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# Ecology Assessment Report

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***Vegetation Assessment and Predictive MNES Fauna Habitat Mapping for Springwater, Lot 8 on Plan SP261936, Fairview Gas Field.***

Compiled by BOOBOOK for Santos

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## Executive Summary and Caveat

This report provides a description of selected ecological values documented during a desktop assessment and preliminary field survey undertaken by BOOBOOK Ecological Consulting (BOOBOOK) at Springwater Holding (hereafter referred to as 'the Site') from 3 -14 August 2015. The Site is a 12,636 ha grazing property described as Lot 8 on Plan SP261936 and is located approximately 46 km east-northeast of Injune, southern inland Queensland. The ecological assessment was originally conducted to assist Santos in determining the Site's value in terms of meeting offset requirements of disturbances associated with Santos Gladstone Liquefied Natural Gas (GLNG) projects in Queensland (BOOBOOK 2015a). As such this report focuses on vegetation mapping and predictive Matters of National Environmental Significance (MNES) threatened fauna mapping.

The desktop and field assessment included identification of remnant and regrowth regional ecosystems (RE), condition assessment (using the BioCondition methodology) and fauna habitat values assessment. BioCondition assessments were completed at 23 sites which were pre-selected within Queensland government mapped regional ecosystem types or subsequent to field assessment of vegetation at the Site.

A desktop review of aerial imagery and ground-truthing detected 14 RE types at the Site. Note that not all vegetation was ground-truthed hence confidence ratings were applied to each RE polygon (refer to spatial data associated with this report). Confidence ratings applicable to vegetation polygons should be checked prior to the use of this mapping for planning purposes. Further on-ground assessments may be required within areas having low levels of confidence.

The presence of two Threatened Ecological Communities (TECs) was confirmed these being:

- ✦ Brigalow (*Acacia harpophylla* dominant and co-dominant): 635.9 ha; and
- ✦ Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions: 249.5 ha.

Areas of young regrowth of Brigalow (124.3 ha) and young and advanced regrowth of semi-evergreen vine thicket (SEVT) (142.6 ha) were identified which may represent future potential TEC with appropriate rehabilitation and management.

No comprehensive fauna surveys were performed under this Scope of Works. Fauna surveys were limited to incidental observations at BioCondition assessment sites. One fauna species listed as vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999) and *Nature Conservation Act 1992* (NC Act) was detected during the field survey this being Squatter Pigeon (*Geophaps scripta scripta*).

Fauna habitat and likelihood of occurrence assessments were conducted for 16 threatened fauna species nominated by Santos for consideration under the Scope of Works. This assessment considered that habitat is potentially suitable for 13 of the nominated species at the Site acknowledging that three of these species (Northern Quoll, Eastern Star Finch and Black-throated Finch) are or are likely to be locally extinct:

- ✦ *Dasyurus hallucatus* (Northern Quoll) – 6782.0 ha;
- ✦ *Chalinolobus dwyeri* (Large-eared Pied Bat, Large Pied Bat) – 6782.0 ha;
- ✦ *Nyctophilus corbeni* (South-eastern Long-eared Bat) – 6782.0 ha;
- ✦ *Botaurus poiciloptilus* (Australasian Bittern) – 257.3 ha;
- ✦ *Geophaps scripta scripta* (Squatter Pigeon (Southern)) – 6296.8 ha;
- ✦ *Erythrotriorchis radiatus* (Red Goshawk) – 6782.0 ha;
- ✦ *Neochmia ruficauda ruficauda* (Eastern Star Finch) – 257.3 ha;
- ✦ *Poephila cincta cincta* (Black-throated Finch) – 257.3 ha;
- ✦ *Rostratula australis* (Australian Painted Snipe) - 257.3 ha;
- ✦ *Turnix melanogaster* (Black-breasted Button-quail) – 481.5 ha;
- ✦ *Delma torquata* (Collared Delma) – 6039.5 ha;
- ✦ *Egernia rugosa* (Yakka Skink) – 6039.5 ha; and
- ✦ *Furina dunmalli* (Dunmall's Snake) – 6296.8 ha.

Areas of young regrowth of several vegetation communities were identified which may represent future potential habitat for threatened fauna with appropriate rehabilitation and management.

Note that this report utilises data obtained from desktop searches conducted in 2015. Desktop search results presented in this report should therefore not be relied upon for planning and management purposes.

## List of Abbreviations

ALA	Atlas of Living Australia
AU (s)	assessment unit (s)
BOO	Best on Offer
BOM	Bureau of Meteorology
DBH	diameter at breast height
DEHP	Department of Environment and Heritage Protection
DERM	Department of Environment and Resource Management
DEWHA	Department of Environment, Water, Heritage and the Arts
Dia.	diameter
DNRM	Department of Natural Resources and Mines
DoTE	Department of the Environment
DSITIA	Department of Science, Information Technology, Innovation and the Arts
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
GLNG	Gladstone Liquefied Natural Gas
GPS	Global Positioning System
ha	hectare (s)
km	kilometre (s)
m	metre (s)
NC Act	<i>Nature Conservation Act 1992</i>
NP	National Park
PMST	Protected Matters Search Tool
RE (s)	Regional Ecosystem (s)
REDD	Regional Ecosystem Description Database
SEVT	Semi-evergreen vine thicket
SPRAT	Species Profile and Threats Database
TEC (s)	Threatened Ecological Community (ies)
TSSC	Threatened Species Scientific Committee

# 1. Introduction

## 1.1. Purpose and Scope

This report provides a description of REs and MNES fauna habitat documented during a desktop assessment and field survey undertaken by BOOBOOK Ecological Consulting (hereafter BOOBOOK) at ‘Springwater’ (hereafter referred to as ‘the Site’), southern inland Queensland. The results are based on an initial desktop assessment, involving examination of imagery, followed by a field survey to confirm type and extent of vegetation communities, presence of habitat features which may support threatened fauna, and determination of potential extent of threatened fauna species habitat.

This assessment forms part of an assessment undertaken at two additional properties both contiguous with the Site these being ‘Fairview’ (BOOBOOK 2015b) and ‘Waddy Brae’ (BOOBOOK 2015c). The properties have very similar geology, topography and vegetation and also share a similar land use history. Preliminary locations of BioCondition sites were determined by initial examination of aerial imagery (Santos Quickbird), RE mapping (DNRM and ground-truthed datasets) and review of data collected from previous field surveys at the Site, ‘Fairview’ (BOOBOOK 2015b) and ‘Waddy Brae’ (BOOBOOK 2015c).

## 1.2. Site Description

The Site is a 12,636 ha grazing property described as Lot 8 on Plan SP261936 which is located approximately 46 km east-northeast of Injune, southern inland Queensland (Appendix A). The Site is accessed via Springwater Road (off the Injune-Taroom Road) and is under the jurisdiction of the Maranoa Regional Council. The Site is located within subregion 24 (Carnarvon Ranges) of the Brigalow Belt South bioregion (Sattler and Williams 1999). Current land uses at the Site include cattle grazing, irrigated cropping, tree plantations and coal seam gas extraction. The property is contiguous with large areas of remnant vegetation in the north on Beilba State Forest, ‘Fairview’ Holding and Expedition (Limited Depth) National Park, to the northeast on Expedition Resource Reserve, and to the south on Hallett State Forest. The Site is owned and managed by Santos and situated within tenements operated by Santos these being PL92, PL99, PL100 and PL232.

Surface geology mapping for the Site shows that it is comprised entirely of Lower Jurassic sediments (Forbes 1968). The west and much of the south-east of the Site features plateaux of the Boxvale Sandstone Member, falling to valleys and low undulating hills with sandy and clay soils derived from the Evergreen Formation. Plateaux of the Boxvale Formation are also present in the far northeast of the Site. Hutton Creek enters the Site in the central north and cuts a steep gorge eastward through the Precipice Sandstone to meet the Dawson River in the central east of the Site. Soils in this region are coarse sands with expansive areas of surface rock especially within close proximity to Hutton Creek and the Dawson River. Vegetation is dominated by dry sclerophyll *Eucalyptus* and *Acacia* woodlands with pockets of semi-evergreen vine thicket (SEVT) in sheltered south-facing parts of the plateau scarps and slopes and within gorges. The dominant land zone (Sattler and Williams 1999) in this area is land zone 10 (coarse-grained sediments) with a small areas of land zone 9 (fine-grained sediments) on slopes and valleys and land zone 3 (alluvium) along Hutton Creek and the Dawson River.

Hutton Creek and the Dawson River are part of the Fitzroy River Basin. The nearest weather station to the Site is at Injune within 46 km of the Site. Yearly average temperatures range from a maximum of 33.6°C in January to a minimum of 3.1°C in July (BOM 2015). Average annual rainfall is 636.3 mm, with the highest monthly average rainfall occurring in December (89.1 mm) and the lowest occurring in August (25.2 mm) (BOM 2015).

## 1.3. Survey Team

A field survey of the Site was conducted by Richard Johnson (Senior Ecologist), Rosamund Aisthorpe (Botanist) and Angela Bendall (Field Technician) between 3<sup>rd</sup> and 14<sup>th</sup> August 2015.

## 2. Methodology

### 2.1. Desktop Assessment

A desktop assessment was conducted to inform the field survey. Sources of information utilised during the desktop assessment included the following:

- ✂ EPBC Act Protected Matters Search Tool (PMST) (DoTE 2015a);
- ✂ Queensland Department of Environment and Heritage Protection (DEHP) Wildlife Online database (DEHP 2015a);
- ✂ Atlas of Living Australia (ALA) database (ALA 2015);
- ✂ remnant and regrowth REs at the property scale (DNRM 2015a); and
- ✂ Essential Habitat (EH) (DNRM 2015b) and Essential Regrowth Habitat (ERH) mapping (DNRM 2015c).

Data searches were performed using the property lot/plan number or using a 10km buffer around the coordinates - 25.6499°S, 148.9670°E (these equate to the approximate centre point of the Site).

### 2.2. Field Survey

#### 2.2.1. BioCondition Survey

To assist in the evaluation of the Site's ecological function and condition a series of BioCondition assessments were undertaken. BioCondition assessments were completed at 23 sites which were pre-selected within each mapped AU or RE type (DNRM 2015a) or selected in the field following field assessment (e.g. re-located to more suitable site). BioCondition data relevant to RE at the Site was also obtained in field surveys at the adjacent 'Waddy Brae' and 'Fairview' properties (BOOBOOK 2015a, 2015b). Pooling of data for RE on the three properties, which are contiguous and occur on similar topography, have similar vegetation and patterns of land use, allowed for development of condition benchmarks for several RE which lack published benchmarks (DSITIA 2014).

BioCondition assessments were undertaken as per the methodologies described by Eyre *et al.* (2011, 2015). This involved the establishment of a 100 m x 50 m transect containing five assessment areas (plots/quadrats) to record values for defined ecological attributes. These values were used as indicators to provide a quantitative measure for the performance of ecosystem function within the context of biodiversity conditions.

