripta scripta*);
- Koala (*Phascolarctos cinereus*); and
- South-eastern Long-eared Bat (*Nyctophilus corbeni*).

The presence of *Cadellia pentastylis* (Ooline), which is listed as Vulnerable under the EPBC Act, has previously been recorded within the offset site (Austecology, 2012).

3.3 OFFSET SITE 2 DESCRIPTION

Site 1 alone fulfils the Project's offset requirements for Ornamental Snake (refer to Section 3-4). As such, the site has been treated in detail. Offset Site 2 has been offered to supplement the offset values at Site 1 as it contains a previous record of the Ornamental Snake and provides a direct compensatory link. Consequently, Site 2 has not been addressed in as much detail; however the following sections provide an overview of its values, condition and threatening processes.

3.3.1 LOCATION AND SIZE

Site 2 occurs in the northern portion of the Terang property and surrounds an existing historic record (1995) for the Ornamental Snake (Figure 3-5) (Queensland Museum, 2013). The offset is approximately 44 ha in size.

3.3.2 OFFSET VALUES

The historic record (1995) of the Ornamental Snake within Site 2 was submitted where a preserved specimen and is therefore considered to have a high degree of accuracy in terms of identification.

The record is associated with a remnant drainage line and runs through an area of mapped remnant vegetation (RE 11.7.2 *Acacia* spp. woodland on lateritic duricrust). This RE is not typically associated with the Ornamental Snake. However, the presence of a drainage line is a good indication of suitable habitat and helps to validate the record.

3.3.3 EXISTING CONDITION

The offset site consists of a drainage line in remnant condition.

3.3.4 THREATENING PROCESSES

Existing processes currently operating within Site 2 and threatening Ornamental Snake are considered to be similar to the processes operating within Site 1. Site 2 occurs within a grazing paddock that is managed similarly to the paddock in which Site 1 is located. It also consists of a vegetated drainage line with similar potential to harbour pest animals and weeds.

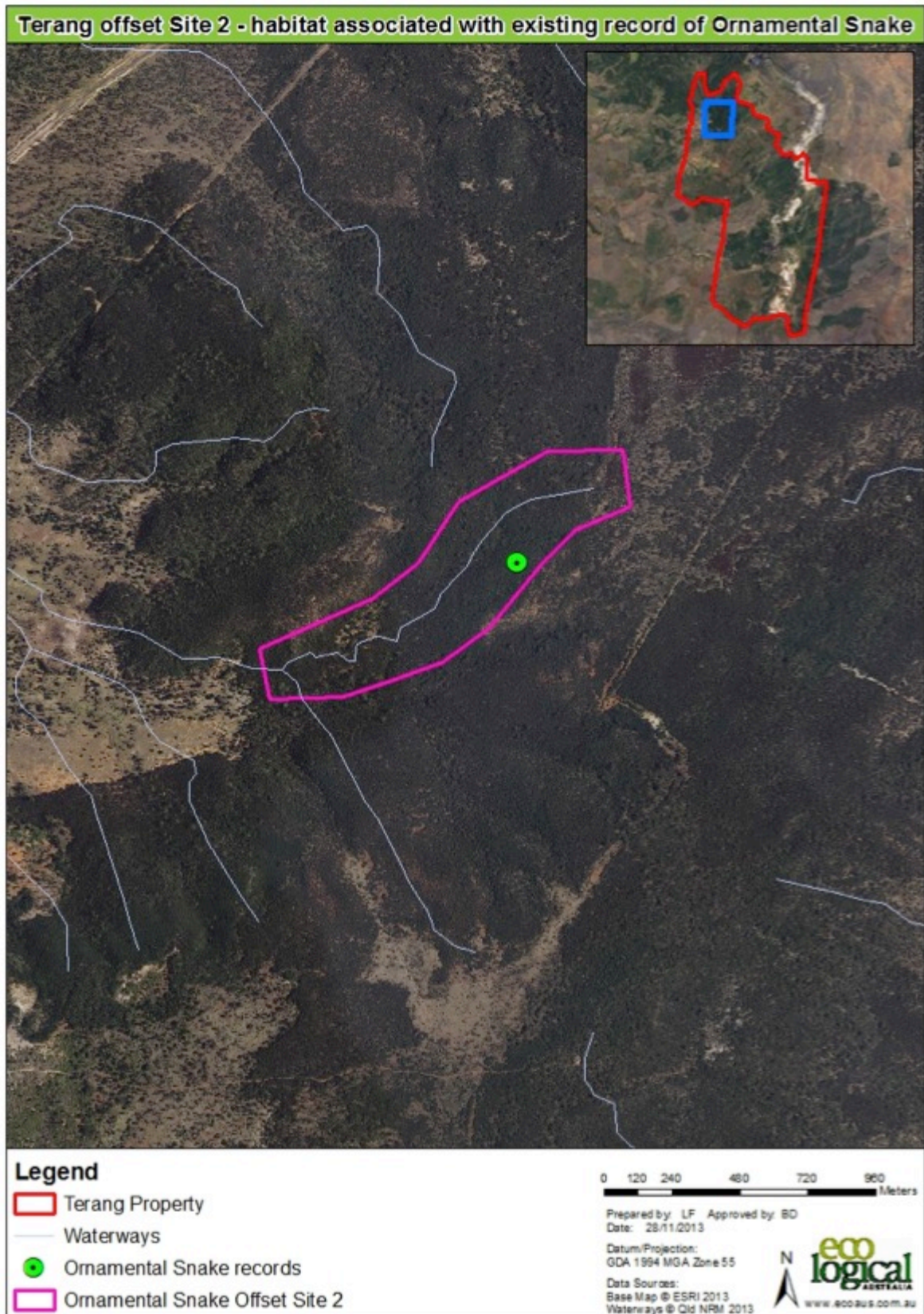


Figure 3-5: Terang offset Site 2 - habitat associated with an existing record of the Ornamental Snake

3.4 OFFSET SUITABILITY FOR ORNAMENTAL SNAKE IMPACTS

Following review of the Offsets Policy and the associated OAG, suggested attribute values for use in the OAG have been generated. The suggested attribute values and scores are provided based on both desktop and on ground assessment of Site 1 (Table 3-3 and Table 3-4).

