Santos
GLNG Project

Ecological Assessment Report FV18-26 (Strathblane)

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Abbreviation	Definition
ATP	Authority To Prospect
AVPA	Arcadia Valley Project Area
CG	Coordinator-General
CG Report	Coordinator-General's evaluation report for an environmental impact statement Gladstone Liquefied Natural Gas - GLNG project. May 2010.
CSG	Coal Seam Gas
CDZ	Construction Disturbance Zone
DERM	Department of Environment and Resource Management
DEHP	Department of Environment and Heritage Protection
DOTE	Department Of The Environment
E	Endangered
EA	Environmental Authority
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPBC Approval	EPBC Act Approval dated 22 October 2010 in respect of referral EPBC No 2008/4059
ESA	Environmentally Sensitive Area
EVNT	Endangered, Vulnerable and Near Threatened species under the *Nature Conservation Act 1992*
Field MP	Field MP Field Management Procedures
FMP	FMP Fauna Management Plan
FPA	Fairview Project Area
GTP	Gas Transmission Pipeline
GIS	Geographic Information System
GLNG	Gladstone Liquefied Natural Gas
GLNG ESC Manual	GLNG Project Upstream Activities Erosion and Sediment Control Manual
GPS	Global Positioning System
GBR	Great Barrier Reef
HVR	High Value Regrowth

LC	Least Concern
LNG	Liquefied Natural Gas
LP Act	*Land Protection (Pest and Stock Route) Management Act 2002 (Qld)*
M	Migratory
MNES	Matters of National Environmental Significance
NC Act	Nature Conservation Act 1992
NT	Near Threatened
OC	Of Concern
PL	Petroleum Lease
PPL	Petroleum Pipeline Licence
QLD	Queensland
QWP	Queensland Wetlands Program
RE	Regional Ecosystem
RVMM	Regulated Vegetation Management Map
SEWPaC	Department of Sustainability, Environment, Water, Population and Communities
SSMP	Significant Species Management Plan
TAR	Type A Restricted Plant
TARPSSMP	Type A Restricted Plant Species Salvage Management Plan for the Coal Seam Gas Fields
TEC	Threatened Ecological Community
The Project	The GLNG Project
The Protocol	The Environmental Protocol for Constraints, Planning and Field Development
V	Vulnerable
VM Act	*Vegetation Management Act 1999*
VMSM	Vegetation Management Supporting Map

1. Introduction

1.1. Project Description

The Gladstone Liquefied Natural Gas (GLNG) Project (the GLNG Project) involves the construction and operation of coal seam gas fields (CSG Fields) in the Bowen and Surat Basins, a gas transmission pipeline (GTP) and an LNG liquefaction and export facility (LNG Facility) in Gladstone, Queensland. The CSG field's component of the Project is operated by Santos Limited (Santos) on behalf of the GLNG joint venture.

The Commonwealth Minister for the Department of the Environment (DOTE) (formerly the Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC) granted conditional approvals to the Project under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 22 October 2010. These include approval no. 2008/4059 which relates to the CSG Fields component of the Project (EPBC Approval).

The evaluation report for the Project under the *State Development and Public Works Organisation Act 1971* (Qld) (SDWPO Act) was prepared by the Co-ordinator General and published in May 2010 (CG Report). The CG Report included an evaluation of the CSG Fields. The development of the CSG fields will be undertaken pursuant to petroleum authorities under the *Petroleum and Gas (Production and Safety) Act 2004*, and the *Petroleum Act 1923*, environmental authorities under the *Environment Protection Act 1994* (Qld) (EP Act), the EPBC Approval and in accordance with the requirements of the *Nature Conservation Act 1992* (Qld) (NC Act).

1.2. Scope and Purpose

This report specifically outlines the survey methods utilised and the results of a preclearance ecological survey of a proposed well lease pad and access track referred to as FV18-26 on the property identified as Strathblane.

The requirement to conduct preclearance ecological surveys of proposed disturbance areas has arisen from environmental conditions required by relevant Commonwealth and State authorities. More specifically DOTE requires the proponent to conduct all activities in accordance with conditions outlined in EPBC Act Approval 2008/4059 and the Queensland Department of Environment and Heritage Protection (DEHP) requires preclearance surveys to be conducted in accordance with the relevant project area Environmental Authority (EA). In addition, the CG report requires an assessment of Type A Restricted Plants and Koala Habitat. The FV18-26 pre-clearance ecological survey has been conducted in accordance with the Fairview Project Area (FPA) Environmental Authority (EA) as current at the time of survey.

2. Site Location

The lease CDZ and Buffer FV18-26 is located at 715365E, 7142119N on Lot 9 Plan AB244 approximately 56km east – northeast of Injune, Queensland. The location of the site is illustrated in **Figure 1**.

Figure 1 - Locality Plan

3. Methodology

3.1. Desktop Assessment

Prior to the field investigations, a preliminary desktop assessment was undertaken. This information was used to inform the field survey as well as identifying target species that may inhabit the area.

The following Santos GIS layers were included in the desktop assessment:

- **Regional Ecosystem and Remnant Map (Biodiversity status) Version 7.0;**
- **High-value Regrowth Vegetation Version 2.1;**
- **EPBC Threatened Ecological Communities (TECs);**
- **Threatened Fauna Habitat ("Constraints Fauna" layer);**
- **Herbarium Records Database of Specimens (HERBRECS);**
- **Referable Wetlands (including High Ecological Significance (HES) Wetlands, HES Wetlands in Great Barrier Reef (GBR) Catchments and General Ecological Significance (GES) Wetlands;**
- **Watercourses "Ordered drainage";**
- **Hydrology waterbodies (i.e. lakes);**
- **Springs; and**
- **Aerial photography.**

In addition, the following mapping, databases and other sources were included in the desktop assessment:

- **Vegetation Management Supporting Map;**
- **Essential Habitat Mapping Version 2.1**
- **Biodiversity Status of Pre-clearing Vegetation (spatial dataset V.2009);**
- ***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Database.** The EPBC Act Protected Matters search was conducted for a 5 km radius surrounding coordinates 715084E and 7148002N;
- **Wildlife Online**. A Wildlife Online Database search was conducted for a 5 km radius surrounding coordinates 715084E and 7148002N;
- **Significant Species Management Plan.** A review of General/Indicative and Essential Microhabitat in the SSMP for significant fauna and flora species identified during database searches was undertaken; and
- **Existing reports and previous studies.**

Koala Habitat Mapping under the *Nature Conservation (Koala) Conservation Plan 2006* "the Koala Plan" is relevant to the applicable EA conditions. However, due to the location of the CDZ and Buffer within District C under the Koala Plan, koala habitat mapping is not available for this district and as a result, has not been used for the desktop assessment.

3.2. Field survey methodology

The survey was undertaken on the 14th and 15th December 2013 by Santos Ecologist Lincoln Smith (Commonwealth approved terrestrial (flora and fauna) ecologist).

Table 1 presents the ecological values surveyed within the "Construction Disturbance Zone (CDZ)" and relevant buffer distances to capture ecological values of the CDZ and Buffer which are relevant to conditions stipulated in the applicable EPBC Act Approval EA and CG Report. The CDZ and associated buffers are hereafter collectively referred to as "the CDZ and Buffer". The CDZ and associated buffers are illustrated in **Attachment 8.1** - Ecological Assessment Area.

A GPS equipped Motion J3500 Tablet was used to record the spatial locations of significant ecological values including species listed as endangered, vulnerable or near threatened (EVNT) under the NC Act, species listed as matters of national environmental significance (MNES) under the EPBC Act, habitat features and Type A Restricted (TAR) Plants.

Table 1 - Required Assessments

Ecological Assessments	Construction Disturbance Zone (CDZ)	Buffer	Buffer Size
Water			
Watercourses (Water Act)	Yes[3]	Yes	100m
Referable Wetlands	Yes	Yes	200m
Lakes	Yes	Yes	200m
Springs	Yes	Yes (within 200m)	200m
Land			
Threatened Ecological Communities (TECs)	Yes	Yes	200m
Environmentally Sensitive Areas (ESAs)	Yes	Yes	200m
Regional Ecosystems (REs)	Yes	Yes (Endangered and Of Concern REs only)	200m
Vegetation Communities (quaternary assessment)	Yes	No	N/A
EVNT Flora Species (NC/EPBC Acts)	Yes[4]	Yes	200m
Type A Restricted Plants	Yes	No	N/A
Impacts on Ecosystem functionality	Yes	No	N/A
Soils (Dispersive or highly erodible)	Yes	No	N/A
Fauna			
Habitat Values	Yes	No	N/A
EPBC Fauna Habitat	Yes	Yes[1]	200m
Koala Habitat	Yes	Yes	200m
Breeding places	Yes	Yes	200m
Fauna Observations	Yes	Yes	200m

[1] Comment on likelihood of area to support EPBC fauna based on general observations on the presence of habitat features etc.

[2] Report any obvious features likely to require mitigation. Detailed assessment not required.

[3] If a watercourse is mapped, a Waterway Barrier Works Permit may be required.

[4] Sufficient data for an NC Act clearing permit was collected only if EVNT flora species were identified within the CDZ.

3.2.1. Water

During the field assessment, all mapped watercourses, referable wetlands, lakes and springs were field verified. Mapped watercourses were field verified in accordance with the definition of a watercourse under the *Water Act 2000* as stipulated by the EA, with mapped watercourses being field verified as either a watercourse or drainage feature.

Mapped referable wetlands were field verified in accordance with the definition of a wetland under the Queensland Wetlands Program as stipulated by the EA. Mapped wetlands were field assessed in accordance with the *Santos GLNG Upstream Procedure for Conducting Wetland Assessments*. Mapped lakes and springs were field verified in accordance with the definition in the EA.

3.2.2. Flora

All Category A, B and C Environmentally Sensitive Areas (ESAs) as defined by the Fairview EA and mapped or identified during the field assessment within 200m of the CDZ were field assessed. Vegetation communities within the CDZ were also field assessed. All vegetation communities within the CDZ and Endangered and Of Concern regional ecosystems (REs) that are classed as Category B and C ESAs within the CDZ and Buffer were field assessed at a quaternary level of detail (as per Nelder *et. al.,* 2012) using the Santos Quaternary Data Sheet (see **Attachment 8.2** - Quaternary Data Sheets). Data collected included information on vegetation structure, flora species present, soils, habitat value and ecosystem functioning as stipulated in the relevant EA conditions. Where applicable, sufficient data was captured to confirm mapped vegetation community polygons in accordance with regional ecosystem (biodiversity status) and EPBC Threatened Ecological Community (TEC) criteria.

In order to capture the diversity of flora of the CDZ and Buffer, the area was slowly traversed and searched for the presence of threatened flora species, Type A restricted plants, and least concern flora species. Where threatened flora were identified within the CDZ, these flora were quantified and the spatial locations were recorded. A list of observed flora along with representative photographs of each observed community was recorded within the CDZ and Buffer.

3.2.3. Fauna

Fauna were recorded opportunistically in association with the vegetation survey. All fauna present were recorded through direct observation and/or through call verification.

Where applicable, ground searches were undertaken throughout the CDZ and Buffer using the following methods:

- active searches for cryptic fauna (such as reptiles) via methods such as turning over logs, disturbing woodpiles, lifting loose bark on trees, investigating hollow logs and disturbing leaf litter;
- tracks, scats, animal remains, movement pathways, feeding signs and any other traces of animal presence were recorded when observed; and
- trees were closely observed for scratch marks, nests and hollows to determine their potential value as habitat.