The following information was recorded at each BioCondition site:

- ✂ Date;
- ✂ Observers;
- ✂ Description of location (bioregion, general description, co-ordinates for plot origin and centre, plot bearing and alignment);
- ✂ General habitat description and RE type;
- ✂ Median height for canopy, emergent and subcanopy strata;
- ✂ Slope position/slope degree and slope aspect;
- ✂ Tree species richness (within 100 m x 50 m plot);
- ✂ Native plant species richness (within 50 m x 10 m plot);
- ✂ Non-native plant cover (within 50 m x 10 m plot);
- ✂ Total length of coarse woody debris (length >10 cm diameter and >0.5 m long within 50 m x 20 m plot);
- ✂ Number and average diameter at breast height (DBH) of large eucalypt and non-eucalypt trees (within 100 m x 50 m plot);
- ✂ Recruitment of canopy species (within the 100 m x 50 m plot);

- ✂ Tree and shrub canopy cover (within 100 m transect);
- ✂ Ground cover within 1 m x 1 m plots (native perennial grass and organic litter cover in the ground layer);
- ✂ Disturbances (severity, last event and observation type).

Large tree DBH thresholds for each RE were used where benchmark documents were available, otherwise the default >30 cm DBH for eucalypts and >20 cm DBH for non-eucalypts was applied. For SEVT-dominant communities (i.e. RE 11.9.4, 11.10.8), the threshold for RE 11.9.4 (>17 cm DBH for non-eucalypts) was applied to all sites due to similarities in vegetation structure and composition.

Site photographs were taken using a Canon digital camera in accordance with Eyre *et al.* (2011, 2015) (i.e. one photograph at plot origin and north, east, south and west photographs at the plot centre). Photograph numbers were recorded. Locations of BioCondition sites were determined using a handheld Global Positioning System (GPS) (Garmin GPSmap 78S) and BioCondition assessment data was captured by mobile GIS devices (Motion CFT-003 tablet device).

Field data was recorded using the BioCondition reference site sheet template (Eyre *et al.* 2011) to ensure data suitable data was collected consistently for all sites regardless of whether a benchmark document was available for any particular RE or not. Canopy recruit and non-native plant cover attributes are not normally recorded on this template, however this data was added to field sheets so it could be used for calculating BioCondition scores. Site data has been presented as either BioCondition assessment or reference form templates to differentiate between sites with or without published benchmarks. Due to the remoteness and terrain of the BioCondition site locations, permanent 0 m and 50 m markers were not established using steel fence posts as described in the methodology Eyre *et al.* (2011, 2015).

Scores for BioCondition sites were calculated in accordance with Eyre *et al.* (2015) which compares the values obtained at each survey site with values in the benchmark document for that particular RE (DSITIA 2014). Sub-scores are awarded to each site and landscape attribute then are added together and divided by the maximum possible score for that RE. This provides a numeric value along a continuum of biodiversity condition, where scores closer to 0 indicates that sites are 'dysfunctional' and those closer to 1 indicates that sites have 'functional' condition.

## 2.2.2. Vegetation Assessment and Mapping

High resolution aerial photography was provided for the Site by Santos in 2015. Detailed review of this imagery enabled a desktop vegetation assessment to be conducted. Potential RE types and their extent were identified as well as determining highly disturbed areas. Examination of imagery enabled vegetation to be divided into four categories:

- ✂ Remnant: woody vegetation that has not been cleared or vegetation that has been cleared but where the dominant canopy has greater than 70% of the height and greater than 50% of the cover relative to the undisturbed height and cover of that stratum and is dominated by species characteristic of the vegetation's undisturbed canopy (Neldner *et al.* 2012).
- ✂ Advanced Regrowth: areas previously cleared or disturbed (e.g. by wildfire) and containing well advanced woody vegetation floristically and structurally consistent with the RE but typically <70% of the height and <50% density of the RE. Such regrowth with appropriate management will likely achieve remnant status (potentially <30 years).
- ✂ Young regrowth: areas previously cleared or disturbed (e.g. by wildfire) and containing varying densities of woody vegetation floristically consistent with the RE type. Such regrowth lacks structural elements typical of the RE but with appropriate management may eventually achieve remnant status (likely >30 years).
- ✂ Non-remnant: areas previously cleared or otherwise significantly disturbed which have little or no woody vegetation present.

Vegetation assessments were undertaken within 50 m x 50 m plots at the BioCondition sites for the purpose of typifying the vegetation community under assessment. Vegetation assessments at all of these survey sites were consistent with the quaternary level of detail as per Neldner *et al.* (2012).

At each quaternary survey site the following was recorded:



- ✂ height (median and maximum/minimum) and % cover of each stratum of vegetation (i.e. ground, shrub, tree and emergent layers);
- ✂ dominant flora in each stratum of vegetation;
- ✂ RE type mapped and observed;
- ✂ geology, landform and soil descriptions;
- ✂ presence and abundance of weeds (declared and non-declared species) as well as estimated % coverage of the site;
- ✂ a list of all other flora encountered at the survey site.

Determination of RE type and status (as per the Regional Ecosystem Description Database (REDD) DEHP 2015b)) was possible for areas at and immediately adjoining formal survey sites. REs were also able to be described and mapped for a range of other areas traversed within the Site and areas that were visible from suitable vantage points. Locations of each vegetation survey site were determined using a handheld Global Positioning System (GPS) (Garmin GPSmap 78S) and/or a Motion CFT-003 tablet device. Locations of vegetation survey sites are shown in Appendix A.

Information obtained from the BioCondition survey sites and other field observations was also used to identify TEC by comparison of field assessment results with TEC technical descriptions which include floristic, structural and condition criteria (TSSC 2013, Environment Australia 2003).

Mapping protocols applied to remnant and regrowth RE within this assessment are as follows:

- ✂ Two SEVT communities/REs were recognised as present at the Site. SEVT on coarse-grained sedimentary rocks (RE 11.10.8) was present on colluvium on the lower slopes of gorges (e.g. Baffle Creek, Dawson River) associated with the Precipice Sandstone, where it was readily differentiated and mapped. SEVT patches attributed to RE 11.10.8 have some structural and floristic differences to SEVT patches assigned to RE 11.9.4. These include fewer large trees, lower median canopy height, greater frequency of emergent trees (usually *Brachychiton* spp.) and lower canopy species richness. This RE also occurred on sheltered scarp crests where rocky terrain protected the vegetation from fire. Many of these occurrences were patches too small to be mapped. In some areas this RE was contiguous with larger patches of SEVT present on scarp slopes and growing on soils derived from fine-grained sedimentary rocks (Land Zone 9) and attributable to RE 11.9.4. In this situation, where possible the two REs have been mapped separately but where mapping scale issues prevent differentiation between the two REs, the vegetation is mapped as the dominant RE present. Note that tiny (often <1 ha) patches of SEVT-dominated communities may occur within larger areas of non-SEVT vegetation (e.g. RE 11.10.1, 11.10.7) particularly along cliff lines and other sheltered or long unburnt areas. These areas have not been mapped at the scale of the current mapping.
- ✂ Areas of RE 11.9.5, particularly larger patches, may contain small (<5 ha) areas locally dominated by SEVT species (e.g. *Croton* spp., *Acalypha eremorum*, *Diospyros humilis*, *Capparis loranthifolia*).
- ✂ Remnant *Eucalyptus crebra* dominated communities were mapped for the purposes of this assessment as RE 11.10.7 or 11.10.7a (where *Callitris glaucophylla* is co-dominant in the canopy or dominant in the subcanopy). These communities are mapped partly as RE 11.10.1 by DNRM (2015a).
- ✂ Remnant *E. melanophloia* dominated communities were also mapped as RE 11.10.7 (these are mapped partly as RE 11.3.39 by DNRM) as RE 11.10.7 may be dominated by *E. crebra* or *E. melanophloia*.
- ✂ Woodland communities dominated by a mix of *Eucalyptus*, *Corymbia* and *Acacia* spp. occurring on sandstone plateaux and scarps were mapped for the purposes of this assessment as RE 11.10.13. It is acknowledged that minor areas of other RE including 11.10.1, 11.10.3 and 11.10.4 may form components of areas mapped as RE 11.10.13.
- ✂ Areas mapped as 11.10.1 contain patches which have localised areas dominated or co-dominated by *Eucalyptus fibrosa*. As these patches occur as mosaics within *Corymbia citriodora* subsp. *variegata* dominated communities, and they are not as uniform or extensive as at 'Waddy Brae' and 'Fairview' properties (BOOBOOK 2015a, 2015b), such areas have not been attributed to RE 11.10.1c for the purposes of this assessment.

Identification of categorised regional ecosystems forms the basis of AUs as per the DEHP (2014) *Guide to determining terrestrial habitat quality*.

Where cited within this report species names for flora follow Bostock and Holland (2014).

### 2.2.3. Threatened Fauna Habitat Value Assessment

No comprehensive fauna surveys were undertaken under this Scope of Works. Fauna surveys were limited to incidental observations at BioCondition sites or general property traverses. Where time permitted active searches were conducted particularly targeting threatened reptiles. This included overturning rocks, logs, fallen bark and other ground debris raking leaf litter, peeling loose bark on trees/stumps, checking burrows and crevices with torches, looking for animal traces (scats, sloughs, shells, scratches, diggings and burrows) and scanning logs for basking reptiles.

Fauna habitat assessments were conducted for the following species nominated by Santos:

- ✂ *Dasyurus hallucatus* (Northern Quoll);
- ✂ *Chalinolobus dwyeri* (Large-eared Pied Bat, Large Pied Bat);
- ✂ *Nyctophilus corbeni* (South-eastern Long-eared Bat);
- ✂ *Petrogale penicillata* (Brush-tailed Rock-wallaby);
- ✂ *Botaurus poiciloptilus* (Australasian Bittern);
- ✂ *Erythrotriorchis radiatus* (Red Goshawk);
- ✂ *Geophaps scripta scripta* (Squatter Pigeon (Southern));
- ✂ *Neochmia ruficauda ruficauda* (Star Finch);
- ✂ *Poephila cincta cincta* (Black-throated Finch);
- ✂ *Rostratula australis* (Australian Painted Snipe);
- ✂ *Turnix melanogaster* (Black-breasted Button-quail);
- ✂ *Delma torquata* (Collared Delma);
- ✂ *Denisonia maculata* (Ornamental Snake);
- ✂ *Egernia rugosa* (Yakka Skink);
- ✂ *Furina dunmalli* (Dunmall's Snake); and
- ✂ *Rheodytes leukops* (Fitzroy River Turtle).

Fauna habitat assessments were undertaken at each BioCondition site. Although BioCondition measures some microhabitat features, such as length of coarse woody debris, and leaf litter cover, not all fauna habitat features likely to be utilised by threatened fauna are measured under the BioCondition methodology. Presence/absence, abundance or density of habitat features was recorded within a 50 m x 50 m plot at each survey site including:

- ✂ embedded and loose rocks and boulders: (estimated % cover);
- ✂ logs (abundance);
- ✂ trees >18m height (abundance);
- ✂ logs with hollows (abundance);
- ✂ trees with hollows (abundance);
- ✂ trees and/or logs with loose bark (abundance);
- ✂ burrows, sinkholes and tunnel erosion (abundance);
- ✂ fallen bark (estimated % cover);
- ✂ shrub layer (estimated % cover);

- ✂ ground cover (estimated % cover);
- ✂ leaf litter (estimated % cover);
- ✂ termite mounds (abundance);
- ✂ mistletoe (abundance);
- ✂ rock structures (caves, overhangs and crevices);
- ✂ cliffs, escarpments and steep rocky slopes within 5km (presence);
- ✂ watercourses with permanent water, pools and riffles and abundant woody/rock cover (presence);
- ✂ cracking clays soils (presence);
- ✂ gilgai and ephemeral wetlands (presence); and
- ✂ canopy dominated by Myrtaceae species (presence).