As demonstrated in the calculations below, in accordance with the Offsets Policy and associated OAG, Site 1 directly offsets 100% of the impact. Given this, the offset is considered to deliver a conservation outcome that will maintain or improve the viability of the affected MNES - Ornamental Snake habitat. Whilst not included in the calculations, the inclusion of Site 2 will also assist in the delivery of this conservation outcome.

Table 3-3: Ornamental Snake habitat - Dysart Road impact site

Attribute	Value/Score	Rationale
Area	10.4 ha	Area of impact to Ornamental Snake habitat within road alignment.
Quality		
Site context	6	Impact site is connected to adjacent habitat.
Site condition	6	Degraded Brigalow vegetation in gilgai landscape and woodland adjacent to creeks.
Species stocking rate	6	One juvenile and one adult are known from the impact site, indicating that populations are breeding.
	6	Rounded average of above three quality component scores.
Total quantum of impacts	6.2	As per OAG calculations.

Table 3-4: Ornamental Snake habitat - Terang property offset Site 1

Attribute	Value/Score	Rationale
Start quality		
Site context	6	Site consists of a creek line that has adjacent woodland along 50% of its length and connected to woodland to the north and south.
Site condition	6	Some woodland areas adjacent to the creek have been cleared.
Species stocking rate	5	Assumed presence based on potential habitat.
	6	Rounded average of above three quality component scores.

Future quality without offset		
Site context	5	Potential for future clearance for grazing, decreasing connectivity along the creek.
Site condition	5	Continued presence of cattle will reduce the quality of vegetation which could impact negatively on frog populations, which are a key prey item for the Ornamental Snake.
Species stocking rate	4	Density of the assumed Ornamental Snake population would fall as habitat continues to degrade and prey items become scarcer.
	5	Rounded average of above three quality component scores.
Future quality with offsets		
Site context	7	Increased buffer along creek line and connectivity to surrounding vegetation. This will help maintain quality of habitat for both frogs and the foraging habitat for the Ornamental Snake.
Site condition	7	Removal of stock will allow microhabitats for frogs to improve and will increase the potential number of prey items for the Ornamental Snake. Less trampling and more woody debris will provide more potential shelter habitat for the Ornamental Snake.
Species stocking rate	6	Assumed density would increase due to the increase in habitat and prey items (frogs).
	7	Rounded average of above three quality component scores.
Confidence in quality scores	60%	Removal of cattle and threats from exotic weeds is likely to increase the ability of frogs to increase in density and an increase in potential shelter habitat for the Ornamental Snake.
Time over which loss is averted	20 years	Maximum of 20 years.
Time until ecological benefit	10 years	Estimate of 3 years for increase in plant diversity, another 3 years for increase in frog diversity and abundance and another 3 years for increase in Ornamental Snake abundance and breeding success (due to better quality habitat and more prey items).
Risk of loss without offset	30%	Habitat is in relatively good condition, so the risk that no offsets would result in loss of species/habitat is relatively low.

Risk of loss with offset	2%	Habitat would be improved with offset and therefore the risk of loss is lower.
Raw gain	2	Difference between future quality without offset score and future quality with offset score.
Confidence in result	75%	Confidence is based on habitat surveys/vegetation mapping of the site.
Adjusted gain	1.2	As per OAG calculations.
Net present value	12.7	As per OAG calculations.
% of impact offset	122.5%	As per OAG calculations.

3.5 SECURITY AND MANAGEMENT

3.5.1 SECURITY

The Ornamental Snake offset sites will be legally secured via a Voluntary Declaration under the VM Act, based on meeting the criteria for an area of high nature conservation value.

3.5.2 AREA MANAGEMENT

This Offset Management Plan, supported by the site specific Terang Offset Area Management Plan, has been prepared to accompany the Voluntary Declaration. It states the management objective and outcomes for the offset area. It identifies the existing condition and current threats. The associated Terang Offset Area Management Plan outlines the potential risks to achieving management outcomes. Management actions required to be undertaken to minimise threats and risks identified are also detailed.

Key management actions outlined in the plan include:

- Increasing the vegetation buffer along the creek line to improve connectivity to surrounding vegetation, enhance potential habitat for frogs and in turn potential foraging habitat for the Ornamental Snake;
- Management of cattle to improve potential microhabitats for frogs and the Ornamental Snake, with less trampling and more woody debris providing further potential shelter habitat for the Ornamental Snake;
- Exclusion of cattle during wet periods; and
- Control of exotic weeds, and pest animals if required, to increase population density of frogs and the Ornamental Snake.
 - Priority pest animals are: Feral Cats, Pigs and, to a lesser degree, foxes. Control of foxes is included, however it is worth noting that fox sightings and presence in the region is generally low due to the species being rare in central and northern Queensland due to unsuitable climate conditions.
 - Weeds of specific concern include: Parthenium (*Parthenium hysterophorus*), Parkinsonia (*Parkinsonia aculeata*), Prickly Acacia (*Acacia nilotica subsp. indica*) Leucaena (*Leucaena leucocephala*) and Buffel Grass (*Cenchrus ciliaris*).

3.5.3 CONSISTENCY WITH RECOVERY PLANS, CONSERVATION ADVICE AND THREAT ABATEMENT PLANS

There is no Recovery Plan currently in place for the Ornamental Snake.

A Draft *Queensland Brigalow Belt Reptile Recovery Plan (2008)* has been developed which includes actions relevant to the Ornamental Snake. The management actions outlined in the Terang Offset Area Management Plan are in line with relevant priority actions in the *Draft Queensland Brigalow Belt Reptile Recovery Plan*, namely:

- Identifying key threats and developing habitat management guidelines for key habitat (Action 1.2);
- Negotiating management agreements for the protection of key habitat areas (Action 1.3); and
- Facilitating community on-ground projects for the protection of habitat across a suite of land tenures, including fencing of remnants to reduce impacts of grazing, weed management and feral predator control (Action 2.1).

There are three Threat Abatement Plans (TAPs) that have relevance to the Ornamental Snake and more specifically to the management of the Terang Offset Area, these are:

- *Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs (2005)*.
- *Threat abatement plan for predation by Feral Cats, (2008)*.
- *Threat abatement plan for predation by the European Red Fox (2008)*.