The SSMP describes “General / Indicative” and “Essential microhabitat” for numerous threatened and migratory fauna species listed under the EPBC Act and NC Act that may occur at times within the CSG fields. The field survey undertaken within the CDZ and Buffer considered the habitat requirements of these and other significant species identified during the desktop assessment. In addition, koala habitat as defined under the *Nature Conservation (Koala) Conservation Plan 2006* was field assessed.

3.2.4. Survey Limitations

Ecological surveys often fail to record all flora and fauna species present within a CDZ and Buffer due to a variety of reasons, particularly the seasonality of the survey. In this context, it is noted that some flora species do not persist over all seasons, and some flora species are more prominent in certain seasons when flowers and/or fruits are produced.

In addition, the limited time spent within the CDZ and Buffer, the scope of the fauna survey (i.e. no trapping and no nocturnal survey) and the time of day the survey was undertaken (e.g. birds are generally more active at dawn and dusk, however the field assessments were undertaken between approximately 8am and 3pm,) all limit the overall survey effort and associated species detected. The assessment of the CDZ and Buffer was limited to three hour diurnal surveys over two consecutive days and therefore nocturnal and cryptic species were highly unlikely to be detected. Furthermore, it is to be noted that it was not within the current scope of this project to conduct a dedicated fauna assessment, but rather to assess the fauna habitat values of the CDZ and Buffer based on ecological characteristics of the vegetation communities.

4. Results and discussion

4.1. Water

4.1.1. Referable Wetlands

Desktop Assessment

A map of referable wetlands sourced from the DEHP shows no referable wetlands are located within the CDZ or Buffer (**Attachment 8.3** - DEHP Referable Wetlands Mapping). The nearest referable wetland is a GES wetland, mapped as a spring, approximately 7km to the north northwest of the CDZ and Buffer.

Field Assessment Results

Consistent with the desktop assessment, the field ecological assessment verified the absence of referable wetlands within the CDZ or Buffer. The proposed activities are unlikely to have an impact on any GES and HES wetlands due to the distance between these wetlands and the proposed CDZ.

4.1.2. Lakes

Desktop Assessment

A desktop review of the Santos GIS database (source: Geoscience Australia 250k) indicated there are no lakes (hydrology waterbodies) within the CDZ or Buffer. The nearest lake occurs approximately 9.6km north northwest of the CDZ and Buffer.

Field Assessment Results

Consistent with the desktop assessment, the field ecological assessment verified the absence of lakes within the CDZ or Buffer.

4.1.3. Springs

Desktop Assessment

A desktop review of the Santos GIS database (DERM, 2011) indicated there are no springs within the CDZ or Buffer. The nearest spring occurs approximately 7km to the northwest of the CDZ and Buffer.

Field Assessment Results

Consistent with the desktop assessment, the field ecological assessment verified the absence of springs within the CDZ or Buffer.

4.1.4. Watercourses

Desktop Assessment

One stream order two mapped watercourse traverses the access track twice and runs parallel to the access track for approximately 700m. Two stream order one watercourses are within 100m of the access track. These mapped watercourses are illustrated in **Attachment 8.1** - Ecological Assessment Area. No other watercourses were mapped within the CDZ or within 100m of the CDZ.

Field Assessment Results

The field ecological assessment verified that the two mapped stream order one watercourses (see **Attachment 8.1** - Ecological Assessment Area) satisfied the definition of a drainage feature under the *Water Act 2000*, that being:

drainage feature means a natural landscape feature, including a gully, drain, drainage depression or other erosion feature that—
(a) is formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events; and
(b) flows for only a short duration after a rainfall event, regardless of the frequency of flow events; and
(c) commonly, does not have enough continuing flow to create a riverine environment.

Plate 1 and **Plate 2** illustrate the two mapped stream order 1 watercourses, considered to be drainage features.

Plate 1 - Drainage feature (mapped stream order 1)

Plate 2 - Drainage feature (mapped stream order 1)

The mapped stream order two was field verified as a watercourse as it met the definition of a watercourse under the *Water Act 2000*, that being:

A ***watercourse*** is a river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow event –

a) In a natural channel, whether artificially modified or not; or
b) In an artificial channel that has changed the course of the stream.

However, a watercourse does not include a drainage feature.

The stream order two watercourse was field verified as a watercourse as it:

- is likely to flow at times in addition to during and immediately following a rainfall event; and
- has enough continuing flow to support a riverine environment, including the presence of riparian vegetation and hydrophytes.

Plate 3 illustrates the stream order two field verified watercourse.

Plate 3 - Stream order two field verified watercourse

4.2. Flora

4.2.1. Threatened Ecological Communities

Desktop Assessment

Commonwealth Matters of National Environmental Significance (MNES) identified by a search of the Protected Matters Database using a 5 kilometre buffer around the CDZ and Buffer included two Threatened Ecological Communities (TECs), namely Coolibah – Black Box woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions, and Weeping Myall woodlands. No TECs were identified by the desktop assessment which included an analysis of RE mapping as occurring within the CDZ or Buffer. The nearest mapped TEC - Brigalow *Acacia harpophylla* dominant and co-dominant) Endangered regional ecosystem is located approximately 2.5km to the north northwest of the CDZ and Buffer.

Field Assessment

No TECs were identified within the CDZ and Buffer.

4.2.2. Environmentally Sensitive Areas (ESAs)

Desktop Assessment

Two Category C ESAs were mapped as occurring within the CDZ and Buffer and were:

1. Category C ESA associated with an area of Hallett State Forest located to the immediate south west of the first third of the access track; and
2. Category C ESA associated with an Of Concern Regional Ecosystem (OCRE 11.3.2) located to the north west of the northern end of the access track CDZ.

All mapped Category C ESA areas are illustrated in **Attachment 8.1** - Ecological Assessment Area.

Field Assessment Results

There were no ESAs identified within the CDZ.

One Category C ESA was identified within the buffer during the field survey, i.e. Hallett State Forest.

The OCRE (11.3.2) mapped to the north of the northern end of the access track was field verified as No Concern at Present RE 11.10.9 by RPS during a field assessment undertaken in October / November 2013 and therefore is not classified as a Category C ESA (RPS, 2013).

4.2.3. Regional Ecosystems (Biodiversity status)

Desktop Assessment

A review of Regional Ecosystem Mapping (Biodiversity status) Version 7.0 shows the CDZ and Buffer contains non-remnant vegetation and remnant vegetation. As illustrated in **Attachment 8.4** - DEHP Vegetation Management Supporting Map, the majority of the CDZ and Buffer supports remnant vegetation mapped as RE 11.10.9 (No concern at present Biodiversity Status).

Field Assessment Results

Consistent with the desktop assessment, the field assessment identified areas of remnant and non-remnant vegetation within the CDZ and Buffer.

The areas mapped as non-remnant and remnant (RE 11.9.10) vegetation within the CDZ were found to be consistent with RE mapping and are discussed (including their composition and status) in detail in Section 4.2.4.

The OCRE (11.3.2) mapped to the north of the northern end of the access track was field verified as No Concern at Present RE 11.10.9 by RPS during a field assessment undertaken in October / November 2013 (RPS, 2013).

4.2.4. Vegetation Communities

The CDZ supports one distinct vegetation community, that being white cypress pine (*Callitris glaucophylla*) dominated woodland with a moderate to dense shrublayer on undulating hills (Vegetation Community 1). Vegetation Community 1 is located among undulating hills characterised by coarse grained sedimentary rocks with predominantly shallow soils (typical of landzone 10). Vegetation Community 1 was field verified as analogous to remnant vegetation regional ecosystem 11.10.9 (No concern at present Biodiversity Status).

The canopy layer was dominated by white cypress pine (*Callitris glaucophylla*) with silver-leaved ironbark (*Eucalyptus melanophloia*), carbeen bloodwood (*Corymbia tessellaris*), false sandalwood (*Eremophila mitchellii*), smooth-barked apple (*Angophora leiocarpa*), Clarkson's bloodwood (*Corymbia clarksoniana*), vine tree (*Ventilago viminalis*), Baradine red gum (*Eucalyptus chloroclada*) and poplar box (*Eucalyptus populnea*). The canopy layer was the ecologically dominant layer with an average of 10% foliage projective cover, a height range of 15 to 30m and an average height of 22m.

The sub-canopy layer was dominated by white cypress pine (*Callitris glaucophylla*) with false sandalwood (*Eremophila mitchellii*), ironwood (*Acacia excela*), black wattle (*Acacia leiocalyx*), bull oak (*Allocasuarina leuhmannii*), poplar box (*Eucalyptus populnea*), silver-leaved ironbark (*Eucalyptus melanophloia*), carbeen bloodwood (*Corymbia tessellaris*) also present. The structural formation consisted of 40% foliage projective cover a height range of 5 to 19m and an average height of 12m.

The shrub layer was dominated by White cypress pine (*Callitris glaucophylla*) with a diverse range of other native species including sandalwood (*Santalum laceolatum*), belah (*Casuarina cristata*), kurrajong (*Brachychiton populneus*), vine tree (*Ventilago viminalis*), carbeen bloodwood (*Corymbia tessellaris*), false sandalwood (*Eremophila mitchellii*), ironwood (*Acacia excelsa*), bull oak (*Allocasuarina leuhmannii*), native orange (*Capparis lasiantha*), black orchid (*Cymbidium canaliculatum*), beefwood (*Grevillea striata*), quinine (*Petalostigma pubescens*), black wattle (*Acacia leiocalyx*), wilga (*Geijera parviflora*), crrant bush (*Carissa ovata*), red ash (*Alphitonia excela*), bootlace oak (*Hakea lorea*), wild orange (*Capparis canescens*), pretty wattle (*Acacia decora*), whitewood (*Atalaya hemiglauca*), kurrajong (*Brachychiton populneus*), brush myrtle (*Psydrax oleifolia*) and *Acacia* sp. The structural formation included an average of 40% foliage projective cover, a height range of 1 to 9m and an average height of 5m.

The ground layer ranged from moderate to heavy cover with an average cover of 50% and average height of 0.25m. The ground layer was dominated by buffel grass (*Cenchrus ciliaris*) in the majority of areas, with kangaroo grass (*Themeda triandra*) or many-headed wire grass (*Aristida caput-medusae*) co-dominant in some areas.

Quaternary data sheets for the CDZ are included in **Attachment 8.2** - Quaternary Data Sheets. **Plate 4** and **Plate 5** illustrate the typical structure and condition of Vegetation Community 1.

Plate 4 - Vegetation Community 1

Plate 5 - Vegetation Community 1

4.2.5. MNES and EVNT Flora Species

Desktop Assessment

Commonwealth Matters of National Environmental Significance (MNES) identified by a search of the Protected Matters Database using a 5 kilometre buffer around the CDZ and Buffer included one

threatened flora species, that being ooline (*Cadellia pentastylis*). Results from the Wildlife Online database search using a 5 kilometre buffer around the CDZ and Buffer did not return any EVNT flora species.

Field Assessment Results

No MNES or EVNT flora were observed within the CDZ or Buffer during the field assessment. A full floristic inventory for the CDZ and Buffer is provided in **Attachment 8.5** - Flora Species List.