Habitat feature data allowed assessment of the likelihood of occurrence of the listed fauna at each survey site and, by inference, within similar vegetation (REs) at the Site. Mapping of threatened fauna habitat is based on preliminary remnant and regrowth RE polygons identified during this survey. Field data collected for each fauna habitat assessment has been supplied in electronic format to the client separately.

Where cited within this report species names for fauna follow those used by the Queensland Government's Wildlife Online database (DEHP 2015a).

#### **2.2.4. Survey Limitations**

The field investigations undertaken were limited to passive techniques (e.g. no live trapping) and were undertaken in winter only. Additional survey effort would be required to provide a more comprehensive inventory of species, both threatened and common.

Due to the scale and accessibility of the Site and the resources available many vegetation polygons identified within this report have not been ground-truthed. However sufficient sampling of remnant and regrowth RE was conducted to give a high level of confidence in the extrapolation of these field assessments to vegetation in inaccessible areas.

Timing (season) and duration of the survey period (for the Site, 'Fairview' and 'Waddy Brae' properties) during late March to early April and mid-September was favourable for BioCondition assessment (Eyre *et al.* 2011, 2015). As per the methodology, most sites were located >50 m away from any major disturbances (e.g. road/ track) (Eyre *et al.* 2015), however this may not have been possible for sites in REs with limited extents. This is important when undertaking BioCondition reference sites, or 'Best on Offer' (BOO) sites, which need to be carried out in mature and long undisturbed sites to calculate benchmark values averaged over several reference sites.

Five REs occurring at the Site did not have benchmark documents available, these being RE 11.3.39, RE 11.10.7 and RE 11.10.9. To score these AUs, at least three reference BioCondition sites per unit should be sampled to generate thresholds for each RE. Survey sites should also be placed >3 km apart and within patches >5 ha (Eyre *et al.* 2011). This was not always practical during this survey due to limited access in parts of the Site. Note that, as described above, pooled data from reference sites on Waddy Brae, Fairview and Springwater was used to derive thresholds for each of these RE.

### **3. Results & Discussion**

#### **3.1. BioCondition Assessment**

BioCondition assessments were completed at 23 locations at the Site (Appendix A). BioCondition site characteristics and scores are summarised in Table 1. Existing RE benchmark values (DSITIA 2014) were available for 17 of the BioCondition sites and their corresponding scores have been calculated and presented below. Six BioCondition reference sites were used to derive benchmarks, and therefore calculate BioCondition scores, for RE without published benchmark data. Raw data for BioCondition assessment sheets are contained within Appendix B.

Scores for sites in RE 11.9.5 were derived from the comparison of values collected in the field and the 'western form' benchmark of the RE. The geographic locality of the Site (within subregion 24) which lies within the western zone and examples of remnant Brigalow (*Acacia harpophylla*) with average height approximately 15 m and average of 39 large trees per hectare at the Site supported using the western benchmark values.

Eleven BioCondition sites (SW01, SW02, SW03, SW05, SW10, SW17, SW18, SW19, SW20, SW21 and SW22) received high scores (>0.80) which indicates vegetation at these sites displays 'functional biodiversity condition'. These sites represent examples of advanced regrowth RE 11.10.3 and remnant RE 11.3.2, RE 11.3.25, RE 11.3.39, RE 11.9.4, RE 11.9.5, RE 11.9.7, RE 11.10.1, RE 11.10.9 and RE 11.10.11.

The highest score, 0.98, corresponds to BioCondition site SW10, a site which was assessed as RE 11.10.9, where the site score was 1 and the landscape score was 0.85. The high site score is based on a comparison with a benchmark derived from the average of three sites, which due to the small sample size will have skewed the BioCondition scores towards 1. Similarly, the site assessed in RE 11.3.39 was also measured against benchmarks created from averages of values from two sites each and their scores may be affected similarly. A larger number of reference sites and/or comparison with future-published benchmark documents to account for local variances in vegetation, aspect, geology and disturbance history would provide scores with a higher degree of confidence around their functional biodiversity condition.

The lowest score, 0.47, was calculated for BioCondition site SW13, located in a patch of young RE 11.9.7 regrowth. However no sites received low scores (<0.40) and thus indicated vegetation at none of the sites displayed 'dysfunctional biodiversity condition'.

Most assessment sites had above average functional biodiversity condition, i.e. 20 BioCondition sites achieved scores >0.60. All of these sites were within remnant vegetation except for BioCondition sites SW03, SW11, SW15 and SW23 that were within patches of advanced regrowth RE 11.10.3, RE 11.9.7, RE 11.10.9 and RE 11.10.7, respectively.

Generally, these scores reflect exposure to various disturbances. For example, the three lowest scoring BioCondition assessments at the Site were recorded in regrowth that all had achieved low values for canopy height, canopy cover, shrub cover and landscape attributes. These low scores are likely to be associated with disturbances present at these sites, namely historic clearing and wildfire.

Table 1: Summary of BioCondition sites and their calculated scores.

BioCondition Survey Site	Site Type	RE	Structural Class/Condition	Field Vegetation Description	Site Score	Landscape Score	BioCondition Score
SW01	Assessment	11.10.1	Remnant	<i>Corymbia citriodora</i> subsp. <i>variegata</i> open forest; midlayer dominated by <i>Acacia longispicata</i> ; grassy ground layer composed of <i>Cenchrus ciliaris</i> , <i>Enneapogon</i> sp. and <i>Aristida</i> spp.	0.78	1.00	0.83
SW02	Assessment	11.9.4	Remnant	Semi-evergreen vine thicket	0.80	1.00	0.85
SW03	Assessment	11.10.3	Advanced regrowth	<i>Acacia sparsiflora</i> open forest with emergent <i>Eucalyptus crebra</i> ; grassy ground layer composed of <i>Aristida</i> spp. and <i>Digitaria</i> sp.	0.80	1.00	0.85
SW04	Assessment	11.10.13	Remnant	<i>Eucalyptus tenuipes</i> and <i>Corymbia trachyphloia</i> woodland; midlayer composed of canopy recruits, <i>Acacia longispicata</i> and <i>A. macradenia</i> ; grassy ground layer dominated by <i>Cleistochloa subjuncea</i> .	0.63	1.00	0.71
SW05	Reference	11.3.39	Remnant	<i>Eucalyptus melanophloia</i> woodland with associated <i>E. tereticornis</i> ; shrub layer composed of <i>Pittosporum spinescens</i> , <i>Bertya oleifolia</i> , <i>Alectryon diversifolius</i> and other softwood spp. (Lack of fire); dense grassy ground layer dominated by <i>Megathyrsus maximus</i> , <i>Dinebra decipiens</i> , <i>Chloris ventricosa</i> , <i>Verbesina encelioides</i> and <i>Bidens pilosa</i> .	0.89	1.00	0.92
SW06	Assessment	11.3.25	Remnant	<i>Eucalyptus tereticornis</i> and <i>Casuarina cunninghamiana</i> fringing woodland; midlayer dominated by <i>Melaleuca viminalis</i> ; grassy ground layer dominated by <i>Cynodon dactylon</i> .	0.71	1.00	0.78
SW07	Assessment	11.9.4	Advanced regrowth	Semi-evergreen vine thicket	0.69	0.10	0.58
SW08	Reference	11.10.9	Remnant	<i>Callitris glaucophylla</i> , <i>Eucalyptus populnea</i> and <i>E. melanophloia</i> woodland with associated <i>Corymbia clarksoniana</i> ; midlayer composed of <i>C. glaucophylla</i> saplings, <i>Alphitonia excelsa</i> and <i>Acacia leiocalyx</i> ; ground layer composed of <i>Aristida</i> spp., <i>Phyllanthus</i> sp. and <i>Sida</i> sp.	0.82	0.45	0.75
SW09	Assessment	11.3.2	Remnant	<i>Eucalyptus populnea</i> open woodland; very sparse midlayer of canopy recruits and <i>Citrus glauca</i> ; grassy ground layer composed of <i>Themeda triandra</i> , <i>Cenchrus ciliaris</i> and <i>Bothriochloa decipiens</i> .	0.78	0.20	0.67
SW10	Reference	11.10.9	Remnant	<i>Callitris glaucophylla</i> open forest with associated <i>Eucalyptus crebra</i> ; midlayer composed of <i>Acacia longispicata</i> , <i>A. leiocalyx</i> and canopy recruits; ground layer composed of <i>Aristida</i> spp., <i>Sida atherophora</i> , <i>Digitaria</i> sp. and <i>Cymbopogon refractus</i> .	1.00	0.85	0.98
SW11	Assessment	11.9.7	Advanced regrowth	<i>Eucalyptus populnea</i> woodland; patchy midlayer dominated by <i>Eremophila mitchellii</i> ; grassy ground layer dominated by <i>Heteropogon contortus</i> and <i>Themeda triandra</i> .	0.76	0.90	0.79