Relevant Priority Actions from these three TAPs that are relevant to management actions outlined in the Terang Offset Area Management Plan are:

Feral Pigs

- Relevant agencies to verify, as far as practicable, the presence or absence of feral pigs in priority areas;
- Relevant agencies to develop and implement strategies, including surveillance monitoring and contingency plans to remove any pigs found in priority areas. Where, practicable, monitoring should be integrated in other monitoring programs where they exist.
- Specifically address the impact on nationally listed threatened species and ecological communities in priority areas.
- Address other environmental threats in a strategic, coordinated and integrated manner.

Feral Cats

- Identify priority areas for feral cat control based on:
 - the significance of the ecological community or the regional population of the native species threatened by feral cats,
 - the degree of threat posed by feral cats to species or ecological communities relative to other threats,
 - the cost-effectiveness of maintaining feral cat populations below an identified 'threat threshold' in the region, and

- the feasibility of effective remedial action.
- Conduct and monitor regional feral cat control through new or existing programs.

Foxes

- Develop management plans to prevent, monitor and, if incursions occur, contain and eradicate any fox incursion, for 'islands' with high conservation values.
- Implement management plans for high-conservation-value 'islands', including prevention and monitoring actions, and containment or eradication actions if incursions occur.

As is noted in all three TAPs, eradication (that is the permanent removal of every last pig, fox, and cat) with currently available technology is not possible except on islands and in some local areas. Consequently, management actions in the offset areas are aimed at sustainable control of the damage caused by these pest species.

The site specific Terang Offset Area Management Plan for the Ornamental Snake offset sites, including management objectives and descriptions of management actions relevant to the above, is provided in **Appendix A**.

4 INDERI PROPERTY - NATURAL GRASSLANDS TEC OFFSET

4.1 PROPERTY DESCRIPTION

4.1.1 LOCATION

Inderi is located approximately 90 km south east of Emerald and approximately 240 km south of the Dysart Road relocation project in the Bowen Basin, Queensland (Figure 4-1). The property is situated in Central Highlands Regional Council local government area (Table 4-1) and zoned rural under the planning scheme. The total area of the property is approximately 3,033.5 ha (Table 4-1).

Table 4-1: Inderi property details

Property Name	Lot on Plan	Tenure	Local Government Area	Total Area (ha)
Inderi	55 DSN318	Freehold	Central Highlands Regional Council	3,033.5

4.1.2 REGIONAL CONTEXT

The property is within the Brigalow Belt North biogeographic region, the same as the Project. The offset property contains neighbouring woodland and grassland vegetation communities recognised as regionally significant under the Biodiversity Planning Assessment (BPA) for the Brigalow Belt bioregion. The property is flanked to the north east and south west by land recognised as state significant under the BPA for the Brigalow Belt bioregion. Connectivity with remnant vegetation is present to the north, east and south of the property. Albinia National Park and Albinia Conservation Park lie immediately to the south east adjacent to the Dawson Highway and Mount Hope State Forest is approximately 20 km south west of the property (Figure 4-1).

4.1.3 TENURE AND OWNERSHIP

The Inderi property comprises freehold tenure lot owned by a third party. No mineral, mining or petroleum extraction leases occur over the Inderi Property; however these do occur in the surrounding area (Figure 4-2). Xstrata Coal Rolleston Mining Lease (ML70307) and Mineral Development Licence (MDL 227) occurs south of the Dawson Highway directly adjacent to the property. Petroleum Pipeline Licence (PPL) for the Australian Pacific LNG (Origin) gas pipeline also occurs 8.6km west of the property. Petroleum Leases (PL173 and PL42) held by Australian Pacific LNG (Origin) and Santos occur 4.3km north and 18.6km south of the property, respectively.

4.1.4 EXISTING USE

The property is currently used for cattle grazing. There has been a history of cultivation more than a decade ago. These cultivated areas are now extensively established with the fodder plant, Leucaena.