4.2.6. Type A Restricted Plants

Three Type A Restricted Plants (pursuant to the *Nature Conservation (Administration) Regulation 2006*) occur within the CDZ and Buffer. Black orchids (*Cymbidium caniculatum*) (**Plate 6**), kurrajongs *(Brachychiton populneus*) (**Plate 7** and **Plate 8**) and narrow-leaved bottle trees *(Brachychiton rupestris)* were located predominantly within Vegetation Community 1, with a couple of individuals located within non-remnant areas. The exact locations of the Type A plants are listed in **Table 2**.

Table 2 - Locations of Type A Species within the CDZ and Buffer

Species name	Common name	Easting	Northing	GIS Code
Brachychiton populneus	Kurrajong	715379	7142049	FV18-26 BP1
Brachychiton populneus	Kurrajong	715371	7142128	FV18-26 BP2
Brachychiton populneus	Kurrajong	715381	7142211	FV18-26 BP3
Brachychiton populneus	Kurrajong	715231	7142188	FV18-26 BP4
Brachychiton populneus	Kurrajong	715435	7142417	FV18-26 BP5
Brachychiton populneus	Kurrajong	715409	7142421	FV18-26 BP6
Brachychiton populneus	Kurrajong	715410	7142429	FV18-26 BP7
Brachychiton populneus	Kurrajong	715416	7142440	FV18-26 BP8
Brachychiton populneus	Kurrajong	715424	7142442	FV18-26 BP9
Brachychiton populneus	Kurrajong	715412	7142449	FV18-26 BP10
Brachychiton populneus	Kurrajong	715456	7142445	FV18-26 BP11
Brachychiton populneus	Kurrajong	715453	7142451	FV18-26 BP12
Brachychiton populneus	Kurrajong	715456	7142457	FV18-26 BP13
Brachychiton populneus	Kurrajong	715445	7142461	FV18-26 BP14
Brachychiton populneus	Kurrajong	715433	7142458	FV18-26 BP15
Brachychiton populneus	Kurrajong	715492	7142441	FV18-26 BP16
Brachychiton populneus	Kurrajong	715489	7142484	FV18-26 BP17
Brachychiton populneus	Kurrajong	715459	7142506	FV18-26 BP18
Brachychiton populneus	Kurrajong	715464	7142543	FV18-26 BP19
Brachychiton populneus	Kurrajong	715459	7142546	FV18-26 BP20
Brachychiton populneus	Kurrajong	715445	7142607	FV18-26 BP21
Brachychiton populneus	Kurrajong	715359	7142636	FV18-26 BP22
Brachychiton populneus	Kurrajong	715344	7142642	FV18-26 BP23
Brachychiton populneus	Kurrajong	715358	7142645	FV18-26 BP24
Brachychiton populneus	Kurrajong	715363	7142668	FV18-26 BP25
Brachychiton populneus	Kurrajong	715298	7142697	FV18-26 BP26
Brachychiton populneus	Kurrajong	715230	7142760	FV18-26 BP27
Brachychiton populneus	Kurrajong	715230	7142765	FV18-26 BP28
Brachychiton populneus	Kurrajong	715227	7142777	FV18-26 BP29

Species name	Common name	Easting	Northing	GIS Code
Brachychiton populneus	Kurrajong	715210	7142796	FV18-26 BP30
Brachychiton populneus	Kurrajong	715262	7142785	FV18-26 BP31
Brachychiton populneus	Kurrajong	715110	7142874	FV18-26 BP32
Brachychiton populneus	Kurrajong	715120	7142897	FV18-26 BP33
Brachychiton populneus	Kurrajong	715124	7142903	FV18-26 BP34
Brachychiton populneus	Kurrajong	715159	7142919	FV18-26 BP35
Brachychiton populneus	Kurrajong	715149	7142924	FV18-26 BP36
Brachychiton populneus	Kurrajong	715109	7142927	FV18-26 BP37
Brachychiton populneus	Kurrajong	715058	7143037	FV18-26 BP38
Brachychiton populneus	Kurrajong	714956	7143114	FV18-26 BP39
Brachychiton populneus	Kurrajong	714883	7143171	FV18-26 BP40
Brachychiton populneus	Kurrajong	714881	7143214	FV18-26 BP41
Brachychiton populneus	Kurrajong	714843	7143214	FV18-26 BP42
Brachychiton populneus	Kurrajong	714860	7143220	FV18-26 BP43
Brachychiton populneus	Kurrajong	714580	7143460	FV18-26 BP44
Brachychiton populneus	Kurrajong	714582	7143464	FV18-26 BP45
Brachychiton populneus	Kurrajong	714585	7143465	FV18-26 BP46
Brachychiton populneus	Kurrajong	714586	7143469	FV18-26 BP47
Brachychiton populneus	Kurrajong	714590	7143471	FV18-26 BP48
Brachychiton populneus	Kurrajong	714600	7143487	FV18-26 BP49
Brachychiton populneus	Kurrajong	714541	7143500	FV18-26 BP50
Brachychiton populneus	Kurrajong	714540	7143591	FV18-26 BP51
Brachychiton populneus	Kurrajong	714496	7143612	FV18-26 BP52
Brachychiton populneus	Kurrajong	714483	7143612	FV18-26 BP53
Brachychiton populneus	Kurrajong	714474	7143646	FV18-26 BP54
Brachychiton populneus	Kurrajong	714474	7143649	FV18-26 BP55
Brachychiton populneus	Kurrajong	714476	7143652	FV18-26 BP56
Brachychiton populneus	Kurrajong	714485	7143645	FV18-26 BP57
Brachychiton populneus	Kurrajong	714486	7143646	FV18-26 BP58
Brachychiton populneus	Kurrajong	714513	7143650	FV18-26 BP59
Brachychiton populneus	Kurrajong	714466	7143668	FV18-26 BP60
Brachychiton populneus	Kurrajong	714470	7143676	FV18-26 BP61
Brachychiton populneus	Kurrajong	714492	7143668	FV18-26 BP62
Brachychiton populneus	Kurrajong	714500	7143676	FV18-26 BP63
Brachychiton populneus	Kurrajong	714444	7143703	FV18-26 BP64
Brachychiton populneus	Kurrajong	714410	7143764	FV18-26 BP65
Brachychiton populneus	Kurrajong	714386	7143819	FV18-26 BP66
Brachychiton populneus	Kurrajong	714381	7143880	FV18-26 BP67
Brachychiton populneus	Kurrajong	713989	7144627	FV18-26 BP68
Brachychiton populneus	Kurrajong	713644	7145116	FV18-26 BP69
Brachychiton populneus	Kurrajong	713628	7145131	FV18-26 BP70
Brachychiton populneus	Kurrajong	713457	7145257	FV18-26 BP71
Brachychiton populneus	Kurrajong	713449	7145275	FV18-26 BP72
Brachychiton populneus	Kurrajong	713471	7145314	FV18-26 BP73
Brachychiton populneus	Kurrajong	713480	7145316	FV18-26 BP74
Brachychiton populneus	Kurrajong	713442	7145324	FV18-26 BP75
Brachychiton populneus	Kurrajong	713441	7145348	FV18-26 BP76
Brachychiton populneus	Kurrajong	714790	7143216	FV18-26 BP77

Species name	Common name	Easting	Northing	GIS Code
Brachychiton populneus	Kurrajong	714786	7143218	FV18-26 BP78
Brachychiton populneus	Kurrajong	714344	7143854	FV18-26 BP79
Brachychiton rupestris	Narrow-leaved bottle tree	715410	7142421	FV18-26 BR1
Brachychiton rupestris	Narrow-leaved bottle tree	713640	7145113	FV18-26 BR2
Cymbidium canaliculatum	Black orchid	715272	7142211	FV18-26 CC1
Cymbidium canaliculatum	Black orchid	715116	7142943	FV18-26 CC2
Cymbidium canaliculatum	Black orchid	715430	7142477	FV18-26 CC3

Plate 6 - Black orchid (*Cymbidium caniculatum*)

Plate 7 - Juvenile kurrajong (*Brachychiton populneus*)

Plate 8 - Kurrajong (*Brachychiton populneus*)

4.3. Fauna

4.3.1. Fauna Habitat Values within the CDZ and Buffer

Within Vegetation Community 1, which dominated the CDZ and Buffer, a high abundance of habitat trees including mature, dead and decaying trees were recorded within the canopy and sub canopy providing potential habitat features including, hollows, perches and trees bearing loose bark. The understorey supported moderate shrub layer coverage with a diverse range of shrub species and regenerating tree species providing shelter and foraging habitat for common and adaptable

terrestrial fauna species. The ground storey supported moderate ground layer coverage of native and non - native vegetation with some rocks and boulders and a moderate to high abundance of organic matter including small and large logs, logs with hollows and leaf litter.

The disturbed non remnant areas within the CDZ and Buffer lacked a distinct forest structure (canopy, mid-storey and understorey), limiting ecosystem functionality and potential for fauna utilisation. These non-remnant areas contained very sparsely scattered mature trees observed to be, utilised as a perch for birds, bearing loose bark and containing hollows. The shrub layer was predominately scattered regrowth of white cypress pine and poplar box providing sub optimal shelter and foraging habitat for common and adaptable terrestrial fauna species. The ground storey contained native and non-native vegetation establishing moderate to high vegetation coverage with habitat features including some loose and embedded rocks and a moderate abundance of organic matter including woody debris owing to historic and recent land use practices which predominantly included selective clearing.

Plate 9, Plate 10, Plate 11 and **Plate 12** show representative photos of fauna habitat features found within the CDZ and Buffer.

Plate 9 - Stick nest within Vegetation Community 1

Plate 10 - Decorticating bark. Potential habitat for fauna, particularly small reptiles

Plate 11 - Coarse woody debris

Plate 12 - Stag with numerous hollows

4.3.2. MNES and EVNT Fauna Species

Desktop Assessment

Commonwealth Matters of National Environmental Significance (MNES) identified by a search of the Protected Matters Database using a 5 kilometre buffer around the CDZ and Buffer included 13 threatened fauna species and 9 migratory species. Results from the Wildlife Online database search using a 5 kilometre buffer around the CDZ and Buffer did not return any EVNT fauna species.

Field Assessment

No MNES or EVNT fauna were observed within the CDZ and Buffer during the field assessment.

4.3.3. Essential Habitat Mapping

As illustrated in **Attachment 8.4** - DEHP Vegetation Management Supporting Map, the CDZ, Buffer and immediate surrounds are not mapped as supporting Essential Habitat for threatened flora or fauna species.

4.3.4. Fauna Habitat Assessment for MNES and EVNT Fauna Species

For each MNES and EVNT species that was identified through the desktop assessment, their potential to occur within the CDZ and Buffer was determined based upon the habitat assemblages present within the CDZ and Buffer. From this assessment, two species were identified as either confirmed or likely to occur within the CDZ and Buffer, those being the squatter pigeon (*Geophaps scripta scripta*) and rainbow bee-eater (*Merops ornatus*) (all other MNES and EVNT species identified during the desktop assessment are unlikely to occur within the CDZ and Buffer). **Table 3** lists these two species, discusses their likelihood of occurring in each vegetation community and provides an assessment against their General Habitat requirements as defined in the SSMP. **Attachment 8.7** - Habitat Assessment and Likelihood of Occurrence of MNES and EVNT Species provides a full list of MNES and EVNT species sourced from the database searches, their potential to occur within the CDZ and Buffer and an assessment against their General Habitat requirements as defined in the SSMP.