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BioCondition Survey Site	Site Type	RE	Structural Class/Condition	Field Vegetation Description	Site Score	Landscape Score	BioCondition Score
SW12	Assessment	11.9.5	Remnant	<i>Acacia harpophylla</i> open forest with scattered <i>Brachychiton rupestris</i> ; midlayer dominated by <i>A. harpophylla</i> ; shrub layer composed of <i>A. harpophylla</i> , <i>Eremophila mitchellii</i> and <i>Geijera parviflora</i> ; low shrub layer of <i>Carissa ovata</i> ; grassy ground layer composed of <i>Paspalidium caespitosum</i> , <i>Enteropogon ramosus</i> and <i>Cenchrus ciliaris</i> .	0.85	0.55	0.80
SW13	Assessment	11.9.7	Young regrowth	<i>Eucalyptus populnea</i> low woodland; midlayer dominated by <i>Eremophila mitchellii</i> ; grassy ground layer composed of <i>Cenchrus ciliaris</i> and <i>Aristida</i> sp.	0.53	0.20	0.47
SW14	Assessment	11.3.2	Advanced regrowth	<i>Eucalyptus populnea</i> open woodland with associated <i>Eucalyptus tereticornis</i> ; midlayer dominated by canopy recruits; dense grassy ground layer dominated by <i>Themeda triandra</i> and <i>Bothriochloa bladhii</i> .	0.63	0.20	0.55
SW15	Assessment	11.10.9	Advanced regrowth	<i>Callitris glaucophylla</i> low open forest with associated <i>Eucalyptus melanophloia</i> ; midlayer dominated by canopy recruits; shrub layer composed of <i>Dodonaea viscosa</i> subsp. <i>spatulata</i> , <i>Acacia decora</i> and <i>Geijera parviflora</i> ; grassy ground layer composed of <i>Enneapogon</i> sp. and <i>Themeda triandra</i> .	0.75	0.90	0.79
SW16	Assessment	11.10.11	Remnant	<i>Eucalyptus populnea</i> and <i>Callitris glaucophylla</i> woodland with associated <i>Eucalyptus melanophloia</i> ; midlayer composed of <i>Eremophila mitchellii</i> , canopy recruits and <i>Corymbia clarksoniana</i> ; grassy ground layer comprised of <i>Bothriochloa decipiens</i> , <i>Heteropogon contortus</i> and <i>Aristida</i> spp.	0.81	0.55	0.77
SW17	Assessment	11.9.7	Remnant	<i>Eucalyptus populnea</i> woodland; midlayer comprised of canopy recruits, <i>Eremophila mitchellii</i> , <i>Geijera parviflora</i> , <i>Atalaya hemiglauca</i> , <i>Psydrax odorata</i> and <i>Denhamia oleaster</i> ; shrub layer composed of <i>Hovea longipes</i> and <i>Carissa ovata</i> ; grassy ground layer dominated by <i>Aristida</i> sp., <i>Bothriochloa decipiens</i> , <i>Themeda triandra</i> and <i>Chloris ventricosa</i> .	0.87	0.55	0.81
SW18	Assessment	11.10.11	Remnant	<i>Eucalyptus populnea</i> woodland with associated <i>Callitris glaucophylla</i> and <i>E. melanophloia</i> ; patchy midlayer composed of <i>C. glaucophylla</i> and <i>Eremophila mitchellii</i> ; grassy ground layer dominated by <i>Cenchrus ciliaris</i> .	0.80	0.80	0.81
SW19	Assessment	11.3.2	Remnant	<i>Eucalyptus populnea</i> woodland with scattered <i>E. melanophloia</i> ; sparse midlayer of canopy recruits, <i>Callitris glaucophylla</i> and <i>Eremophila mitchellii</i> ; grassy ground layer dominated by <i>Bothriochloa decipiens</i> , <i>Cymbopogon refractus</i> and <i>Aristida</i> sp.	0.81	0.95	0.84
SW20	Assessment	11.3.25	Remnant	<i>Angophora floribunda</i> , <i>Eucalyptus camaldulensis</i> and <i>Casuarina cunninghamiana</i> fringing woodland; midlayer (confined to channel edges) composed of <i>Melaleuca viminalis</i> ; dense ground layer dominated by <i>Lomandra longifolia</i> , <i>Imperata cylindrica</i> and <i>Entolasia marginata</i> .	0.87	0.95	0.89
SW21	Reference	11.10.9	Remnant	<i>Callitris glaucophylla</i> open forest with associated <i>Eucalyptus populnea</i> ; midlayer dominated by <i>C. glaucophylla</i> ; sparse ground layer dominated by <i>Eragrostis lacunaria</i> , <i>Aristida</i> spp. and <i>Perotis rara</i> .	0.83	0.80	0.83

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BioCondition Survey Site	Site Type	RE	Structural Class/Condition	Field Vegetation Description	Site Score	Landscape Score	BioCondition Score
SW22	Assessment	11.9.5	Remnant	<i>Acacia harpophylla</i> open woodland; midlayer composed of canopy recruits, <i>Eremophila mitchellii</i> , <i>Geijera parviflora</i> and <i>Pittosporum spinescens</i> ; low shrub layer dominated by <i>Carissa ovata</i> ; grassy ground layer composed of <i>Paspalidium caespitosum</i> , <i>Enteropogon ramosus</i> , <i>Ancistrachne uncinulata</i> and <i>Aristida</i> sp.	0.91	0.90	0.91
SW23	Assessment	11.10.7	Advanced regrowth	<i>Eucalyptus melanophloia</i> low woodland; midlayer composed of <i>Psydrax johnsonii</i> , <i>Notelaea microcarpa</i> , <i>Eremophila mitchellii</i> and <i>Callitris glaucophylla</i> ; grassy ground layer dominated by <i>Themeda triandra</i> .	0.78	0.80	0.79

## 3.2. Vegetation Mapping

### 3.2.1. Desktop Mapping

DNRM (2015a) mapped remnant REs are described (as mapped) in Table 2 and shown in Appendix C.

Table 2: Description of remnant REs mapped by DNRM within the Site.

RE Code	VM Act Class	Biodiversity Status	Short Description (DEHP 2015b)	Extent (ha)
11.10.1	LC	NCAP	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks	701.3
11.10.7	LC	NCAP	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks	1953.7
11.10.9	LC	NCAP	<i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	126.8
11.10.11	LC	NCAP	<i>Eucalyptus populnea</i> , <i>E. melanophloia</i> and/or <i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	2.0
11.10.1/ 11.10.13	LC / LC	NCAP/ NCAP	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks/ <i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp. open forest on scarps and sandstone tablelands	565.3
11.10.7/ 11.10.9	LC / LC	NCAP/ NCAP	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks/ <i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	401.0
11.10.13/ 11.10.1/ 11.3.25	LC/ LC/ LC	NCAP/ NCAP/ OC	<i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp. open forest on scarps and sandstone tablelands/ <i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks/ <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	158.2
11.10.1/ 11.10.8	LC/ OC	NCAP/ OC	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks/ Semi-evergreen vine thicket in sheltered habitats on medium to coarse-grained sedimentary rocks	582.8
11.10.1/ 11.9.5	LC/ E	NCAP/ E	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks/ <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	212.8
11.10.7/ 11.9.5	LC / E	NCAP / E	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks/ <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	0.0
11.10.8/ 11.10.7/ 11.10.9	OC/ LC/ LC	OC/ NCAP/ NCAP	Semi-evergreen vine thicket in sheltered habitats on medium to coarse-grained sedimentary rocks/ <i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks/ <i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	158.7
11.3.2/ 11.3.25	OC/ LC	OC/ OC	<i>Eucalyptus populnea</i> woodland on alluvial plains/ <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	337.1
11.10.8/ 11.10.7/ 11.9.5	OC/ LC/ E	OC/ NCAP/ E	Semi-evergreen vine thicket in sheltered habitats on medium to coarse-grained sedimentary rocks/ <i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks/ <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	54.0
11.9.7/ 11.9.5	OC/ E	OC/ E	<i>Eucalyptus populnea</i> , <i>Eremophila mitchellii</i> shrubby woodland on fine-grained sedimentary rocks/ <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	225.3
11.9.4	OC	E	Semi-evergreen vine thicket or <i>Acacia harpophylla</i> with a semi-evergreen vine thicket understorey on fine-grained sedimentary rocks	164.5
11.9.5	E	E	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	389.1

DNRM (2015a) mapped regrowth REs are described (as mapped) in Table 3 and shown in Appendix C.



Table 3: Description of regrowth REs mapped by DNRM within the Site.

RE Code	VM Act Class	Biodiversity Status	Short Description (DEHP 2015b)	Extent (ha)
11.10.1	LC	NCAP	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks	222.9
11.10.7	LC	NCAP	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks	43.8
11.10.9	LC	NCAP	<i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	8.1
11.10.11	LC	NCAP	<i>Eucalyptus populnea</i> , <i>E. melanophloia</i> and/or <i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	14.0
11.10.1/ 11.9.5	LC/ E	NCAP/ E	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks/ <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	66.5
11.10.7/ 11.9.5	LC/ E	NCAP/ E	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks/ <i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	80.7
11.3.2/ 11.3.25	OC/ LC	OC/ OC	<i>Eucalyptus populnea</i> woodland on alluvial plains/ <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	195.7
11.9.5	E	E	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	138.6

### 3.2.2. Ground-truthed RE Mapping

Ground-truthing and examination of aerial imagery identified 14 remnant and 8 regrowth RE types at the Site. Regrowth RE were assessed as either advanced or young regrowth. Mapping of remnant and regrowth REs based on desktop interpretation and field analysis is presented in Appendix D. The extent (total area) of each mapped remnant and regrowth RE is summarised in Table 4. These RE essentially represent AUs for the Site as defined by the *Guide to Determining Terrestrial Habitat Quality* (DEHP 2014).

Table 4: Summary of extent of individual mapped REs from ground-truthing and imagery analysis within the Site.

RE Code	VM Act Class	Biodiversity Status	Short Description (DEHP 2015b)	Extent - Remnant (ha)	Extent – Advanced Regrowth (ha)	Extent – Young Regrowth (ha)
11.3.2	OC	OC	<i>Eucalyptus populnea</i> woodland on alluvial plains	93.7	67.6	2.5
11.3.25	LC	OC	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	257.3	Not identified	Not identified
11.3.39	LC	NCAP	<i>Eucalyptus melanophloia</i> +/- <i>E. chloroclada</i> open woodland on undulating plains and valleys with sandy soils	3.1	Not identified	Not identified
11.9.4	OC	E	Semi-evergreen vine thicket or <i>Acacia harpophylla</i> with a semi-evergreen vine thicket understory on fine-grained sedimentary rocks	249.5	110.7	31.9
11.9.5	E	E	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on fine-grained sedimentary rocks	465.8	194.4	124.3
11.9.7	OC	OC	<i>Eucalyptus populnea</i> , <i>Eremophila mitchellii</i> shrubby woodland on fine-grained sedimentary rocks	180.8	67.4	27.6

RE Code	VM Act Class	Biodiversity Status	Short Description (DEHP 2015b)	Extent - Remnant (ha)	Extent – Advanced Regrowth (ha)	Extent – Young Regrowth (ha)
11.10.1	LC	NCAP	<i>Corymbia citriodora</i> woodland on coarse-grained sedimentary rocks	519.2	Not identified	Not identified
11.10.2	OC	OC	Tall open forest in sheltered gorges on coarse-grained sedimentary rocks	2.8	Not identified	Not identified
11.10.3	LC	NCAP	<i>Acacia catenulata</i> or <i>A. shirleyi</i> open forest on coarse-grained sedimentary rocks. Crests and scarps	Not identified	2.5	Not identified
11.10.7	LC	NCAP	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks	2405.4	209.9	26.3
11.10.7a	LC	NCAP	<i>Eucalyptus crebra</i> woodland on coarse-grained sedimentary rocks	398.8	Not identified	11.9
11.10.8	OC	OC	Semi-evergreen vine thicket on medium to coarse-grained sedimentary rocks	124.9	Not identified	Not identified
11.10.9	LC	NCAP	<i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	757.8	150.6	Not identified
11.10.11	LC	NCAP	<i>Eucalyptus populnea</i> , <i>E. melanophloia</i> ± <i>Callitris glaucophylla</i> woodland on coarse-grained sedimentary rocks	279.8	Not identified	Not identified
11.10.13	LC	NCAP	<i>Eucalyptus</i> spp. and/or <i>Corymbia</i> spp. open forest on scarps and sandstone tablelands	240.0	Not identified	Not identified

This assessment identified four RE types which were not mapped by DNRM (2015a) namely:

- ✂ Remnant RE 11.3.39;
- ✂ Remnant RE 11.10.2;
- ✂ Advanced regrowth RE 11.10.3; and
- ✂ Remnant 11.10.7a.

This assessment identified the presence of all other remnant RE types which were mapped by DNRM (2015a).