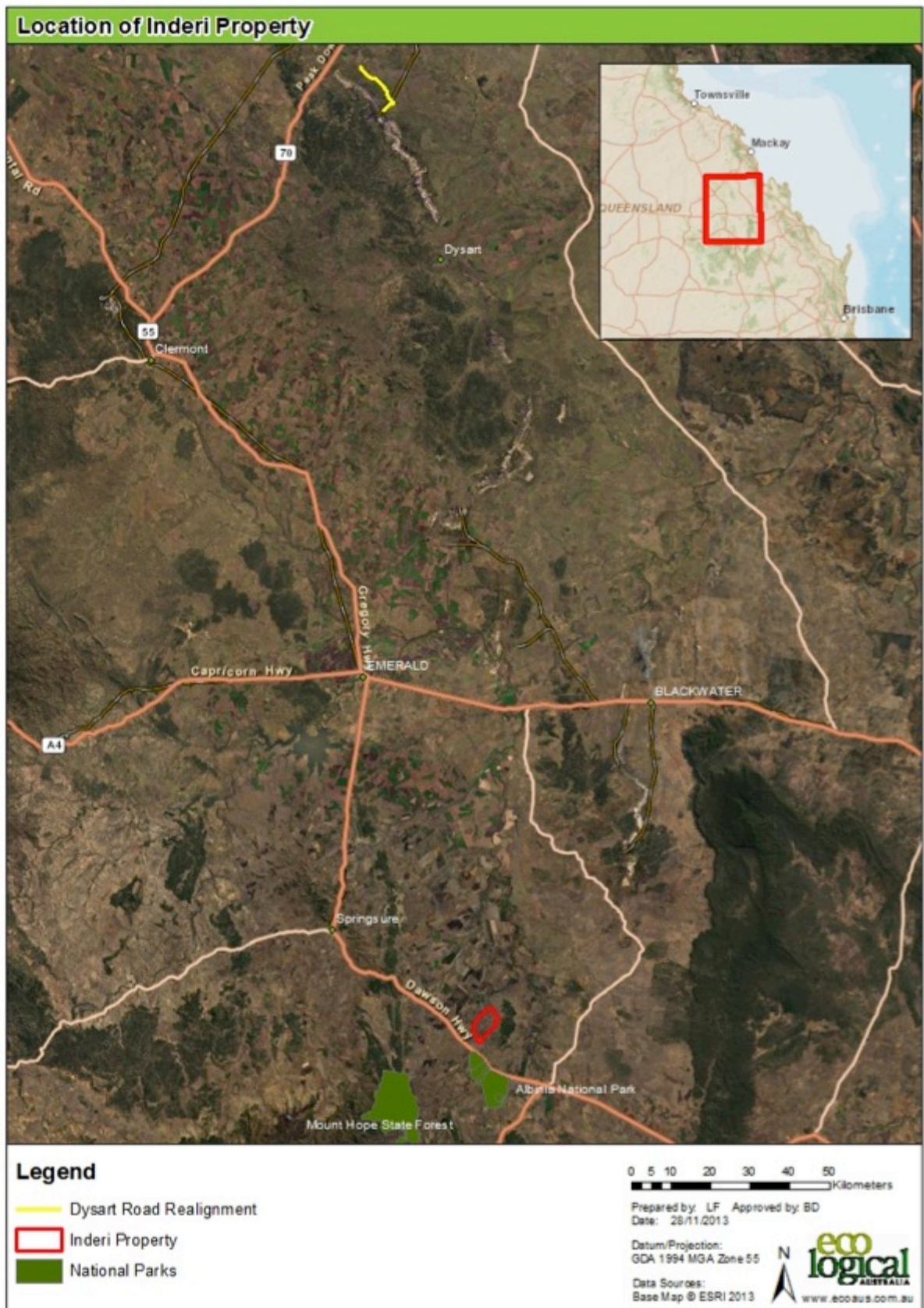


Figure 4-1: Location of the Inderi property

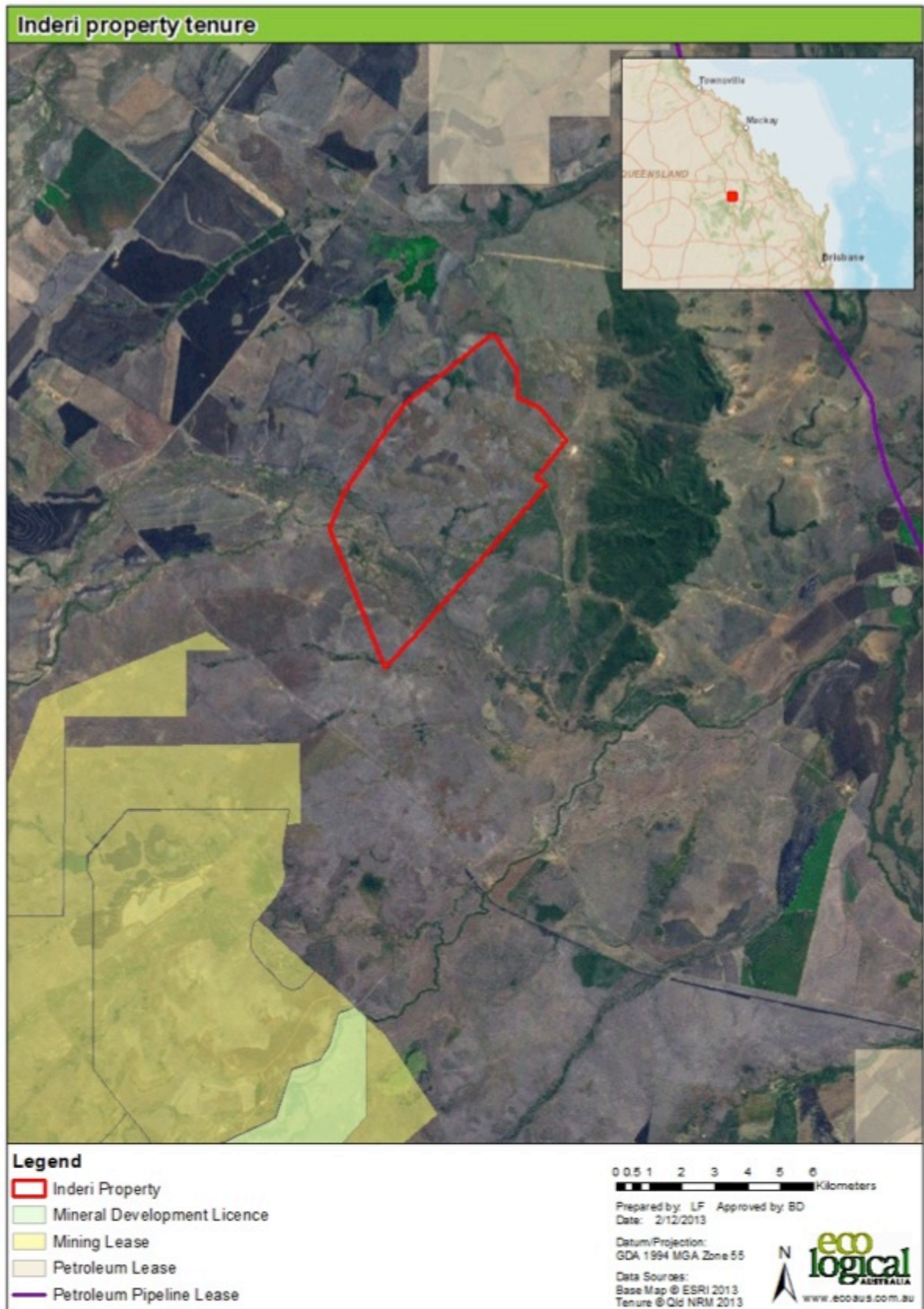


Figure 4-2: Inderi property tenure

4.2 OFFSET SITE DESCRIPTION

4.2.1 LOCATION AND SIZE

The Natural Grassland TEC offset is located in the south-eastern portion of the Inderi property and is 137.2 ha in size (Figure 4-3). Of the 137.2 ha, 67.7 ha comprises the Natural Grassland TEC and 69.5 ha comprises connected woodland areas.

4.2.2 OFFSET VALUES

The offset on Inderi offers grassland that is consistent with the Natural Grassland TEC diagnostic characteristics and condition threshold requirements as outlined in the listing advice (TSSC 2008a). The Natural Grassland TEC within the offset area can be described as consisting of:

- Grassland on colluvial slopes (<3%) of self-mulching vertisols derived from basalt. Dominant grassland species are *Dichanthium sericeum*, *Panicum decompositum*, *Panicum queenslandicum*, *Aristida leptopoda* and *Bothriochloa erianthoides* (RE 11.8.11); and
- Grassland with scattered presence of *Eucalyptus orgadophila* (Mountain Coolibah) and *Corymbia erythrophloia* (Gum-topped Bloodwood) on flat-topped basalt rises with ferrosols and self-mulching vertisols. Dominant grassland species are *Dichanthium sericeum*, *Panicum queenslandicum*, and *Heteropogon contortus* (RE 11.8.11).