Table 3 - MNES and EVNT Species Confirmed or Likely to Occur within the CDZ and Buffer

Species Name	Status	Likelihood of occurrence in Vegetation Community 1 (RE 11.10.9)	Likelihood of occurrence in Non remnant areas	Assessment against GENERAL HABITAT requirements
Geophaps scripta scripta (Squatter Pigeon)	V (EPBC Act) V (NC Act)	Likely	Possible	The CDZ and Buffer are not within close proximity of permanent water and has not been recorded as being utilised for breeding .The majority of the CDZ and Buffer contains RE 11.9.10 (a vegetation community associated with supporting general habitat for this species) and is within the vicinity of previously recorded siting's of this species, therefore this species is considered likely to occur. GENERAL HABITAT: Yes
Merops ornatus Rainbow bee-eater	Migratory (EPBC Act) SLC (NC Act)	Likely	Possible	The CDZ and Buffer contains general habitat, some essential microhabitat features and is within the vicinity of previously recorded siting's of this species, therefore this species is considered likely to occur. GENERAL HABITAT: Yes

4.3.5. Koalas

Desktop Assessment

Mapping illustrating Koala habitat (as defined by the Koala Plan) shows that the CDZ and Buffer falls within Koala District C. Although there is evidence of koala decline in this district, koalas are classified as *special least concern wildlife* under the NC Act due to a generally lower perceived threat to their survival.

Unlike Koala District A which falls within South-east Queensland where the koala is listed as Vulnerable (SEQ Bioregion), Koala District C is not supported by Koala Habitat mapping. Under the Koala Plan there are no specific conditions relating to koala management for Koala District C areas.

Condition 5 (b) of the CG Report however, stipulates "Preconstruction surveys of the activities in gas fields …… must identify koala habitat as defined under the *Nature Conservation (Koala) Conservation Plan 2006*. Specific mitigation measures and habitat offsets for residual impacts to koala habitat must be provided." The Koala Plan defines "koala habitat" as:

(a) a woodland where koalas currently live; or

(b) a partially or completely cleared area that is used by koalas to cross from 1 woodland where koalas currently live to another woodland where koalas currently live; or

(c) a woodland where koalas do not currently live, if the woodland -

(i) primarily consists of koala habitat trees; and

(ii) is reasonably suitable to sustain koalas.

Koala habitat trees are defined under the Koala Plan as "a tree of any of the following genera:

(a) *Angophora;*

(b) *Corymbia;*

(c) *Eucalyptus;*

(d) *Lophostemon;*

(e) *Melaleuca."*

Regional ecosystem mapping within the CDZ and Buffer shows that the CDZ and Buffer predominantly consists RE 11.10.9, a regional ecosystem which has the potential to contain koala habitat due to the presence of koala habitat trees, namely *Eucalyptus* spp. and *Corymbia* spp.

Field Assessment Results

The field assessment identified one vegetation community, Vegetation Community 1 (illustrated in **Attachment 8.1** - Ecological Assessment Area) which was analogous with regional ecosystem RE 11.10.9, as containing koala habitat trees. This community consisted of koala habitat trees within the canopy layer including poplar box (*Eucalyptus populnea*), silver-leaved ironbark (*Eucalyptus melanophloia*), smooth-barked apple (*Angophora leiocarpa*), Clarkson's bloodwood (*Corymbia clarksoniana*), Baradine red gum (*Eucalyptus chloroclada*) and Carbeen bloodwood (*Corymbia tessellaris*). However, no evidence of koala activity (i.e. scats or scratches) was observed during the survey and it is considered to be unlikely that this community and the remainder of the CDZ and Buffer are suitable to sustain koalas.

The likelihood of koalas utilising the CDZ and Buffer is discussed further in **Attachment 8.7** - Habitat Assessment and Likelihood of Occurrence of MNES and EVNT Species.

4.3.6. Fauna Species Observed within the CDZ and Buffer

One pest fauna species (declared under the LP Act) was observed within the CDZ and Buffer, i.e. European rabbit (*Oryctolagus cuniculus*). A full list of all fauna species observed within the CDZ and Buffer is provided in **Attachment 8.6** - Fauna Species List.

4.4. Ecosystem functionality

The condition of the CDZ and its ecosystem functionality is considered to be high within the area mapped and field verified as remnant regional ecosystem RE 11.10.9 (**Figure 2**). This high ecosystem functionality can be attributed to a high degree of connectivity between the CDZ and Buffer and surrounding remnant vegetation. It is unlikely that the proposed activities will impact on the ecosystem functionality of this regional ecosystem, however, within the CDZ the following impacts are likely:

- An increase in weed species within disturbed areas;
- A decrease in habitat features within the CDZ; and/or
- Possible increase in pest fauna utilisation in disturbed areas.

A small portion of the CDZ and Buffer is mapped and field verified as non-remnant vegetation (**Figure 2**). Ecosystem functionality within the non-remnant vegetation is low due to a predominantly disturbed community structure, the presence of introduced pasture grasses, and little evidence of fauna utilisation. Therefore, it is unlikely the proposed activities will impact on ecosystem functionality within non-remnant areas within the CDZ.

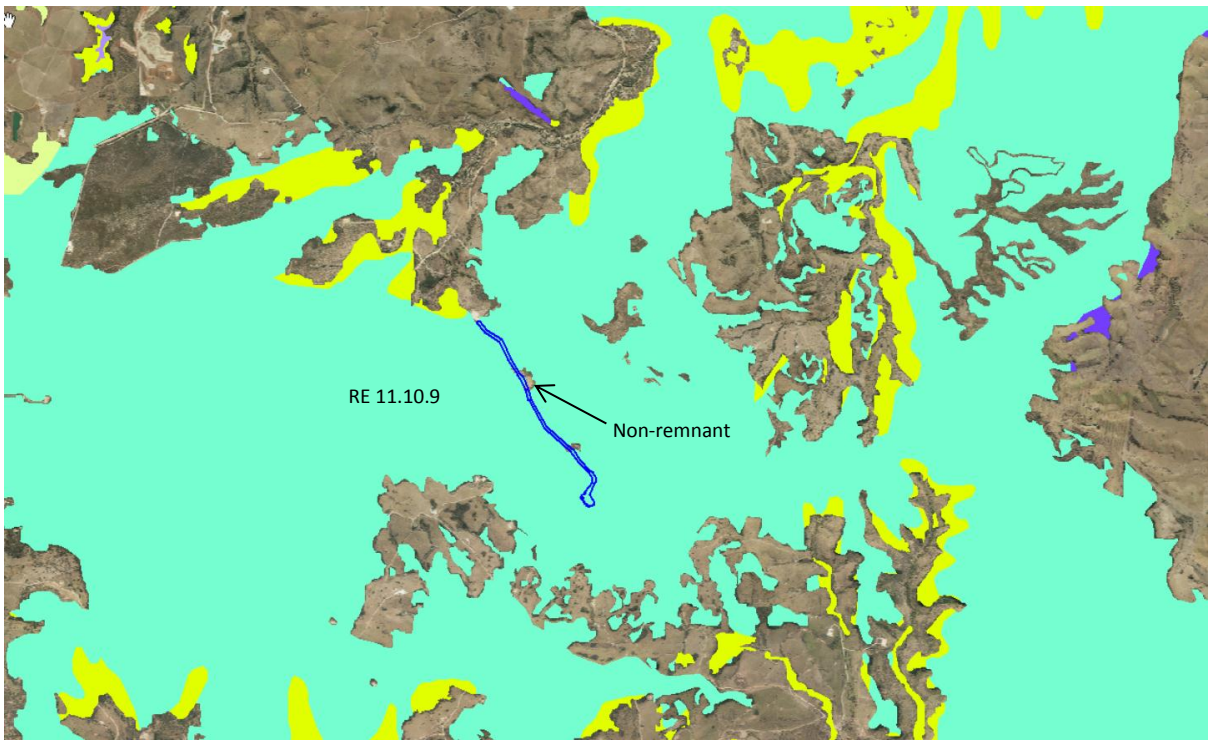

Figure 2 - Landscape context view

5. Summary and Recommendations

5.1. Summary

The ecological survey conducted for FV18-26 was carried out in accordance with the environmental conditions required by relevant GLNG Project approvals and revealed the following key information:

- No referable wetlands were identified within the CDZ and Buffer and it is unlikely any HES or GES wetlands are likely to be impact by activities within the CDZ and Buffer.
- No lakes or springs were identified within the CDZ and Buffer
- Two mapped stream order 1 watercourses were field verified as drainage features and a stream order 2 as a watercourse as defined under the *Water Act 2000*.
- No TECs were identified within the CDZ and Buffer or within 200m of the CDZ and Buffer
- No Environmentally Sensitive Areas occur within the CDZ.
- One Category C ESA was identified within 200m of the CDZ and Buffer, that being Hallett State Forest which occurs within 200m of the access track.
- The majority of the CDZ and Buffer occurs within RE 11.10.9 (No Concern at Present), with a small portion of the access track occurring within non-remnant vegetation.
- Three Type A species, kurrajong (*Brachychiton populneus*), narrow-leaved bottle tree (*Brachychiton rupestris*) and black orchid (*Cymbidium caniculatum*), were identified within the CDZ and Buffer.

- No MNES or EVNT flora or fauna species were identified during the field assessment as occurring within the CDZ and Buffer.
- Two MNES species were identified as likely to occur within the CDZ and Buffer, namely squatter pigeon (Vulnerable under the EPBC Act and (Vulnerable under the NC Act) and rainbow bee eater (Migratory under the EPBC Act and Special Least Concern under the NC Act).
- No essential habitat was mapped within or in proximity to the CDZ and Buffer.
- General habitat for MNES species including squatter pigeon, northern quoll, south-eastern long-eared bat, koala, large-eared pied bat, collared delma, yakka skink, Dunmall's snake, brigalow scaly foot, rainbow bee-eater, satin flycatcher and cattle egret was identified within the CDZ.
- The CDZ and Buffer is not mapped as Koala habitat as defined by the Koala Plan. No Koalas or signs of Koala activity (scats or scratches) were observed during the CDZ and Buffer survey.

5.2. Recommendations

Considering two threatened fauna species were identified as likely to occur within the CDZ and Buffer, the presence of general habitat for numerous MNES species and the high abundance of fauna habitat values, project managers should consider using an experienced fauna handler (i.e. spotter-catcher) holding a valid State Rehabilitation Permit to undertake a preclearance fauna habitat survey prior to and as close as practicable to clearing operations taking place. The fauna handler should also be within the CDZ and Buffer during all clearing operations to undertake all fauna management responsibilities in accordance with the Upstream Species Management Plan for Roma, Arcadia and Fairview CSG Fields (231733-002-002) and the RSGPA Fauna Management Plan (0020-GLNG-4-1.3-0073).

Management of the TAR species must be undertaken in accordance with the Type A Restricted Plant Species Salvage Management Plan for the Coal Seam Gas Fields (TARPSSMP).

Clearing and grading activities must be conducted in conjunction with the implementation of erosion and sediment control measures in accordance with the GLNG Erosion and Sediment Control Manual. The current condition of the area relies on the mix of grassy ground cover to maintain soil stability. Any clearing activity is likely to increase the potential risk of erosion and loss of sediment.