### 3.2.3. Threatened Ecological Communities

The field survey confirmed the presence of two TECs at the Site. The TEC ‘Brigalow (*Acacia harpophylla* dominant and co-dominant)’ is represented by the RE 11.9.5, while the TEC ‘Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions’ is represented by RE 11.9.4. Note that the SEVT RE 11.10.8, also present at the Site, is not defined as a component RE in this TEC (TSSC 2001). The mapped extent of TEC at the Site is shown within Appendix E. Note that not all areas of TEC have been ground-truthed, however, there is a high degree of confidence relating to the location and extent of remnant TEC.

For the purposes of this assessment all remnant and advanced regrowth RE that are a listed component of the TEC are mapped as TEC for Brigalow (TSSC 2013) with the exception of one area of RE 11.9.5 (24.3 ha) that was dominated by Belah (*Casuarina cristata*). To qualify as this TEC the vegetation must be Brigalow (*Acacia harpophylla*) dominant or co-dominant (TSSC 2013).

There are currently no condition criteria for SEVT regrowth (TSSC 2001) therefore no SEVT regrowth is mapped as TEC. Table 5 describes the extent (ha) of each TEC. BioCondition site data for remnant REs equivalent to TEC is presented within Appendix B.

Table 5: Description and extent of TEC within the Site.

TEC Description	RE Code	Extent of REs Listed as TEC (ha)	Potential Future TEC (ha)
Brigalow ( <i>Acacia harpophylla</i> dominant and co-dominant)	11.9.5	635.9*	124.3
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	11.9.4	249.5	142.6**

\*includes remnant and advanced regrowth of the REs

\*\* includes advanced and young regrowth of the RE

RE 11.9.5 is a component RE of the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (TSSC 2013). To be classified as TEC vegetation conforming to the RE description vegetation must also meet certain structural, floristic and condition criteria. Regrowth vegetation must contain the species composition and structural elements found in undisturbed (remnant) RE. Typically, regrowth greater than 15 years old is considered to contain these features (TSSC 2013). Both remnant and regrowth must be in good condition. Butler (2007) defined component RE in poor condition as having one or more of the following characteristics: vegetation that has been cleared within 15 years; vegetation in which exotic perennial plants have more than 50% cover, assessed in a minimum area of 0.5 ha; and individual patches of Brigalow that are smaller than 0.5 ha.

Areas of advanced and young regrowth of RE 11.9.5 were sampled during the field survey. General field observations noted that young regrowth comprises a layer of Brigalow shrubs from 1 to 5 metres height. A lower shrub layer has not yet formed and the species associated with the subcanopy (e.g. *Geijera parviflora*, *Eremophila mitchellii*) and emergent layers are absent or very rare. Though this vegetation has the potential in time to develop to remnant status young regrowth does not currently meet TEC criteria in that it lacks some of the structural elements typical of the RE (TSSC 2013). For the purposes of this assessment all identified advanced Brigalow regrowth is mapped as TEC.

### 3.3. Threatened Fauna

#### 3.3.1. Likelihood of Occurrence Assessment

Searches of Wildlife Online (DEHP 2015a) and Atlas of Living Australia (ALA 2015) databases did not indicate the recorded presence of any EPBC Act or NC Act listed fauna. One species was recorded during the field survey, this being the Squatter Pigeon (*Geophaps scripta scripta*). Birds were observed on two occasions on roads within the Site.

General habitat requirements and distribution for all EPBC Act and NC Act species nominated for assessment under the Scope of Works is provided in Table 6. Analysis of distributional data indicates that three of these species do not occur at the Site, these being the Brush-tailed Rock-wallaby (*Petrogale penicillata*), Fitzroy River Turtle (*Rheodytes leukops*) and Ornamental Snake (*Denisonia maculata*). Two other species recorded historically from the region – the Black-throated Finch (*Poephila tincta tincta*) and Star Finch (Eastern) (*Neochmia ruficauda ruficauda*) were potentially present at the Site. However, the ranges of these species have contracted markedly and both are likely to be extinct in southern Queensland, including the Site.

Table 6: General habitat requirements and distribution of threatened fauna assessed for the Site.

Class	Scientific/ Common Name	NC Act Status	EPBC Act Status	PMST Likelihood of Occurrence (DoTE 2015a)	General Habitat Requirements	Site Distribution Context
Birds	<i>Botaurus poiciloptilus</i> Australasian Bittern	E		-	Well-vegetated permanent and ephemeral wetlands dominated by sedges, rushes (and sometimes in rice fields and other irrigated areas) (DotE 2015b)	Within (at limits of) species known range (Birdlife Australia 2015).

Class	Scientific/ Common Name	NC Act Status	EPBC Act Status	PMST Likelihood of Occurrence (DoTE 2015a)	General Habitat Requirements	Site Distribution Context
	<i>Erythrotriorchis radiatus</i> Red Goshawk	E	V	species or species habitat likely to occur within area	Woodlands and open forests, especially near permanent water bodies; high prey bird populations; tall trees for nest site (Marchant and Higgins 1993).	Within (at limits of) species known range (Birdlife Australia 2015).
	<i>Geophaps scripta scripta</i> Squatter Pigeon (southern)	V	V	species or species habitat likely to occur within area	Grassy woodlands with open areas for foraging habitat; usually nearby water source (Higgins and Davies 1996).	Within species known range (Birdlife Australia 2015).
	<i>Neochmia ruficauda ruficauda</i> Star Finch (eastern, southern)	E	E	species or species habitat likely to occur within area	Tall grasslands often associated with watercourses (DoTE 2015b).	Within species known historical range (Birdlife Australia 2014) but the subspecies is possibly extinct (Garnett <i>et al.</i> 2011).
	<i>Poephila cincta cincta</i> Black-throated Finch	E	E	-	Grassy open woodlands and forests typically dominated by <i>Eucalyptus</i> , <i>Corymbia</i> and <i>Melaleuca</i> and occasionally in tussock grasslands (DoTE 2015b) usually within a few kilometres of a water source (Grice 2012).	Within species known historical range (Birdlife Australia 2014) but there are no recent records from southern Queensland (DoTE 2015b) and may be locally extinct
	<i>Rostratula australis</i> Australian Painted Snipe	V	E	species or species habitat may occur within area	Forages at shallow edges and adjacent vegetated margins of freshwater wetlands (DoTE 2015b).	Within species known range (Birdlife Australia 2015).
	<i>Turnix melanogaster</i> Black-breasted Button-quail	V	V	-	SEVT and other closed forest types with dense leaf litter and low shrubs (DoTE 2015b, Mathieson and Smith 2009).	At edge of species known range (Birdlife Australia 2015).
Mammals	<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	V	V	species or species habitat likely to occur within area	Forages in open forests and woodlands and roosts in adjacent caves and overhangs of cliffs and rocky hills; occasionally shelters in disused Fairy Martin nests (Hoye and Schultz 2008).	Within species known range (Churchill 2008);
	<i>Dasyurus hallucatus</i> Northern Quoll	LC	E	species or species habitat known to occur within area	Shelter in crevices in rocky hills and escarpments; forage in associated woodland and forest habitats (DoTE 2015b).	Within species historical range (Oakwood 2008) though recent records are lacking (DEHP 2015a).
	<i>Nyctophilus corbeni</i> South-eastern Long-eared Bat	V	V	species or species habitat may occur within area	<i>Eucalyptus</i> and <i>Callitris</i> woodlands and roosts in tree hollows and crevices and under loose bark (DoTE 2015b).	Within species known range (Churchill 2008).
	<i>Petrogale penicillata</i> Brush-tailed Rock-wallaby	V	V	-	Rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks (DoTE 2015b).	Outside of species known range (Lundie-Jenkins 2012).

Class	Scientific/ Common Name	NC Act Status	EPBC Act Status	PMST Likelihood of Occurrence (DoTE 2015a)	General Habitat Requirements	Site Distribution Context
Reptiles	<i>Delma torquata</i> Collared Delma	V	V	species or species habitat may occur within area	Occupies eucalypt woodlands and open forests; lives under surface rock and large woody debris (Wilson 2005).	Within species known/predicted range (DSEWPac 2011a) though occupancy within range apparently patchy.
	<i>Denisonia maculata</i> Ornamental Snake	V	V	species or species habitat may occur within area	Woodland and grassland with cracking clay soils, usually in close proximity to at least seasonally wet areas e.g. billabongs, gilgais, floodplains, riparian corridors (DoTE 2015b).	At edge of species known range (DSEWPac 2011a) with no records for the upper Dawson catchment upstream of about Theodore (ALA 2015).
	<i>Egernia rugosa</i> Yakka Skink	V	V	species or species habitat may occur within area	Woodland and open forests, also derived grassland with regrowth trees; requires suitable soils for burrows, sinkholes, abandoned rabbit warrens or large fallen woody material for shelter (Eddie 2012).	Within species known range (Wilson 2005).
	<i>Furina dunmali</i> Dunmall’s snake	V	V	species or species habitat may occur within area	<i>Eucalyptus</i> , <i>Acacia</i> and <i>Callitris</i> woodlands and open forests; may be reliant on presence of abundant fallen woody debris (Hobson 2012).	Within species known range (DSEWPac 2011a);
	<i>Rheodytes leukops</i> Fitzroy River Turtle	V	V	species or species habitat may occur within area	Dependent on permanent streams with a preference for deep pools often with intervening riffle zones (DoTE 2015b).	Outside of known range (not recorded within upper drainages of the Fitzroy River catchment) (Limpus <i>et al.</i> 2011).

An assessment of fauna microhabitat features observed and recorded at each BioCondition site is summarised in Table 7. The presence or absence (and abundance) of fauna microhabitat features as well as incorporation of local distribution information and expert knowledge has also informed the likelihood of occurrence assessment for threatened fauna at the Site (Table 7).

Table 7: Fauna microhabitat features and predicted occurrence of nominated threatened fauna at the Site.