A shrub layer is predominantly absent across the Natural Grassland TEC; however where noted as a minor component (1% coverage) *Acacia salicina* (Sally Wattle) was found to be the dominant species. A canopy layer is sometimes present; however coverage is low and ranges from 1% - 7%. Dominant species include Mountain Coolibah and Gum-topped Bloodwood.

The landscape processes operating within the offset site and across the broader Inderi property have created the landform and soil type that are typical for naturally derived native grassland communities (Photo Plate 4-1). The natural origin of grassland within the offset site has been confirmed through analysis of 1960 aerial imagery.



Photo Plate 4-1: A shallow gully on the Inderi property offset site which shows the friable self-mulching vertisol typical of naturally derived grasslands.



Figure 4-3: Inderi property Natural Grassland TEC offset site

4.2.3 EXISTING CONDITION

A field survey involving vegetation survey plots to assess Natural Grassland TEC key diagnostic characteristics and condition threshold parameters was undertaken across the Inderi property, including the offset site in September 2013. The field survey results of the offset site (survey site G7 and G8) are detailed in **Appendix D** of this Offset Management Plan.

The grassland at survey site G7 (Figure 4-2) is dominated by *Panicum decompositum* and *Panicum queenslandicum* on shallow/rocky in situ soils on basalt. Groundcover is approximately 77% and ranges from 0.2 m to 1.5 m in height (Photo Plate 4-2). The grassland at survey site G8 (Figure 4-2) is dominated by *Dichanthium sericeum* on deep cracking vertisol on basalt slopes. Groundcover is approximately 71% and height ranges from 0.1 m to 0.5 m (Photo Plate 4-3). The offset site shows evidence of minor to moderate grazing disturbance. Weed incursion is absent or low. In accordance with the TEC condition threshold classes outlined in the listing advice (TSSC 2008a), Natural Grassland TEC within the offset site ranges from 'good' to 'best' quality.

The Commonwealth Listing Advice on Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin (TSSC 2008a) recommends that surveys for Natural Grasslands TEC be undertaken within two months of effective rain. The survey undertaken by Eco Logical Australia from 2-7 September 2013 was in the driest season of the year (spring). It is therefore likely that 'good' quality areas would be reclassified as 'best quality' if surveyed under more favourable conditions.

Conversations with local landholders indicate that within recent decades these grasslands have been heavily grazed. Consequently it is likely that there is a greater presence of 'increaser species' such as *Aristida* spp. than would be naturally expected. Basalt grasslands generally have a strong capacity to regenerate with native species to the exclusion of exotic grass species, particularly where exotic species such as Purple Pigeon Grass (*Setaria* spp.) have not been sown, which is the case for the offset site.



Photo Plate 4-2: Grassland at survey site G7 on the Inderi property offset site, with an occasional occurrence of trees, is located on a flat topped basalt rise. Regional Ecosystem changes from grassland (RE 11.8.11) to Mountain Coolibah/Bloodwood grassy woodland in the distance to the south (RE 11.8.5).



Photo Plate 4-3: Grassland at survey site G8 on the Inderi property offset site showing a distinct woodland/grassland boundary to the left and right of the image. That the woodland/grassland boundary follows a contour line is a strong indication that this boundary is a naturally occurring feature and not the result of past clearing.

4.2.4 THREATENING PROCESSES

Existing processes currently operating within the offset site and threatening existing Natural Grassland TEC include:

- Grazing – continual grazing of the area resulting in a composition change to ‘increaser species’ from the *Aristida* genus, and reduced groundcover increasing the risk of erosion and weed incursion.
- Drought – compound the effects of grazing.
- Fire – frequency and/or severe natural fires can result in the loss of grassland areas.

Whilst not an existing threat in the offset site, the colluvial slopes are well suited to the establishment of the exotic fodder plant *Leucaena leucocephala* (*Leucaena*). To the south-west there are considerable areas of *Leucaena* planted, and ground prepared for further planting.

4.2.5 ADDITIONAL VALUES

Potential occurrence of King Bluegrass was observed within some areas of Natural Grassland TEC offset site; however no complete specimens were able to be collected for confirmation with the Queensland Herbarium due to the dryness of the season. If either King Bluegrass or Finger Panic Grass are found within the Project alignment during the pre-clearance survey in January 2014 (refer to Section 5), their potential occurrence on the Inderi property offset site will also be investigated during this time.

The offset site also comprises 69.5 ha of connectivity woodland areas. Table 4-2 provides a description of the field verified regional ecosystems (RE) and their class as defined under the VM Act. The woodland areas within the offset site provide connectivity with neighbouring regionally significant vegetation communities recognised under the BPA for the Brigalow Belt Bioregion.

Table 4-2: Description of ground-truthed RE’s within the Inderi property Natural Grassland TEC offset site

RE ID	RE Description	VM Act Class/ Biodiversity Status	Area (ha)
11.4.2	<i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp. grassy or shrubby woodland on Cainozoic clay plains	Of concern / Of concern	20.5
11.8.5	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks	Least concern / No concern at present	49.0
11.8.11a	<i>Melaleuca bracteata</i> woodland drainage depressions; occurs in drainage depressions	Of concern / Of concern	0.03
Total			69.5

4.3 OFFSET SUITABILITY FOR NATURAL GRASSLAND TEC IMPACTS

Following review of the Offsets Policy and the associated OAG, suggested attribute values for use in the OAG have been generated. The suggested attribute values and scores are provided based on both desktop and on ground assessment of the offset site (Table 4-3 and Table 4-4).

As demonstrated in the calculations below, in accordance with the Offsets Policy and associated OAG, the offset site directly offsets 100% of the impact. Given this, the offset is considered to deliver a conservation outcome that will maintain or improve the viability of the affected MNES – Natural Grassland TEC.

Table 4-3: Natural Grasslands TEC - Dysart Road impact site

Attribute	Value/Score	Rationale
Area	10.2 ha	Area of impact Natural Grasslands TEC within road alignment.
Quality		
Site context	6	Impact site is connected to adjacent habitat.
Site condition	6	Grassland meeting condition requirements of Natural Grasslands TEC is present within road alignment.
Species stocking rate	6	Number of different species populations, overall species viability or community extent.
	6	Rounded average of above three quality component scores.
Total quantum of impacts	6.12	As per OAG calculations.