6. Reference Documents

6.1. Project References

- GLNG. 0020-GLNG-4-1.3-0053, Rev 0 Santos GLNG Upstream – Type A Restricted Plant Species Salvage Management Plan for the Coal Seam Gas Fields (TARPSSMP);
- GLNG (2012) 0020-GLNG-41.3-0003, CSG Fields Significant Species Management Plan;

6.2. Other Reference Documents

- Aurecon (2012) Upstream Species Management Plan for Roma, Arcadia and Fairview CSG Fields (231733-002-002).
- Aurecon (2011) GLNG Project Upstream Activities Erosion and Sediment Control Manual, Ref 213885, 27 July 2011.
- Bostock, P.D. & Holland, A.E. (eds) (2010). Census of the Queensland Flora 2010. Queensland Herbarium, Department of Environment and Resource Management, Brisbane.
- DEHP (2013). *Environmental Protection Act 1994* Fairview Project Area Environmental Authority: Permit number EPPG00928713 (PEN100178208) dated 18 December 2013.
- DERM (2011) QH_Springs_db.zip data, Dataset Custodian – QLD Herbarium DERM, Dataset Date – September 2011, Metadata Date – 16-09-2011.
- EPBC Act Approval (2010). EPBC Approval to develop, construct, operate and decommission coal seam gas resources in the Surat and Bowen Basins between Roma and Emerald in Queensland to supply gas for a related proposal for a natural gas liquefaction and export facility near Gladstone as described in referral EPBC No 2008/4059. Australian Government Department of Sustainability, Environment, Water, Population and Communities dated 22 October 2010.
- Geoscience Australia (2013) Geoscience Australia (formerly AUSLIG) 250k raster.
- Neldner, V., Wilson, B., Thompson, E., Dillewaard, H. (2012). Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Version 3.2), Environmental Protection Agency, Queensland.
- Queensland Government (2010) Coordinator-General's evaluation report for an environmental impact statement Gladstone Liquefied Natural Gas - GLNG project. May 2010.
- RPS (2013). Stage 2 – Ecology Field Assessment: Fairview Eastern Flank.

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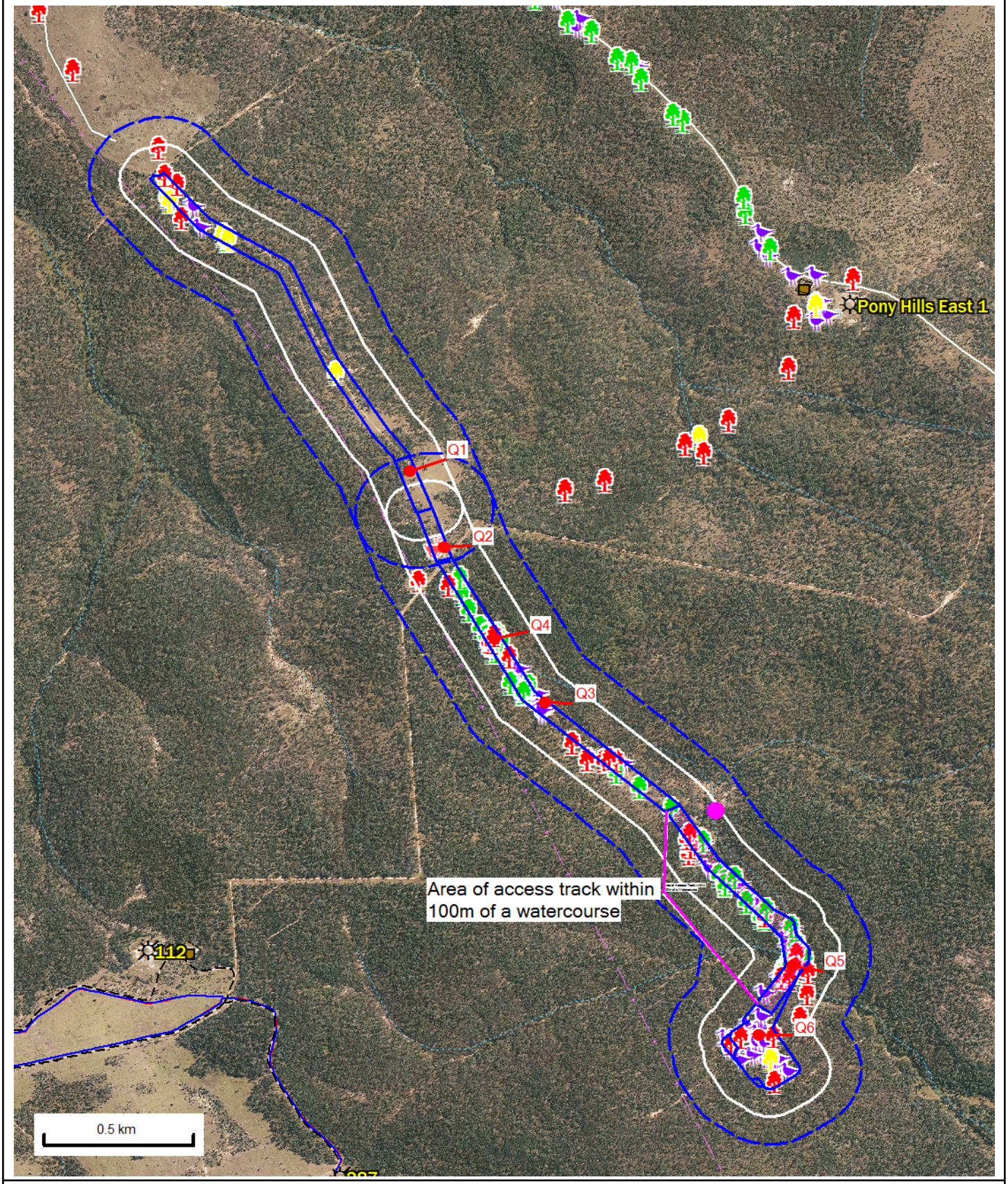
Attachment 8.1 - Ecological Assessment Area



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FV18-26 Ecological Assessment Areas

Drawn by:
Print date: 10 Jan 2014 08:55 AM

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Attachment 8.2 - Quaternary Data Sheets

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Quaternary Data Sheet

CDZ and Buffer no: FV18-26 **Q5**	**Date**: 15/12/13	**Recorder: Lincoln Smith**
Locality/coordinates: 715444, 7142463(Creek crossing)		

Flora

Tree layer 1 Cover: 10% Av Height: 22m Height Range: 17m - 27m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Eucalyptus populnea* (Poplar Box)	A
Eucalyptus melanophloia (Silver Leaved Ironbark)	A	*Eucalyptus chloroclada* (Baradine Red Gum)	A
Corymbia tessellaris (Moreton Bay Ash)	A		
Tree layer 2 Cover: 50% Av Height: 10m Height Range :5m -16m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Acacia leiocalyx* (Black Wattle)	A
Eremophila mitchellii (False Sandalwood)	A	*Allocasuarina leuhmannii* (Bull Oak)	A
Acacia excelsa (Iron wood)	A	*Eucalyptus chloroclada* (Baradine Red Gum)	A
Shrub layer 1 Cover: 30% Av Height: 2m Height Range : 1m - 4m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Brachychiton populneus* (Kurrajong)	A
Santalum lanceolatum (Sandalwood)	A	*Ventilago viminalis* (Vine Tree)	A
Casuarina cristata (Belah)	A		
Ground layer. Cover: 70% Av Height: 0.2m			
Species	Rel Dom	Species	Rel Dom
Themeda triandra (Kangaroo Grass)	D	*Sida acuta* (Spiny Headed Sida)	A
Pennisetum ciliare (Buffel Grass)	CD	*Sclerolaena birchii* (Galvanised Burr)	A
Aristida calycina (Dark Wiregrass)	A	*Cyperus polystachyos* (Bunchy Sedge)	A
Themeda avenacea (Wild Oats Grass)	A	*Glycine tomentella* (Hairy Glycine)	A
Cyperus gracilis (Slender Flat Sedge)	A	*Juncus usitatus* (Common Rush)	A

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Cynodon dactylon (Green Couch)	A	*Austrostipa verticillata* (Slender Bamboo Grass)	A

Geology, landform, soils	Woody Stem Counts 10m X 10m	
Geology code and rock types: Coarse- grained sandstone	T1	1
Landform: Moderate slope to shoulder of creek bank. Channel bed consists of sand and sandstone substrate. Creek banks consist of sand and sandstone forming scarps.	T2	2
Soils: Sandy loam and alluvial sand	S1	2

Regional Ecosystems (RE) / Endangered Ecological Community (EEC)

Mapped RE: 11.10.9	Landzone 10
Corresponding EEC (mapped):	
Ground truthed RE: 11.10.9	Landzone: 10
Corresponding EEC (ground truthed):	

Vegetation Short Description

Moderate density of T1 and T2 species dominated by *Callitirs glaucophylla* with a moderate shrublayer and dense grassy groundlayer species including *Juncus usitatus* were observed within and adjacent the creek line.

Connectivity/Patch Characteristics

Creek line is SO2 (watercourse) within and adjoining intact RE11.10.9.

EVR/Type A Flora Present	**EVR/Type A Flora Likely**
Brachychiton populneus	*Brachychiton populneus (*Kurrajong) *Brachychiton rupestris (*Bottle tree), *Cimbidiums, Xanthorrhoeas.*

Fauna Habitat Features

Density scores: **0** = 0%; **1** = <25%; **2** = 26-50%; **3** = 51-75%; **4** = 75-99%; **5** = 100% abundance.

Rocks - embedded	2	Boulders	1	Shrub layer	1	Ground cover	4
Rocks - loose	1	Fallen Bark	2	Leaf litter	2	Bare ground	1

Abundance Scores: **0** = absent; **1** = 1-5; **2** = 6-20; **3** = 21-50; **4** = 51-75; **5** = 76-100; **6**= >100. In a 1 ha area.

Crevices/ledges	**1**	Large logs (>30cm diamteter)	**2**	Trees/logs bearing loose bark	**3**
Underhangs/overhangs/caves	**1**	Logs with hollows	**1**	Termite mounds	**1**
Small logs (<30cm diameter)	**4**	Hollow bearing /mature trees	**2**	Mistletoe	**0**

EVNT Fauna Present

Nil

Disturbances (e.g. grazed, ploughed, flooded)

Existing track, Erosion

Incidental Fauna Observations

Pied Currawong, Striated pardalote, Noisy friarbird	Pheasant, Eastern striped skink, Skink
Red backed fairy Wren, Apostlebird	Noisy minor, European rabbit,

Notes on watercourses, wetlands, lakes or springs

Stream Order 2 creek line containing defined banks with potential habitat values, riparian vegetation, defined channel and creek bed consisting of sand and sandstone substrate, pooled water, flood debris, exposed roots, overhangs and undercuts. This assessment applies to observations recorded for the creekline that is within 100m of the access track between 715059E 7143036N and 715344E 7142309N as shown in the ecological assessment area map. This SO2 is a watercourse. The northern point of the SO2 (Watercourse) is 715198E 7143025N and north of this point is a drainage feature and does not meet the definition of a watercourse.

Additional Notes Below

Fauna spotter required.