BioCondition Survey Site	RE	Microhabitat Features Present	Predicted Occurrence of Threatened Fauna Based on Microhabitat Habitat Features Present
SW01	11.10.1 (remnant)	Fallen bark, leaf litter, ground cover, trees >18m, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall’s Snake, South-eastern Long-eared Bat
SW02	11.9.4 (remnant)	Embedded and loose rocks, boulders, crevices and ledges, fallen bark, leaf litter, ground cover, coarse woody debris, hollow logs, trees/logs with loose bark, mistletoe, cliffs within 5km	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Black-breasted Button-quail, South-eastern Long-eared Bat

BioCondition Survey Site	RE	Microhabitat Features Present	Predicted Occurrence of Threatened Fauna Based on Microhabitat Habitat Features Present
SW03	11.10.3 (remnant)	Embedded and loose rocks, fallen bark, leaf litter, ground cover, trees >18m, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, termite mounds, cliffs within 5km	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW04	11.10.13 (remnant)	Embedded and loose rocks, fallen bark, leaf litter, ground cover, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW05	11.3.39 (remnant)	Embedded and loose rocks, boulders, fallen bark, leaf litter, ground cover, coarse woody debris, hollow-bearing trees, trees/logs with loose bark, termite mounds, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW06	11.3.25 (remnant)	Embedded rocks, boulders, leaf litter, ground cover, trees >18m, coarse woody debris, hollow-bearing trees, cliffs within 5km, watercourse with deep pools, riffles and woody/rocky cover, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Australian Painted Snipe, Squatter Pigeon (Southern), Dunmall's Snake, South-eastern Long-eared Bat, Eastern Star Finch, Australasian Bittern, Black-throated Finch
SW07	11.9.4 (advanced regrowth)	Embedded and loose rocks, boulders, leaf litter, ground cover, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, mistletoe, cliffs within 5km	Northern Quoll, Large-eared Pied Bat, Black-breasted Button-quail, South-eastern Long-eared Bat
SW08	11.10.9 (remnant)	Fallen bark, leaf litter, ground cover, trees >18m, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Australian, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW09	11.3.2 (remnant)	Leaf litter, ground cover, sinkholes, coarse woody debris, hollow-bearing trees, termite mounds, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW10	11.10.9 (remnant)	Fallen bark, leaf litter, ground cover, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, termite mounds, cliffs within 5km	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW11	11.9.7 (advanced regrowth)	Leaf litter, ground cover, coarse woody debris, hollow logs, hollow-bearing trees, termite mounds, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat

BioCondition Survey Site	RE	Microhabitat Features Present	Predicted Occurrence of Threatened Fauna Based on Microhabitat Habitat Features Present
SW12	11.9.5 (remnant)	Fallen bark, leaf litter, ground cover, coarse woody debris, hollow-bearing trees, trees/logs with loose bark	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW13	11.9.7 (young regrowth)	Fallen bark, leaf litter, ground cover, coarse woody debris, hollow logs	Nil  Potential future: Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW14	11.3.2 (remnant)	Fallen bark, leaf litter, ground cover, coarse woody debris, hollow-bearing trees, trees/logs with loose bark, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW15	11.10.9 (advanced regrowth)	Embedded and loose rocks, fallen bark, leaf litter, ground cover, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, cliffs within 5km	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW16	11.10.11 (remnant)	Leaf litter, ground cover, coarse woody debris, hollow logs, hollow-bearing trees, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW17	11.9.7 (remnant)	Embedded and loose rocks, boulders, dense shrub layer, leaf litter, ground cover, trees >18m, coarse woody debris, hollow-bearing trees, trees/logs with loose bark, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW18	11.10.11 (remnant)	Embedded rocks, leaf litter, ground cover, trees >18m, coarse woody debris, hollow logs, hollow-bearing trees, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW19	11.3.2 (remnant)	Leaf litter, ground cover, trees >18m, coarse woody debris, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat,
SW20	11.3.25 (remnant)	Fallen bark, leaf litter, ground cover, trees >18m, coarse woody debris, hollow logs, hollow-bearing trees, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Squatter Pigeon (Southern), Dunmall's Snake, South-eastern Long-eared Bat, Eastern Star Finch, Australasian Bittern, Black-throated Finch, Australian Painted Snipe
SW21	11.10.9 (remnant)	Fallen bark, leaf litter, ground cover, trees >18m, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, burrows, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat



BioCondition Survey Site	RE	Microhabitat Features Present	Predicted Occurrence of Threatened Fauna Based on Microhabitat Habitat Features Present
SW22	11.9.5 (remnant)	Embedded and loose rocks, fallen bark, leaf litter, ground cover, trees >18m, coarse woody debris, trees/logs with loose bark, cliffs within 5km	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat
SW23	11.10.7 (advanced regrowth)	Embedded and loose rocks, boulders, fallen bark, leaf litter, ground cover, coarse woody debris, hollow logs, hollow-bearing trees, trees/logs with loose bark, cliffs within 5km, myrtaceous canopy	Northern Quoll, Large-eared Pied Bat, Red Goshawk, Collared Delma, Squatter Pigeon (Southern), Yakka Skink, Dunmall's Snake, South-eastern Long-eared Bat

### 3.3.2. Threatened Fauna Predictive Habitat Mapping

Results of microhabitat analyses provided a basis for the indicative presence of threatened fauna based on the microhabitat requirements of each species. Predictive fauna habitat mapping based on these analyses and expert knowledge is shown within Appendix F. Summary data for the estimated extent of General Habitat and Potential Future Habitat for each fauna species is presented in Table 8.

Table 8: List of potentially suitable REs and estimated extent of potentially suitable habitat for nominated threatened fauna at the Site.

Species name	Potentially Suitable REs	Mapped extent of General Habitat (ha)	Mapped extent of Potential Future Habitat (ha)	Habitat Mapping Rules/Notes
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	11.3.2, 11.3.25, 11.3.39, 11.9.4, 11.9.5, 11.9.7, 11.10.1, 11.10.11, 11.10.13, 11.10.2, 11.10.3, 11.10.7, 11.10.7a, 11.10.8 & 11.10.9	6782.0	224.5	<ul style="list-style-type: none"> <li>✎ Mapped General Habitat includes all areas of remnant vegetation and advanced regrowth that may be suitable for foraging or shelter.</li> <li>✎ Young regrowth of all REs represents Potential Future Habitat.</li> <li>✎ RE 11.9.4 is included on the basis that this RE may contain potentially suitable shelter sites.</li> </ul>
<i>Dasyurus hallucatus</i> Northern Quoll	11.3.2, 11.3.25, 11.3.39, 11.9.4, 11.9.5, 11.9.7, 11.10.1, 11.10.11, 11.10.13, 11.10.2, 11.10.3, 11.10.7, 11.10.7a, 11.10.8 & 11.10.9	6782.0	224.5	<ul style="list-style-type: none"> <li>✎ Mapped General Habitat includes all remnant and advanced regrowth vegetation (includes foraging habitat and vegetation containing potentially suitable den sites).</li> <li>✎ Young regrowth of all REs represents Potential Future Habitat.</li> </ul>
<i>Nyctophilus corbeni</i> South-eastern Long-eared Bat	11.3.2, 11.3.25, 11.3.39, 11.9.4, 11.9.5, 11.9.7, 11.10.1, 11.10.11, 11.10.13, 11.10.2, 11.10.3, 11.10.7, 11.10.7a, 11.10.8 & 11.10.9	6782.0	224.5	<ul style="list-style-type: none"> <li>✎ Mapped General Habitat includes all areas of remnant vegetation and advanced regrowth that may be suitable for foraging or shelter.</li> <li>✎ Young regrowth of all REs represents Potential Future Habitat.</li> </ul>
<i>Petrogale penicillata</i> Brush-tailed Rock-wallaby	N/A	nil	nil	<ul style="list-style-type: none"> <li>✎ The Site is not within the range of this species (Lundie-Jenkins 2012).</li> </ul>



Species name	Potentially Suitable REs	Mapped extent of General Habitat (ha)	Mapped extent of Potential Future Habitat (ha)	Habitat Mapping Rules/Notes
<i>Botaurus poiciloptilus</i> Australasian Bittern	11.3.25	257.3	nil	✘ Mapped General Habitat includes all remnant 11.3.25. However, no mapping is available for preferred habitat within this RE (off-stream shallow vegetated wetlands).
<i>Erythrotriorchis radiatus</i> Red Goshawk	11.3.2, 11.3.25, 11.3.39, 11.9.4, 11.9.5, 11.9.7, 11.10.1, 11.10.11, 11.10.13, 11.10.2, 11.10.3, 11.10.7, 11.10.7a, 11.10.8 & 11.10.9	6782.0	224.5	✘ Mapped General Habitat includes all remnant and advanced regrowth of potentially suitable REs. ✘ Young regrowth of all REs represents Potential Future Habitat with appropriate rehabilitation. ✘ This species may also forage within sub-optimal and non-remnant vegetation throughout the Site.
<i>Geophaps scripta scripta</i> Squatter Pigeon	11.3.2, 11.3.25, 11.3.39, 11.9.5, 11.9.7, 11.10.1, 11.10.11, 11.10.13, 11.10.2, 11.10.3, 11.10.7, 11.10.7a, & 11.10.9	6296.8	192.6	✘ Mapped General Habitat includes remnant and advanced regrowth of potentially suitable REs. ✘ Advanced regrowth of all REs represents Potential Future Habitat with appropriate rehabilitation. ✘ This species may also forage within non-remnant vegetation.
<i>Neochmia ruficauda ruficauda</i> Star Finch (Eastern)	11.3.25	257.3	nil	✘ Mapped General Habitat includes remnant 11.3.25. ✘ This species may potentially forage elsewhere on the Site. ✘ Note that this subspecies is considered likely to be extinct in Queensland (Garnett <i>et al.</i> 2011).
<i>Poephila cincta cincta</i> Black-throated Finch	11.3.25	257.3	nil	✘ Mapped General Habitat includes remnant 11.3.25. ✘ This species may potentially forage elsewhere on the Site. ✘ Note that there are no recent records for southern Queensland (DoTE 2015b, Birdlife Australia 2015).
<i>Rostratula australis</i> Australian Painted Snipe	11.3.25	257.3	nil	✘ Mapped General Habitat includes all remnant RE 11.3.25. However, no mapping is available for preferred habitat within this RE (off-stream shallow vegetated wetlands)
<i>Turnix melanogaster</i> Black-breasted Button-quail	11.9.4 & 11.10.8	481.5	31.6	✘ Mapped General Habitat includes all remnant and advanced regrowth RE 11.9.4 and 11.10.8 that have linkages to other woody vegetation. ✘ Young regrowth of RE 11.9.4 represents Potential Future Habitat with appropriate rehabilitation.
<i>Delma torquata</i> Collared Delma	11.3.2, 11.3.39, 11.9.5, 11.9.7, 11.10.1, 11.10.11, 11.10.13, 11.10.2, 11.10.3, 11.10.7, 11.10.7a & 11.10.9	6039.5	192.6	✘ Mapped General Habitat includes all areas of remnant and advanced regrowth of all REs except RE 11.9.4 and 11.10.8. ✘ Young regrowth of potentially suitable REs has been mapped as Potential Future Habitat.
<i>Denisonia maculata</i> Ornamental Snake	N/A	nil	nil	✘ No General Habitat has been mapped for this species as no suitable habitat is considered to be present. The presence of the species at the Site is unconfirmed and doubtful.

Species name	Potentially Suitable REs	Mapped extent of General Habitat (ha)	Mapped extent of Potential Future Habitat (ha)	Habitat Mapping Rules/Notes
<i>Egernia rugosa</i> Yakka Skink	11.3.2, 11.3.39, 11.9.5, 11.9.7, 11.10.1, 11.10.11, 11.10.13, 11.10.2, 11.10.3, 11.10.7, 11.10.7a & 11.10.9	6039.5	192.6	<ul style="list-style-type: none"> <li>✦ Mapped General Habitat includes all remnant vegetation and advanced regrowth of the nominated REs.</li> <li>✦ Young regrowth of potentially suitable REs has been mapped as Potential Future Habitat.</li> </ul>
<i>Furina dunmalli</i> Dunmall’s Snake	11.3.2, 11.3.25, 11.3.39, 11.9.5, 11.9.7, 11.10.1, 11.10.11, 11.10.13, 11.10.2, 11.10.3, 11.10.7, 11.10.7a, & 11.10.9	6296.8	192.6	<ul style="list-style-type: none"> <li>✦ Mapped General Habitat includes all remnant vegetation and advanced regrowth of the nominated REs.</li> <li>✦ Young regrowth of potentially suitable REs has been mapped as Potential Future Habitat.</li> </ul>
<i>Rheodytes leukops</i> Fitzroy River Turtle	N/A	nil	nil	<ul style="list-style-type: none"> <li>✦ The Site is not within the range of this species (Limpus <i>et al.</i> 2011).</li> </ul>

## 4. Recommendations

No fauna surveys conducted in accordance with best practice State (Eyre *et al.* 2014, Ferguson and Mathieson 2014) and/or Commonwealth (DEWHA 2010, 2010c; DSEWPaC 2011b, 2011c) survey guidelines have been undertaken for the nominated species under this Scope of Works. It is recommended that surveys for the target fauna nominated as potentially occurring at the Site be conducted in accordance with State applicable survey guidelines at appropriate times. Such surveys would potentially confirm presence of these and additional threatened fauna species, contribute to documentation of habitat utilisation and significant habitats for threatened species as well as potentially informing management planning documents.