Table 4-4: Natural Grasslands TEC – Inderi property offset site

Attribute	Value/Score	Rationale
Start quality		
Site context	7	80% of the offset site adjoins neighbouring woodland and grassland vegetation communities recognised as Regionally Significant under the State Biodiversity and Planning Assessment mapping (BPA). Neighbouring grassland vegetation also meets the condition threshold for the Natural Grasslands TEC. A large remnant area recognised as State Significant under BPA also occurs east of the offset site and neighbouring vegetation. Direct connectivity between the offset site is limited to narrow vegetated linkages; however proximity to the area is high (200 m). This remnant area forms

Attribute	Value/Score	Rationale
		part of a larger landscape network that connects to Albinia Downs National Park (approximately 8.4 km south of offset site) via the Meteor Creek Bioregional Corridor.
Site condition	6	<p>The TEC Condition Class for the offset site ranges from good to best as per the prescribed condition threshold criteria outlined in the Natural Grassland TEC listing advice (TSSC 2008a). Native grass tussock number is greater than 200 per 50 m x 20 m plot, and species diversity of perennial native grass indicator species as per the listing advice (TSSC 2008a) ranges from three to six across the offset site. The potential presence of <i>Dichanthium queenslandicum</i> was also recorded within the offset site.</p> <p>No evidence of perennial or annual weed incursion was present at the time of the survey; however grazing disturbances were observed in some areas. Within disturbed areas ground coverage and structure was found to be slightly below the average parameters listed in the EHP published technical description for the grassland type RE 11.8.11). Gully erosion was also present on slopes due to decreased groundcover in previous seasons. With current levels of groundcover minimal further erosion would be expected.</p>
Species stocking rate / community viability	8	Historical aerals from the 1960's and 1980's indicate that the Inderi property has been utilised for both cultivation and grazing purposes for the last 50 years. Sheep and cattle grazing would have occurred since the first European presence in the 1850-60s. During this time natural grasslands both across the property and within the offset site have persisted.
	7	Rounded average of above three quality component scores.
Future quality without offset		
Site context	6	Potential for further grassland degradation through increased grazing or Leucaena cultivation, as well as future clearance within woodland areas for pasture improvement. This will decrease connectivity between the surrounding mosaic of Natural Grasslands TEC

Attribute	Value/Score	Rationale
		and woodland areas within the Inderi property, and the greater landscape network, including the Albinia Downs National Park.
Site condition	5	Continued presence of cattle could reduce the quality and integrity of grassland below the TEC condition thresholds. Native grass and forb species diversity and coverage could decrease allowing for the area to become susceptible to secondary impacts associated with soil erosion and weed incursion, particularly Parthenium which is prolific in some areas within the property. Potential population of <i>Dichanthium queenslandicum</i> could also be heavily impacted upon by grazing and significantly reduced or removed.
Species stocking rate / community viability	8	Natural grasslands have persisted across the property. Therefore the community's ability to regenerate, if provided with the opportunity, is considered to be high and will remain unchanged.
	6	Rounded average of above three quality component scores.
Future quality with offsets		
Site context	8	Through quality improvement actions and increased protection measures, there will be greater connectivity between the mosaic of Natural Grasslands TEC and woodland areas within the Inderi property, and the surrounding landscape network. The offset site will maintain a linkage between the Inderi property and surrounding remnant areas, which connect to the Albinia Downs National Park.
Site condition	8	Management of cattle stocking rates and the prevention of weed incursion will allow for the natural grassland to regenerate and potential threatened species to recover. Species diversity and coverage will increase.
Species stocking rate / community viability	9	The integrity of the Natural Grasslands TEC within the offset site will increase creating a robust community and a source of native grass species diversity for surrounding natural grassland areas. Potential population of <i>Dichanthium queenslandicum</i> will expand and persist within the community.

Attribute	Value/Score	Rationale
	8	Rounded average of above three quality component scores.
Confidence in quality scores	65%	Grazing activities are currently impacting on the quality and integrity of the Natural Grasslands TEC within the offset site. Initial removal of cattle and subsequent management of stocking rates is likely to increase native grass and forb species diversity and cover, including potentially occurring <i>Dichanthium queenslandicum</i> .
Time over which loss is averted	20 years	Maximum of 20 years.
Time until ecological benefit	10 years	Estimate of 5 years for increase in plant diversity and cover, and another 5 years for the recovery of a sustainable population of <i>Dichanthium queenslandicum</i> . This time frame considers both seasonal and unseasonal dry periods where growth and recovery rates would be diminished.
Risk of loss without offset	20%	<p>The majority of the Natural Grasslands TEC is in good condition with only portions in the order of 20% adversely affected by cattle grazing. If continued to be grazed at current rates these areas could become heavily eroded or invaded by Parthenium, which could convert this portion of the Natural Grasslands TEC areas to a modified grazing paddock with minimal remaining elements of the TEC.</p> <p>In addition the soil structure and type as well as topographical position of the Natural Grasslands TEC within the offset site make this area highly suitable to Leucaena cultivation. This is demonstrated both historically and recently within other portions of the property where grasslands of similar soil composition and topographical positioning have been completely converted to cultivation. These areas range from 50 ha to 90 ha and no longer retain any natural elements of the previous grassland community. Leucaena cultivation is an existing rural activity within the property.</p>
Risk of loss with offset	3%	<p>Offset site will be secured and protected in perpetuity via a Voluntary Declaration under the VM Act with attached management requirements.</p> <p>No Mineral Development Licences, Mining Leases, Petroleum Leases or Pipeline Licences</p>

Attribute	Value/Score	Rationale
		occur over or in close proximity to the offset site.
Raw gain	2	Difference between future quality without offset score and future quality with offset score.
Confidence in result	65%	Confidence is based on the vegetation survey across the property, which was undertaken during less favourable conditions for Natural Grasslands TEC.
Adjusted gain	1.30	As per OAG calculations.
Net present value	10.60	As per OAG calculations.
% of impact offset	173.22%	As per OAG calculations.

4.4 SECURITY AND MANAGEMENT

4.4.1 SECURITY

The offset site for Natural Grasslands TEC, will be legally secured via a Voluntary Declaration under the VM Act, based on meeting the criteria for an area of high nature conservation value.

4.4.2 AREA MANAGEMENT

This Offset Management Plan, supported by the site specific Inderi Offset Area Management Plan, has been prepared to accompany the Voluntary Declaration. It states the management objective and outcomes for the offset area. It identifies the existing condition and current threats. The associated Inderi Offset Area Management Plan outlines the potential risks to achieving management outcomes. Management actions required to be undertaken to minimise threats and risks identified are also detailed.