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Quaternary Data Sheet

CDZ and Buffer no: FV18-26 **Q4**	**Date**: 19/01/13	**Recorder: Lincoln Smith**
Locality/coordinates: 714492, 7143657(North end of Southern Section)		

Flora

Tree layer 1 Cover: 10% Av Height: 22m Height Range: 18- 30m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Corymbia clarksoniana* (Clarkson's Bloodwood)	A
Eucalyptus melanophloia (Silver Leaved Ironbark)	CD	*Corymbia tessellaris* (Moreton Bay Ash)	A
Eucalyptus populnea (Poplar Box)	CD	*Ventilago viminalis* (Vine Tree)	A
Tree layer 2 Cover: 30% Av Height: 15 Height Range: 9 – 17m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Acacia excelsa* (Iron wood)	A
Eucalyptus populnea (Poplar Box)	CD	*Eremophila mitchellii* (False Sandalwood)	A
Eucalyptus melanophloia (Silver Leaved Ironbark)	CD	*Allocasuarina leuhmannii* (Bull Oak)	A
Corymbia tessellaris (Moreton Bay Ash)	A		
Shrub layer 1 Cover: 60% Av Height: 4m Height Range: 2 – 8m			
Species	Rel Dom	Species	Rel Dom
Eremophila mitchellii (False Sandalwood)	D	*Acacia leiocalyx* (Black Wattle)	A
Acacia excelsa (Iron wood)	A	*Geijera parviflora* (Wilga)	A
Grevillea striata (Beefwood)	A	*Ventilago viminalis* (Vine Tree)	A
Brachychiton populneus (Kurrajong)	A	*Carissa ovata* (Currant Bush)	A
Petalostigma pubescens (Quinine)	A	*Santalum lanceolatum* (Sandalwood)	A
Allocasuarina leuhmannii (Bull Oak)	A	*Alphitonia excelsa* (Red Ash)	A
Capparis lasiantha (Native Orange)	A	*Hakea lorea* (Bootlace Oak)	A
Cymbidium canaliculatum (Black Orchid)	A	Capparis canescens (Wild Orange)	A
Corymbia tessellaris (Moreton Bay Ash)	A	*Acacia decora* (Pretty Wattle)	A
Ground layer. Cover: 40% Av Height: 0.02			
Species	Rel Dom	Species	Rel Dom
Pennisetum ciliare (Buffel Grass)	D	*Sclerolaena birchii* (Galvanised Burr)	A

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Aristida caput medusae (Many Headed Wire Grass)	CD	Aristida calycina (Dark Wiregrass)	A
Aristida calycina (Dark Wiregrass)	A	*Grewia latifolia* (Dysentery Plant)	A
Capparis lasiantha (Wait-a- While)	A	*Tridax procumbens* (Tridax Daisy)	A
Sclerolaena birchii (Galvanised Burr)	A	*Aristida holathera* (Tall Wire Grass)	A
Murdannia graminea (Slug Herb)	A		

Geology, landform, soils

	Woody Stem Counts 10m X 10m	
Geology code and rock types: coarse grained sandstone	T1	1
Landform: Moderately sloping and undulating	T2	3
Soils: Sandy loam	S1	6

Regional Ecosystems (RE) / Endangered Ecological Community (EEC)

Mapped RE: 11.10.9	Landzone 10
Corresponding EEC (mapped):	
Ground truthed RE: 11.10.9	Landzone: 10
Corresponding EEC (ground truthed):	

Vegetation Short Description

Scattered mixed tree species form a sparse T1 Layer, and a moderate T2 Layer dominated by *Callitris glaucophylla*. *Callitris glaucophylla* is dominant within the shrub layer forming dense patches and sparse ground layer coverage dominated by *Cenchrus ciliaris* (Buffel Grass).

Patches of vegetation not dominated by *Callitris glaucophylla* in the shrub layer contain dense ground layer coverage of mixed species dominated by *Cenchrus ciliaris* (Buffel Grass).

Connectivity/Patch Characteristics

Cleared fence line running southwest to northeast, and area of Non remnant selectively cleared to the north. The remaining areas are intact RE 11.10.9.with grazed ground layer.(Refer to aerial imagery)

EVR/Type A Flora Present	**EVR/Type A Flora Likely**
Brachychiton populneus	*Brachychiton populneus* (Kurrajong) *Brachychiton rupestris* (Bottle tree), *Cimbidiums, Xanthorrhoeas.*

Fauna Habitat Features

Density scores: **0** = 0%; **1** = <25%; **2** = 26-50%; **3** = 51-75%; **4** = 75-99%; **5** = 100% abundance.

Rocks - embedded	1	Boulders	0	Shrub layer	3	Ground cover	3
Rocks - loose	1	Fallen Bark	1	Leaf litter	2	Bare ground	2

Abundance Scores: **0** = absent; **1** = 1-5; **2** = 6-20; **3** = 21-50; **4** = 51-75; **5** = 76-100; **6**= >100. In a 1 ha area.

Crevices/ledges	**0**	Large logs (>30cm diamteter)	**2**	Trees/logs bearing loose bark	**2**
Underhangs/overhangs/caves	**0**	Logs with hollows	**2**	Termite mounds	**1**
Small logs (<30cm diameter)	**3**	Hollow bearing /mature trees	**1**	Mistletoe	**1**

EVNT Fauna Present

Nil

Disturbances (e.g. grazed, ploughed, flooded)

Access track, Erosion, Fire.

Incidental Fauna Observations

Kangaroo,	Pied currawong
Macropod Scats	

Notes on watercourses, wetlands, lakes or springs

Nil

Additional Notes Below

Fauna spotter required.

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Quaternary Data Sheet

CDZ and Buffer no: FV18-26 CDZ and Buffer Q2	**Date**: 18/01/13	**Recorder: Lincoln Smith**
Locality/coordinates: 0714330, 7143990 (South End of Northern Section)		

Flora

Tree layer 1 Cover: <5% Av Height: 22m Height Range: 19m – 30m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Corymbia clarksoniana* (Clarkson's Bloodwood)	A
Eucalyptus melanophloia (Silver Leaved Ironbark)	CD	*Eucalyptus populnea* (Poplar Box)	A
Tree layer 2 Cover: <5% Av Height: 15m Height Range : 10m – 18m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Acacia excelsa* (Iron wood)	A
Allocasuarina leuhmanii (Bull Oak)	A	*Atalaya hemiglauca* (Whitewood)	A
Acacia leiocalyx (Black Wattle)	A		
Shrub layer 1 Cover: 20% Av Height: 4m Height Range : 2m -8m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Eucalyptus melanophloia* (Silver Leaved Ironbark)	A
Eucalyptus populnea (Poplar Box)	A	*Alphitonia excelsa* (Red Ash)	A
Allocasuarina leuhmanii (Bull Oak)	A	*Acacia excelsa* (Iron wood)	A
Ground layer. Cover: 70% Av Height: 0 .02m			
Species	Rel Dom	Species	Rel Dom
Pennisetum ciliare (Buffel Grass)	D	*Grewia latifolia* (Dysentery Plant)	A
Murdannia graminea (Slug Herb)	A	*Sida subspicata* (Spiked Sida)	A
Aristida caput medusae (Many Headed Wire Grass)	A	*Sclerolaena birchii* (Galvanised Burr)	A
Aristida calycina (Dark Wiregrass)	A	*Aristida holathera* (Tall Wire Grass)	A
Bracteantha bracteata (Everlasting Daisy)	A		

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Geology, landform, soils	Woody Stem Counts 10m X 10m	
Geology code and rock types:coarse grained sandstone	T1	0.03
Landform: Slightly undulating	T2	0.03
Soils: Sandy loam	S1	1.5

Regional Ecosystems (RE) / Endangered Ecological Community (EEC)

Mapped RE: 11.10.9 and Non -remnant	Landzone: 10
Corresponding EEC (mapped):	
Ground truthed RE: Non- remnant adjoining intact RE 11.10.9	Landzone: 10
Corresponding EEC (ground truthed):	

Vegetation Short Description

Sparsely scattered clumps of *Callitris glaucophylla* within area highly disturbed by selective clearing. Groundlayer has a moderate coverage after recent disturbance from fire.

A dense patch of *Callitris glaucophylla* regrowth averaging 4m height within non-remnant area.

Connectivity/Patch Characteristics

Surrounded by intact RE 11.10.9.

EVR/Type A Flora Present	EVR/Type A Flora Likely
*Brachychiton populneus (*Kurrajong)	*Brachychiton populneus (*Kurrajong) *Brachychiton rupestris (*Bottle tree), *Cimbidiums, Xanthorrhoeas.*

Fauna Habitat Features

Density scores: **0** = 0%; **1** = <25%; **2** = 26-50%; **3** = 51-75%; **4** = 75-99%; **5** = 100% abundance.

Rocks - embedded	1	Boulders	0	Shrub layer	2	Ground cover	3
Rocks - loose	1	Fallen Bark	1	Leaf litter	1	Bare ground	2

Abundance Scores: **0** = absent; **1** = 1-5; **2** = 6-20; **3** = 21-50; **4** = 51-75; **5** = 76-100; **6**= >100. In a 1 ha area.

Crevices/ledges	**0**	Large logs (>30cm diamteter)	**3**	Trees/logs bearing loose bark	**2**
Underhangs/overhangs/caves	**0**	Logs with hollows	**2**	Termite mounds	**1**
Small logs (<30cm diameter)	**4**	Hollow bearing /mature trees	**0**	Mistletoe	**0**

EVNT Fauna Present

Nil

Disturbances (e.g. grazed, ploughed, flooded)

Selective and Historical clearing, Fire, Existing track, Grazing, Erosion

Incidental Fauna Observations

Happy Jacks, striped skink	Macropod scats

Notes on watercourses, wetlands, lakes or springs

Nil

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Quaternary Data Sheet

CDZ and Buffer no: FV18-26 **Q3**	**Date**: 20/01/13	**Recorder: Lincoln Smith**
Locality/coordinates: 714652, 7143423 (Southern Section (Eco-tone of 11.10.9 and Non Remnant))		

Flora

Tree layer 1 Cover: 0.5% Av Height: 22 m Height Range : 18m – 30m			
Species	Rel Dom	Species	Rel Dom
Eucalyptus populnea (Poplar Box)	D	*Ventilago viminalis* (Vine Tree)	A
Corymbia tessellaris (Moreton Bay Ash)	A		
Tree layer 2 Cover: 20% Av Height: 11m Height Range : 9m-17m			
Species	Rel Dom	Species	Rel Dom
Acacia excelsa (Iron wood)	D	Parsonsia straminea (Monkey rope vine)	A
Grevillea striata (Beefwood)	A	*Callitris glaucophylla* (White Cypress Pine)	A
Eremophila mitchellii (False Sandalwood)	A		
Shrub layer 1 Cover: 20% Av Height: 4m Height Range : 2m-8m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Casuarina cristata* (Belah)	A
Acacia leiocalyx (Black Wattle)	A	*Capparis canescens* (Wild Orange)	A
Grevillea striata (Beefwood)	A	*Solanum nigrum* (Blackberry Nightshade)	A
Petalostigma pubescens (Quinine Bush)	A	*Ventilago viminalis* (Vine Tree)	A
Santalum lanceolatum (Sandalwood)	A	*Eremophila mitchellii* (False Sandalwood)	A
Ground layer. Cover: 90% Av Height: 0.2m			
Species	Rel Dom	Species	Rel Dom
Pennisetum ciliare (Buffel Grass)	D	*Sida acuta* (Spinyhead Sida)	A
Murdannia graminea (Slug Herb)	A	*Themeda sp.*(Tall Themeda)	A
Lomandra longifolia (Common rush)	A	*Aristida caput medusae* (Many Headed Wire Grass)	A
Juncus sp.(Common Rush)	A	*Aristida holathera* (Tall Wire Grass)	A
Aristida calycina (Dark Wiregrass)	A	*Grewia latifolia* (Dysentery Plant)	A
Alloteropsis semialata (Cockatoo Grass)	A	Capparis lasiantha (Wait-a- While)	A

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Geology, landform, soils	Woody Stem Counts 10m X 10m	
Geology code and rock types:	T1	0.5m
Landform: Slightly undulating	T2	2
Soils: Sandy loam	S1	3

Regional Ecosystems (RE) / Endangered Ecological Community (EEC)

Mapped RE: 11.10.9 Eco tone and Non remnant	Landzone: 10
Corresponding EEC (mapped):	
Ground truthed RE: 11.10.9 Eco tone and Non remnant	Landzone: 10
Corresponding EEC (ground truthed):	

Vegetation Short Description

Ecotone of RE 11.10.9 and Non remnant containing a dense ground layer coverage of mixed species and sparsely scattered T1 and T2 and shrub layer species.