## 5. Conclusions

The desktop assessment and preliminary field survey confirmed the following ecological values are present at the Site:

- ✦ Approximately 635.9 ha of Brigalow (*Acacia harpophylla* dominant and dominant) TEC.
- ✦ Approximately 249.5 ha of ‘Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions’ TEC.
- ✦ Presence of 14 RE types.
- ✦ Confirmed presence of one species of threatened fauna listed as vulnerable under the EPBC Act and NC Act this being Squatter Pigeon.
- ✦ Confirmed presence of habitat potentially suitable for the following threatened fauna:
  - *Dasyurus hallucatus* (Northern Quoll) – 6782.0 ha;
  - *Chalinolobus dwyeri* (Large-eared Pied Bat, Large Pied Bat) – 6782.0 ha;
  - *Nyctophilus corbeni* (South-eastern Long-eared Bat) – 6782.0 ha;
  - *Botaurus poiciloptilus* (Australasian Bittern) – 257.3 ha;
  - *Geophaps scripta scripta* (Squatter Pigeon (Southern)) – 6296.8 ha;
  - *Erythrotriorchis radiatus* (Red Goshawk) – 6782.0 ha;

- *Neochmia ruficauda ruficauda* (Eastern Star Finch) – 257.3 ha;
- *Poephila cincta cincta* (Black-throated Finch) – 257.3 ha;
- *Rostratula australis* (Australian Painted Snipe) - 257.3 ha;
- *Turnix melanogaster* (Black-breasted Button-quail) – 481.5 ha;
- *Delma torquata* (Collared Delma) – 6039.5 ha;
- *Egernia rugosa* (Yakka Skink) – 6039.5 ha; and
- *Furina dunmalli* (Dunmall's Snake) – 6296.8 ha.

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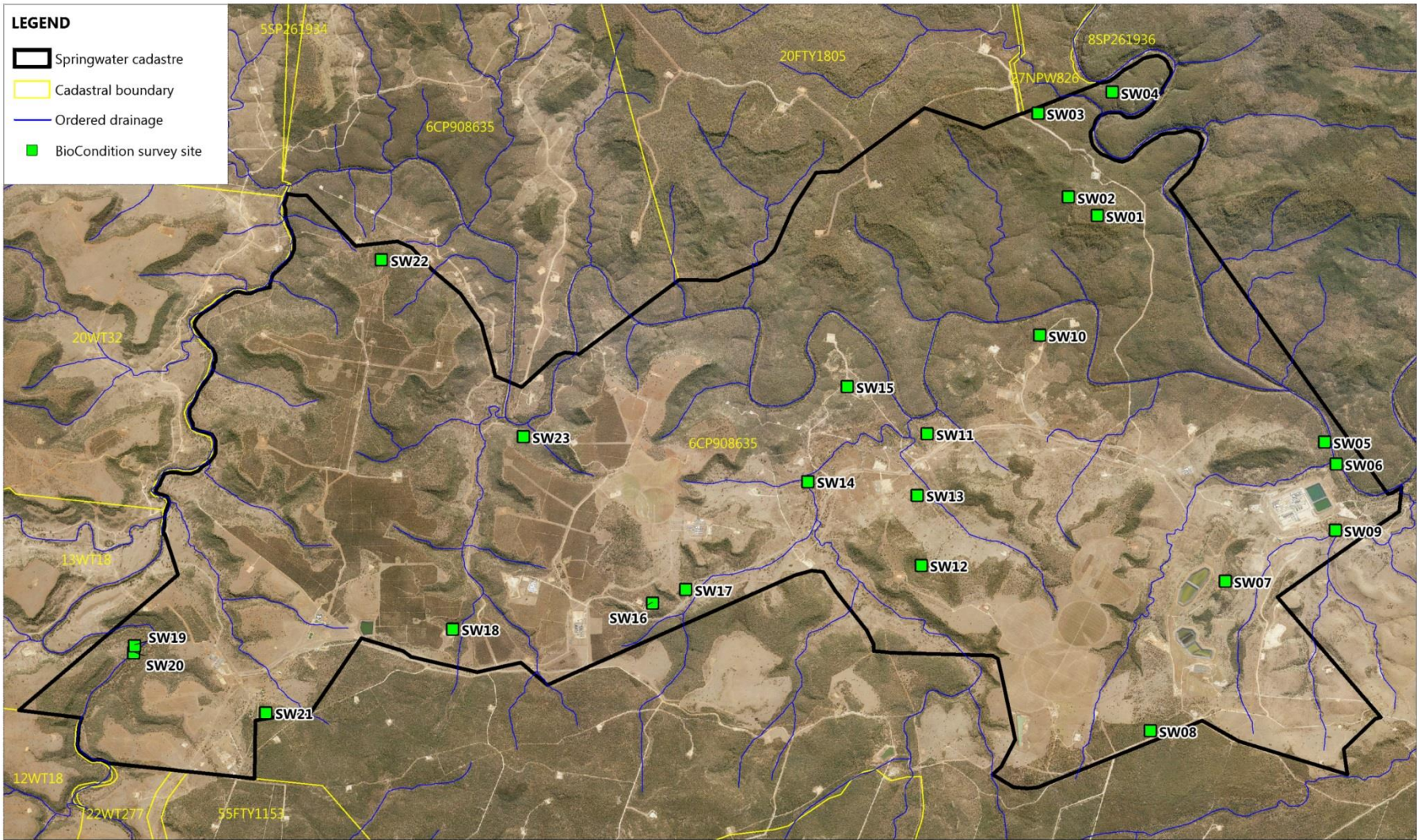
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## **Appendix A.** Site Location & Survey Sites.

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**LEGEND**

- Springwater cadastre
- Cadastral boundary
- Ordered drainage
- BioCondition survey site



**Appendix A**  
**Site Location & Survey Sites**  
 1 October 2015

MGA Zone 55 (GDA 94)      Scale: 1:50 000 @ A4

## **Appendix B.** BioCondition Assessment Field Sheets.

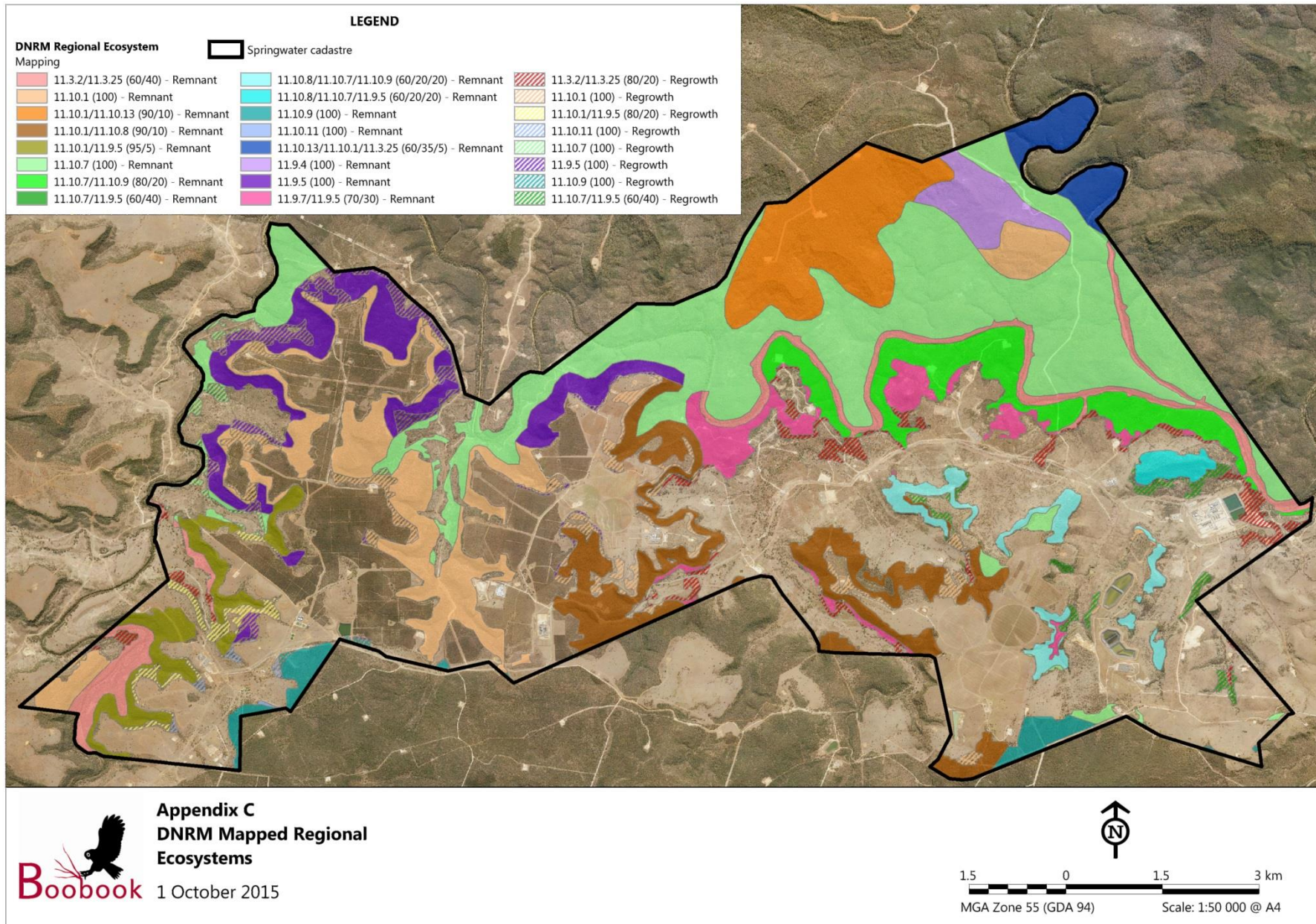
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## **Appendix C.** DNRM Mapped Regional Ecosystems.