Key management actions outlined in the plan include:

- Management of grazing;
- Management to ensure that the *Leucaena* planted to the south west of the offset site does not migrate and establish within the offset site;
- Control of exotic weeds, to maintain the condition and quality of the Natural Grasslands TEC. Potential weeds of specific concern include: *Parthenium* (*Parthenium hysterophorus*), *Parkinsonia* (*Parkinsonia aculeata*), Prickly Acacia (*Acacia nilotica subsp. indica*) *Leucaena* (*Leucaena leucocephala*) and *Buffel Grass* (*Cenchrus ciliaris*); and
- Control of pest animals as required, to limit damage to grassland areas. The pest animals of most concern are feral pigs as they can disturb vegetation cover and landforms leading to erosion and weed infestations.

4.4.3 CONSISTENCY WITH RECOVERY PLANS, CONSERVATION ADVICE AND THREAT ABATEMENT PLANS

A Recovery Plan for this TEC is not currently available, however, “*Approved Conservation Advice for Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin*” has been developed. The management actions outlined in the Inderi Offset Area Management Plan are in line with relevant findings and actions in this conservation advice, namely:

- The main identified threats to the Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin ecological community are: grazing, cropping and pasture improvement; weeds and pest animals; mining activities; construction of roads and other infrastructure.
- Avoid mowing and slashing during peak flowering season from spring to summer.
- Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on the ecological community.
- Investigate and implement formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure.
- Develop and implement management plans for the eradication of weeds such as Parthenium (*Parthenium hysterophorus*), Parkinsonia (*Parkinsonia aculeata*), Prickly Acacia (*Acacia nilotica subsp. indica*) and Buffel Grass (*Cenchrus ciliaris*).
- Manage sites to prevent introduction of invasive weeds, which could become a threat to the ecological community, using appropriate methods.
- Grazing management should focus on maintaining a good cover of perennial grasses and legumes, especially the most palatable species and carrying vegetation cover through the driest years.
- Manage known sites on private property to ensure appropriate cattle and sheep grazing regimes are conducted outside the growing season, i.e. when plants are not fertile.
- Provide and/or promote incentives for good management.
- Where possible, use an intermittent grazing regime in preference to burning. Avoid burning (or grazing or slashing) during peak flowering season (spring to summer).

The *Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs* (2005) has relevance to the management of the Inderi Offset Area. Relevant Priority Actions from this Feral Pig TAP that are relevant to management actions outlined in the Inderi Offset Area Management Plan are:

- Relevant agencies to verify, as far as practicable, the presence or absence of feral pigs in priority areas;
- Relevant agencies to develop and implement strategies, including surveillance monitoring and contingency plans to remove any pigs found in priority areas. Where, practicable, monitoring should be integrated in other monitoring programs where they exist.
- Specifically address the impact on nationally listed threatened species and ecological communities in priority areas.
- Address other environmental threats in a strategic, coordinated and integrated manner.

As is noted in the Feral Pig TAP, eradication (that is the permanent removal of every last pig) with currently available technology, is not possible except on islands and in some local areas. Consequently, management actions in the offset areas are aimed at sustainable control of the damage caused by this pest species. While of a secondary order, management actions related to other pest species, particularly foxes and feral cats, are also included in the Inderi Offset Area Management Plan

The site specific Inderi Offset Area Management Plan for the Natural Grassland TEC offset site, including management objectives and descriptions of management actions relevant to the above, is provided in **Appendix B**.

5 SUMMARY OF OFFSET SUITABILITY AND COMPLIANCE

For the Dysart Road relocation project, residual significant impacts are considered likely for:

- 10.4 ha of habitat for Ornamental Snake (*Denisonia maculata*), listed as vulnerable under the EPBC Act; and
- 10.2 ha of Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin threatened ecological community (Natural Grasslands TEC) listed as endangered under the EPBC Act.

To compensate for these residual significant impacts, this Offset Management Plan has outlined BMA's commitments to providing suitable offsets in accordance with the EPBC Act Offsets Policy and complying with the Project approval conditions (EPBC 2013/6868). The supporting Offset Area Management Plans demonstrate the monitoring and management commitments as outlined in the Assessment Documentation.

Ornamental Snake habitat impacts will be offset by two components:

1. Approximately 57 ha of suitable habitat confirmed through ground truthing within BMA's Terang property (Site 1).
2. Approximately 44 ha of additional land within the Terang property to protect an area surrounding a known record for the species (Site 2).

The offset sites will be legally secured to ensure ongoing protection and managed to enhance habitat, increase connectivity and occupancy. This offset for Ornamental Snake will also provide additional environmental benefits by enhancing the existing Brigalow TEC and improving potential habitat for other MNES including Dunmall's Snake, Yakka Skink, Squatter Pigeon, Koala and South-eastern Long-eared Bat.

Natural Grassland TEC impacts will be offset by 67.7 ha of grassland within the Inderi property consistent with RE 11.8.11 (one of the Queensland RE's recognised as Natural Grasslands TEC (TSSC 2008a)). The offset site will be legally secured to ensure ongoing protection and managed to maintain its ecological values and functions. This offset for Natural Grassland TEC will also provide additional environmental benefits by protecting broader landscape connectivity values through the inclusion of 69.5ha of surrounding woodland areas.

The Project offsets directly offset more than 100% of the impact in accordance with the OAG based on the suggested attribute values and scores derived from field surveys and assessment. Therefore, the offsets are considered to deliver a conservation outcome that will maintain or improve the condition and viability of Ornamental Snake habitat and Natural Grasslands TEC.