The Non remnant area has been historically and selectively cleared with patches of *Callitris glaucophylla* and woody regrowth. Non remnant area contains very sparsely scattered T1, T2 and shrub layer in areas subjected to selective clearing.

Connectivity/Patch Characteristics

Non remnant area is surrounded by intact RE11.10.9. The Non remnant area contains moderate habitat value

EVR/Type A Flora Present	EVR/Type A Flora Likely
*Brachychiton populneus (*Kurrajong)	*Brachychiton populneus (*Kurrajong) *Brachychiton rupestris (*Bottle tree), *Cimbidiums, Xanthorrhoeas.*

Fauna Habitat Features

Density scores: **0** = 0%; **1** = <25%; **2** = 26-50%; **3** = 51-75%; **4** = 75-99%; **5** = 100% abundance.

Rocks - embedded	1	Boulders	0	Shrub layer	2	Ground cover	4
Rocks - loose	1	Fallen Bark	2	Leaf litter	3	Bare ground	1

Abundance Scores: **0** = absent; **1** = 1-5; **2** = 6-20; **3** = 21-50; **4** = 51-75; **5** = 76-100; **6**= >100. In a 1 ha area.

Crevices/ledges	**0**	Large logs (>30cm diamteter)	**3**	Trees/logs bearing loose bark	**3**
Underhangs/overhangs/caves	**0**	Logs with hollows	**2**	Termite mounds	**1**
Small logs (<30cm diameter)	**3**	Hollow bearing /mature trees	**2**	Mistletoe	**1**

EVNT Fauna Present

Nil

Disturbances (e.g. grazed, ploughed, flooded)

Grazed, Existing track,

Incidental Fauna Observations

Macropod Scats	
Pied currawong	

Notes on watercourses, wetlands, lakes or springs

Nil

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Additional Notes Below

Fauna spotter required.

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Quaternary Data Sheet

CDZ and Buffer no: FV18-26 **Q5**	**Date**: 14/12/13	**Recorder: Lincoln Smith**
Locality/coordinates: 715330, 7142215(Lease Area)		

Flora

Tree layer 1
Cover: 15% Av Height: 18m Height Range: 15m – 25m

Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Angophora leiocarpa* (Smooth-barked Apple)	A
Eremophila mitchellii (False Sandalwood)	A	*Corymbia tessellaris* (Moreton Bay Ash)	A
Eucalyptus melanophloia (Silver – leaved Ironbark)	*A*	*Eucalyptus populnea* (Poplar Box)	*A*

Tree layer 2
Cover: 50% Av Height: 9m Height Range: 5m -14m

Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Eremophila mitchellii* (False Sandalwood)	A
Acacia excelsa (Iron wood)	A	*Allocasuarina leuhmannii* (Bull Oak)	A
Corymbia clarksoniana (Small – fruited Bloodwood)	A		

Shrub layer 1
Cover: 15% Av Height: 2m Height Range:1m – 4m

Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Ventilago viminalis* (Vine Tree)	A
Acacia leiocalyx (Black Wattle)	A	*Psydrax oleifolia* (Brush Myrtle)	A
Acacia decora (Pretty Wattle)	A	*Hakea lorea* (Bootlace Oak)	A
Atalaya hemiglauca (Whitewood)	A	*Grevillea striata* (Beefwood)	A
Eremophila mitchellii (False Sandalwood)	A	*Geijera parviflora* (Wilga)	A
Brachychiton populneus (Kurrajong)	A	*Alphitonia excelsa* (Red Ash)	A
Petalostigma pubescens (Quinine Bush)	A	*Acacia excelsa* (Iron wood)	A
Carissa ovata (Currant Bush)	A		

Ground layer.
Cover: 60% Av Height: 0.4m

Species	Rel Dom	Species	Rel Dom
Pennisetum ciliare (Buffel Grass)	D	*Heteropogon contortus* (Black Spear Grass)	A
Aristida caput medusae (Many Headed Wire Grass)	A	*Moss sp.*	A
Capparis lasiantha (Wait-a- While)	A	*Lichen sp.*	A
Enteropogon rasmosus (Twirly Windmill Grass)	A	*Cyperusgracilis* (Slender Flat Sedge)	A
Themeda triandra (Kangaroo Grass)	A	*Aristida jerichoensis* (Jericho Grass)	A

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Dodonaea viscosa (Sticky Hop Bush)	A	*Cheilanthes sieberi* (Mulga Fern)	A
Themeda sp. (Tall Themeda)	A	*Apophyllum anomalum* (Broom Bush)	A

Geology, landform, soils	Woody Stem Counts 10m X 10m	
Geology code and rock types: Coarse-grained sandstone	T1	2
Landform: Gentle slope	T2	8
Soils: Brown loam	S1	3

Regional Ecosystems (RE) / Endangered Ecological Community (EEC)

Mapped RE: 11.10.9	Landzone: 10
Corresponding EEC (mapped):	
Ground truthed RE: 11.10.9	Landzone: 10
Corresponding EEC (ground truthed):	

Vegetation Short Description

Woodland dominated by *Callitris glaucophylla;* T2 layer is dense and dominated by *Callitris glaucophylla* forming the EDL.

Connectivity/Patch Characteristics

High - Lease area is within intact RE 11.10.9 and contains high habitat value

EVR/Type A Flora Present	**EVR/Type A Flora Likely**
*Brachyhiiton populneus (*Kurrajong)	*Brachychiton populneus (*Kurrajong) *Brachychiton rupestris (*Bottle tree), *Cimbidiums, Xanthorrhoeas.*

Fauna Habitat Features

Density scores: **0** = 0%; **1** = <25%; **2** = 26-50%; **3** = 51-75%; **4** = 75-99%; **5** = 100% abundance.

Rocks - embedded	1	Boulders	1	Shrub layer	2	Ground cover	3
Rocks - loose	1	Fallen Bark	2	Leaf litter	3	Bare ground	1

Abundance Scores: **0** = absent; **1** = 1-5; **2** = 6-20; **3** = 21-50; **4** = 51-75; **5** = 76-100; **6**= >100. In a 1 ha area.

Crevices/ledges	**1**	Large logs (>30cm diamteter)	**3**	Trees/logs bearing loose bark	**4**
Underhangs/overhangs/caves	**0**	Logs with hollows	**3**	Termite mounds	**1**
Small logs (<30cm diameter)	**4**	Hollow bearing /mature trees	**3**	Mistletoe	**1**

EVNT Fauna Present

Nil

Disturbances (e.g. grazed, ploughed, flooded)

Erosion,

Incidental Fauna Observations

Macropod Scats, Grey-crowned babler, Australian raven, Laughing kookaburra, Apostlebird, Red necked wallaby,

Pied currawong, Pale-headed Rosella, Pied butcherbird, Black-faced cuckoo shrike

Notes on watercourses, wetlands, lakes or springs

Adjacent drainage feature (not mapped) that does not meet the definition of a watercourse including: would only retain water during a rainfall event. No watercourse in or within100m of the lease area. No Wetlands within 200m of the lease.

Additional Notes Below

Fauna spotter required

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Quaternary Data Sheet

CDZ and Buffer no: FV18-26 CDZ and Buffer Q1	**Date**: 17/01/13	**Recorder: Lincoln Smith**
Locality/coordinates: 7144222, 7144268 (North end of North Section)		

Flora

Tree layer 1 Cover: ~5% Av Height: 22m Height Range : 20m – 30m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Grevillea striata* (Beefwood)	A
Eucalyptus melanophloia (Silver Leaved Ironbark)	CD	*Corymbia tessellaris* (Moreton Bay Ash)	A
Eucalyptus populnea (Poplar Box)	A		
Tree layer 2 A Cover: 30% Av Height: 15m Height Range : 10m -19m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Corymbia clarksoniana* (Clarkson's Bloodwood)	A
Allocasuarina leuhmannii (Bull Oak)	A	*Corymbia tessellaris* (Moreton Bay Ash)	A
Eremophila mitchellii (False Sandalwood)	A		
Shrub layer 1 Cover: 60% Av Height: 5m Height Range : 2m – 9m			
Species	Rel Dom	Species	Rel Dom
Callitris glaucophylla (White Cypress Pine)	D	*Santalum lanceolatum* (Sandalwood)	A
Allocasuarina leuhmannii (Bull Oak)	A	*Alphitonia excelsa* (Red Ash)	A
Carissa ovata (Currant Bush)	A	*Acacia leiocalyx* (Black Wattle)	A
Eremophila mitchellii (False Sandalwood)	A	*Petalostigma pubescens* (Quinine Bush)	A
Acacia furrowed lower etc	A	*Acacia excelsa* (Iron wood)	A
		Acacia sp.	A
Ground layer. Cover: 30% Av Height: 0.2m			
Species	Rel Dom	Species	Rel Dom
Pennisetum ciliare (Buffel Grass)	D	Aristida calycina (Dark Wiregrass)	A
Tridax procumbens (Tridax Daisy)	A	*Murdannia graminea* (Slug Herb)	A
Aristida caput medusae (Many Headed Wire Grass)	A	*Grewia latifolia* (Dysentery Plant)	A
Capparis lasiantha (Wait-a- While)	A	*Murdannia graminea* (Slug Herb)	A
Alloteropsis semialata (Cockatoo Grass)	A	*Aristida holathera* (Tall Wire Grass)	A

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Geology, landform, soils	Woody Stem Counts 10m X 10m	
Geology code and rock types: coarse grained sandstone	T1	0.5
Landform: Moderately sloping and undulating	T2	3
Soils: Sandy loam	S1	6

Regional Ecosystems (RE) / Endangered Ecological Community (EEC)

Mapped RE: 11.10.9	Landzone: 10
Corresponding EEC (mapped):	
Ground truthed RE: 11.10.9	Landzone: 10
Corresponding EEC (ground truthed):	

Vegetation Short Description

Scattered mixed tree species form a sparse T1 Layer, and a moderate T2 Layer dominated by *Callitris glaucophylla*. *Callitris glaucophylla* is dominant within the shrub layer forming dense patches and sparse groundlayer coverage dominated by *Pennisetum ciliare* (Buffel Grass)

Patches of vegetation not dominated by *callitris glaucophylla* contain a dense groundlayer coverage of mixed species

Connectivity/Patch Characteristics

Cleared area mapped Non remnant adjacent to the north and within intact RE 11.10.9 east, west and south.

EVR/Type A Flora Present	EVR/Type A Flora Likely
Brachychiton populneus	*Brachychiton populneus (*Kurrajong) *Brachychiton rupestris (*Bottle tree), *Cimbidiums, Xanthorrhoeas.*

Fauna Habitat Features

Density scores: **0** = 0%; **1** = <25%; **2** = 26-50%; **3** = 51-75%; **4** = 75-99%; **5** = 100% abundance.