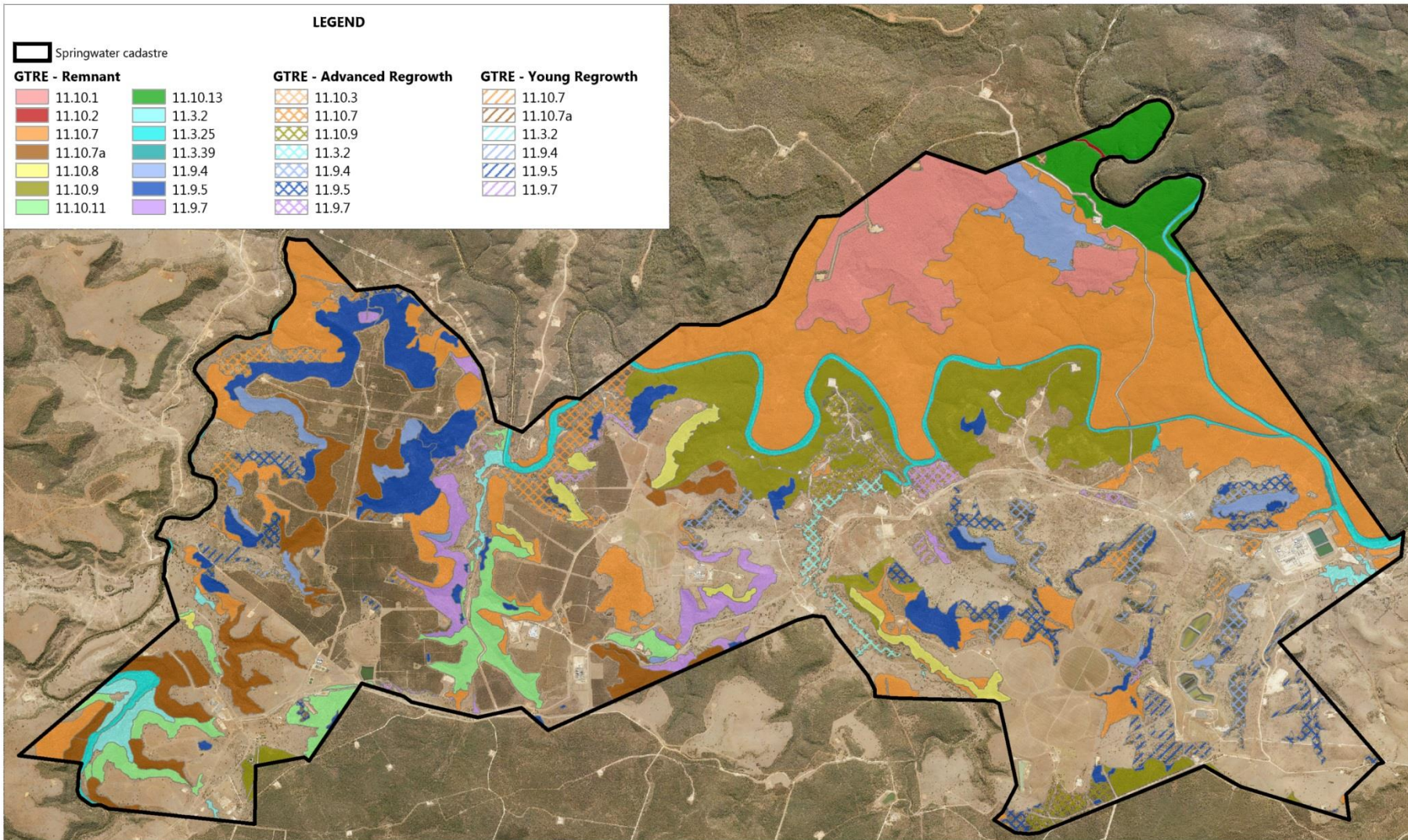
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## **Appendix D.** Ground-truthed Vegetation Mapping.

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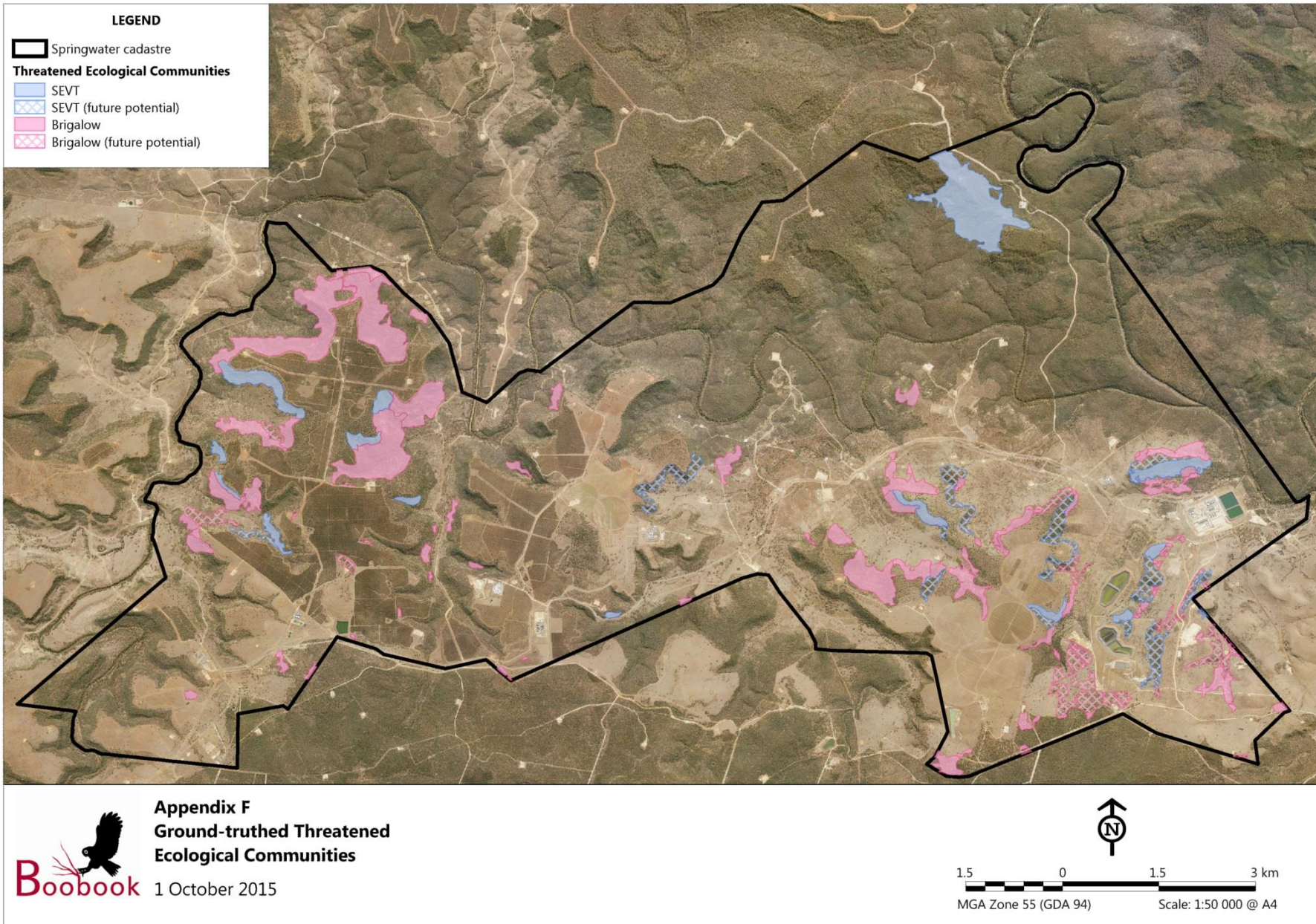




## **Appendix E.** Extent of Threatened Ecological Communities.

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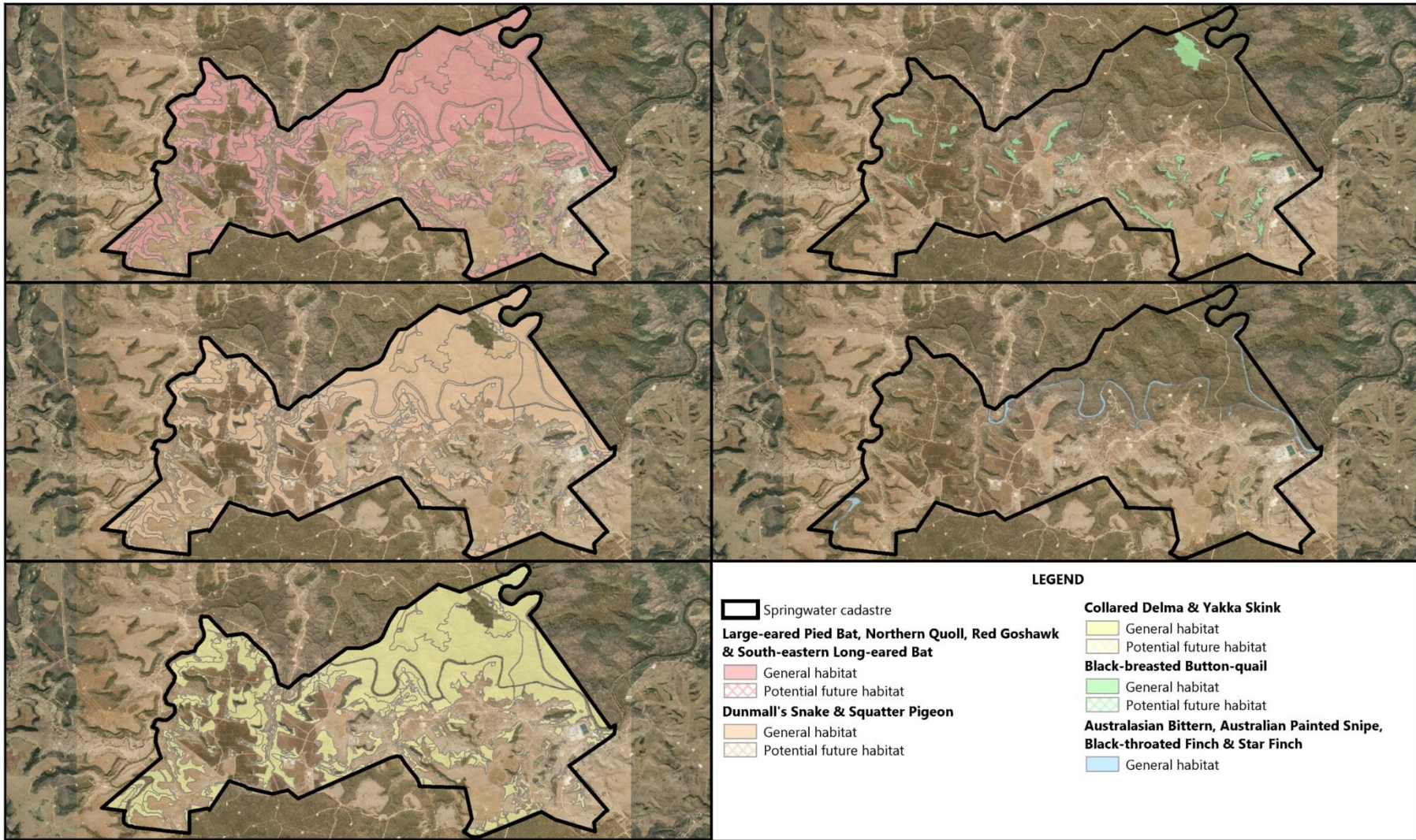




## **Appendix F.** Threatened Fauna Habitat Mapping.

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**Appendix G  
Threatened Fauna  
Habitat Mapping**

1 October 2015