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APPENDIX A – TERANG OFFSET AREA MANAGEMENT PLAN

APPENDIX B – INDERI OFFSET AREA MANAGEMENT PLAN

APPENDIX C – TERANG OFFSET SITE SURVEY RESULTS

Table A- 1: Rapid vegetation quadrat assessment data

Site No.	Dominant Canopy Species	Dominant Mid-story Species	Dominant Understory Species	Comments
1*	<i>Acacia harpophylla</i>	<i>Alectryon diversifolius</i>	<i>Aristida</i> spp.	Native – 60% Exotic – 20% Litter – 10% Bare – 10%
		<i>Geijera parviflora</i>	<i>Cenchrus ciliaris</i> [#]	
		<i>Excoecaria dallachyana</i>	<i>Chloris ventricosa</i>	
12	<i>Eucalyptus populnea</i>	<i>Acacia harpophylla</i>	<i>Aristida</i> sp.	Native – 10% Exotic – 60% Bare – 10% Litter – 20%
			<i>Chloris ventricosa</i>	
			<i>Cenchrus ciliaris</i> [#]	
			<i>Eriochloa australiensis</i>	

Note: * - this site is also a full floristic quadrat assessment site and full data is shown in Table A-2 below. # - exotic species

Table A- 2: Full floristic quadrat assessment data

Species Name	Common Name	Q1
<i>Abutilon oxycarpum</i>	Flannel Flower	3
<i>Acacia harpophylla</i>	Brigalow	4
<i>Alectryon diversifolius</i>	Holly Bush	4
<i>Alectryon</i> sp.		2
<i>Aristida</i> sp.		4
<i>Brunoniella australis</i>	Blue Trumpet	2
<i>Capparis lasiantha</i>	Nepine	2
<i>Cenchrus ciliaris</i> [*]	Buffel Grass	4
<i>Cheilanthes sieberi</i>	Mulga Fern	3
<i>Chloris ventricosa</i>	Plump Windmill Grass	5
<i>Cyperus difformis</i>		3
<i>Desmodium triflorum</i>	Desmodium	1
<i>Dissocarpus paradoxus</i>	Cannonball Burr	3
<i>Einadia nutans subsp. linifolia</i>		1
<i>Enteropogon acicularis</i>	Curly Windmill Grass	2
<i>Excoecaria dallachiana</i>	Scrub Poison Tree	2

Species Name	Common Name	Q1
<i>Geijera parviflora</i>	Wilga	1
<i>Glycine tabacina</i>	Creeping Glycine	4
<i>Jasminum didymum</i>	Jasmine	2
<i>Malvastrum</i> sp.		1
<i>Oplismenus aemulus</i>	Basket Grass	4
<i>Opuntia stricta</i> *	Prickly Pear	3
<i>Panicum queenslandicum</i>	Coolabah Grass	2
<i>Paspalidium caespitosum</i>	Brigalow Grass	4
<i>Phyllanthus virgatus</i>		2
<i>Plectranthus parviflorus</i>	Cockspur Flower	1
<i>Sclerolaena muricata</i>	Black Rolypoly	1
<i>Sporobolus caroli</i>	Fairy Grass	3
<i>Tribulus terrestris</i>	Caltrop	1

Table A- 3: Fauna species list

Scientific Name	Common Name
Aves	
<i>Corvus orru</i>	Torresiana Crow
<i>Cracticus nigrogularis</i>	Pied Butcherbird
<i>Cracticus tibicen</i>	Australian Magpie
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler
Reptiles	
<i>Suta suta</i>	Curl Snake
<i>Ctenotus robustus</i>	Eastern Striped Skink
<i>Heteronotia binoei</i>	Bynoe's Gecko
Amphibians	
<i>Litoria caerulea</i>	Australian Green Tree Frog
Mammals	
<i>Macropus gigantus</i>	Eastern Grey Kangaroo
<i>Bos primigenius</i>	Cattle

Table A- 4: Koala habitat assessment

Site No.	Canopy Species	Cover %	Ground Veg %	Bare Ground %	Leaf Litter %	Surface Water	Distance to Surface Water	Evidence of Dogs
2	<i>E. populnea</i>	10	70%	25	5	Ephemeral creek on site	2km	Yes

APPENDIX D – INDERI OFFSET SITE SURVEY RESULTS

Table B- 1: Natural Grasslands TEC assessment

Condition Attribute	Survey Site	
	G7	G8
Patch Size (ha)	67.7	
No. Indicator Species	3	6
<i>Aristida latifolia</i>		
<i>Aristida leptopoda</i>		1
<i>Astrebla elymoides</i>		
<i>Astrebla lappacea</i>		
<i>Astrebla squarrosa</i>		
<i>Bothriochloa erianthoides</i>		1
<i>Dichanthium queenslandicum</i>		
<i>Dichanthium sericeum</i>	1	1
<i>Eriochloa crebra</i>		1
<i>Panicum decompositum</i>	1	1
<i>Panicum queenslandicum</i>	1	1
<i>Paspalidium globoideum</i>		
<i>Thellungia advena</i>		
Tussock Cover	>200	>200
Woody Shrub Cover (%)	0	0
Canopy Cover (%)	5	0
<i>Eucalyptus orgadophila</i>	1	
Introduced Perennial non-woody Cover (%)	0	0
Quadrat 1	0	0
Quadrat 2	0	0
Quadrat 3	0	0
Quadrat 4	0	0
Quadrat 5	0	0
TEC Condition Class	Good	Best
Analogous RE	11.8.11	11.8.11

Condition Attribute	Survey Site	
Natural Grassland Origin	Confirmed in 1960 aerials	Confirmed in 1960 aerials
Dominant Species	<i>Panicum decompositum</i> and <i>Panicum queenslandicum</i>	<i>Dichanthium sericeum</i>
Landform	Shallow / rocky in situ soils on basalt crest on Waterford system	Deep cracking vertisol on basalt slopes on Oxford system
Groundcover structure	77.4% and 0.2 - 1.5m height	70.8% and 0.1 - 0.5m height
Additional Quality Comments	Minor grazing disturbances	Moderate grazing disturbances and gully erosion
	Comparable groundcover structure to EHP RE technical description (11.8.11)	Below parameters for groundcover structure listed in the EHP RE technical description (11.8.11)
Additional Values	Potential occurrence of <i>Dichanthium queenslandicum</i> and mosaic of RE11.8.5 and RE11.4.2 (Of Concern)	
Existing Threats	None	Grazing
Potential Threats	Increased grazing pressures	Leucana cultivation and increased grazing pressures
Site Context	Offset area adjoins neighbouring woodland and grassland vegetation communities recognised as regionally significant under BPA. A large remnant area recognised as State Significant under BPA occurs east of the offset area. Direct linkage between the offset area is reduced to narrow vegetated linkages; however proximity to the area is high (200m). This remnant area forms part of a larger landscape network that connects to Albinia Downs National Park via Meteor Creek Bioregional Corridor.	
Management Requirements	Fencing and controlled grazing	