Rocks - embedded	0	Boulders	0	Shrub layer	3	Ground cover	2
Rocks - loose	1	Fallen Bark	1	Leaf litter	2	Bare ground	3

Abundance Scores: **0** = absent; **1** = 1-5; **2** = 6-20; **3** = 21-50; **4** = 51-75; **5** = 76-100; **6**= >100. In a 1 ha area.

Crevices/ledges	**0**	Large logs (>30cm diamteter)	**2**	Trees/logs bearing loose bark	**2**
Underhangs/overhangs/caves	**0**	Logs with hollows	**2**	Termite mounds	**2**
Small logs (<30cm diameter)	**3**	Hollow bearing /mature trees	**1**	Mistletoe	**1**

EVNT Fauna Present

Nil

Disturbances (e.g. grazed, ploughed, flooded)

Access track, Erosion, Fire.

Incidental Fauna Observations

Macropod scats	Pied Currawong

Notes on watercourses, wetlands, lakes or springs

Nil

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Additional Notes Below
Fauna spotter required.

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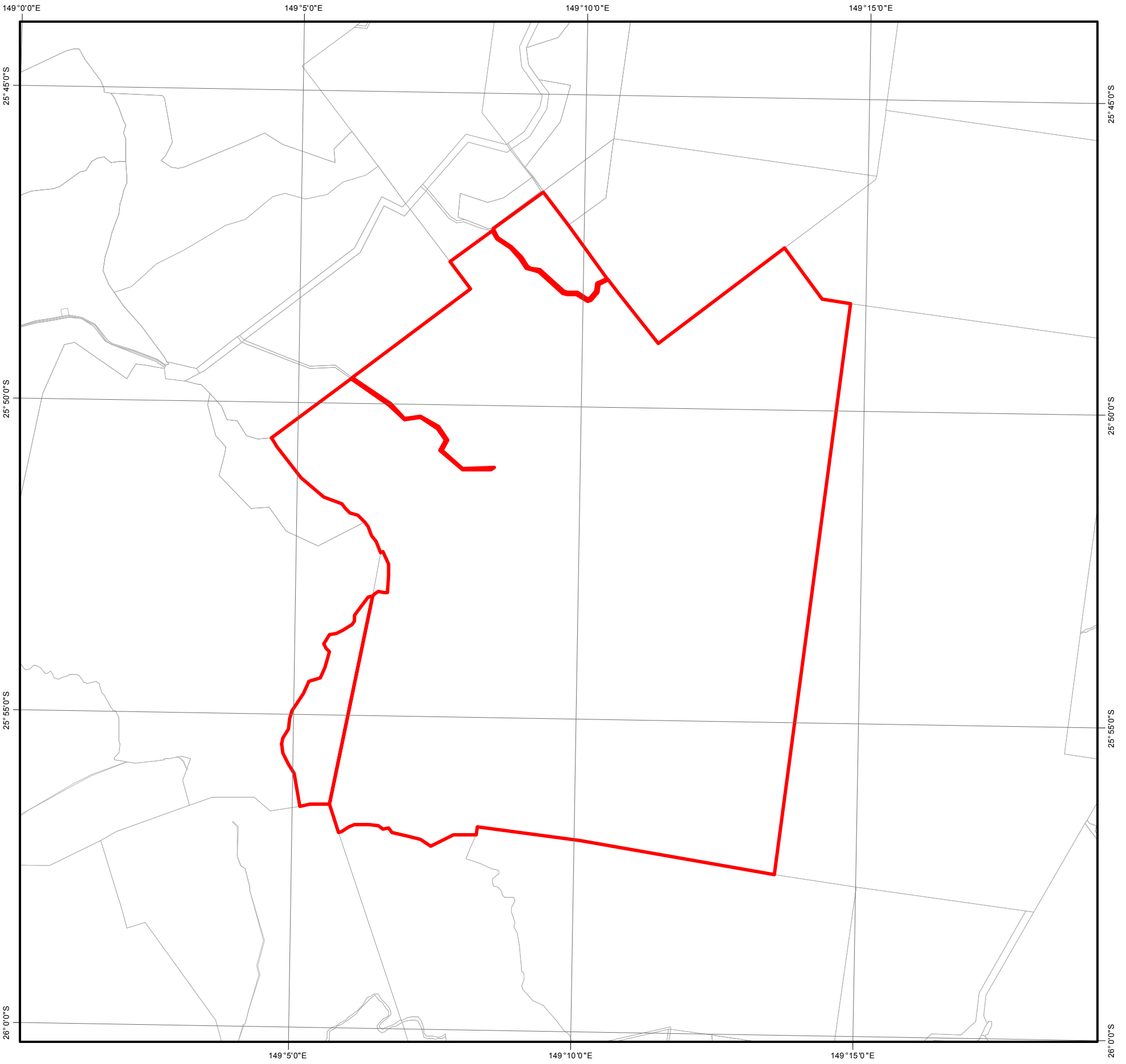
Attachment 8.3 - DEHP Referable Wetlands Mapping



Map of Referable Wetlands
Wetland Protection Areas

Requested By: SUSSAN.LEMON@SANTOS.COM
Date: 24 Dec 13 Time: 09.17.04

Centred on Lot on Plan:
9 AB244

Selected Land Parcel

Cadastral Boundary

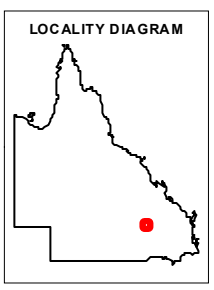
Wetland Protection Areas

HES Wetland

Trigger Area

Queensland Government

LOCALITY DIAGRAM



N

0 1700 3400 5100 6800 8500 m

This product is projected into GDA 1994 MGA Zone 55

Note:
This map shows the location of wetland protection areas which are defined under the Environmental Protection Regulation 2008.

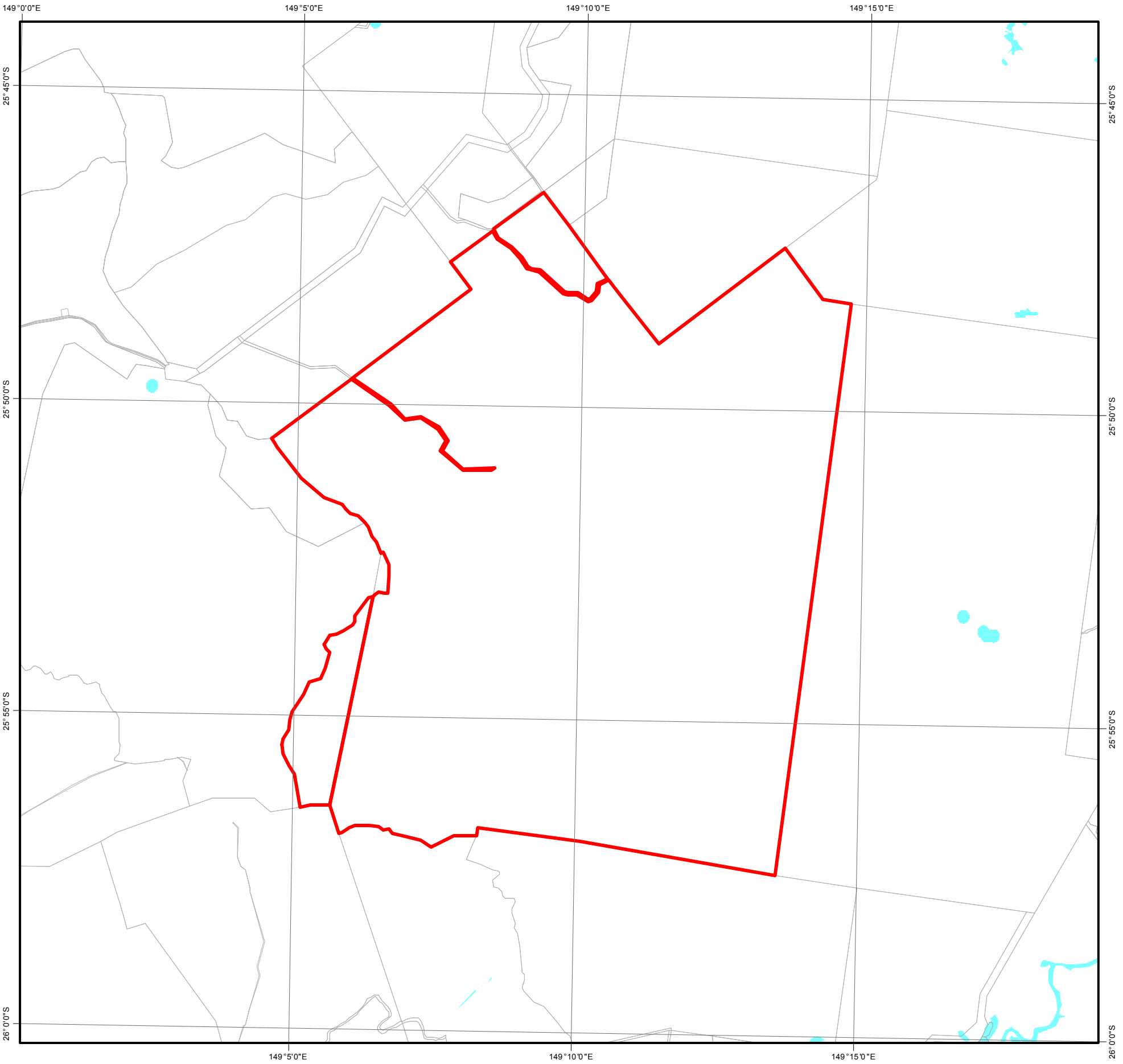
Within wetland protection areas, certain types of development involving high impact earthworks are made assessable under Schedule 3 of the Sustainable Planning Regulation 2009.

The Department of Environment and Heritage Protection has been made a concurrence agency under Schedule 7 of the Sustainable Planning Regulation 2009 for assessable development involving high impact earthworks within wetland protection areas.

The policy outcome and assessment criteria for assessing these applications are described in the State Planning Policy 4/11: Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments.

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Heritage Protection at www.ehp.qld.gov.au or email planning.support@ehp.qld.gov.au.



Map of Referable Wetlands for the Environmental Protection Act 1994

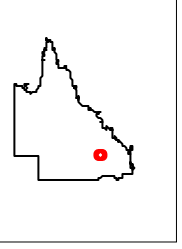
Requested By: SUSSAN.LEMON@SANTOS.COM
Date: 24 Dec 13 Time: 09.17.06

Centred on Lot on Plan:
9 AB244

- Selected Land Parcel
- Cadastral Boundary
- HES Wetland GBR Catchments
- HES Wetland
- GES Wetland

Queensland Government

LOCALITY DIAGRAM



N

0 1700 3400 5100 6800 8500 m

This product is projected into GDA 1994 MGA Zone 55

Note:
This map shows the location of wetlands on the Map of Referable Wetlands which are defined under the Environmental Protection Regulation 2008.

Wetlands are assessed for ecological significance using the environmental values for wetlands in section 81A of the Environmental Protection Regulation 2008. Wetlands are considered either High Ecological Significance (HES) or of General Ecological Significance (GES) for the purposes of the environmental values.

This map is produced at a scale relevant to the size of the lot on plan identified and should be printed at A4 size in portrait orientation. Consideration of the effects of mapped scale is necessary when interpreting data at a large scale.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Heritage Protection at <www.ehp.qld.gov.au> or email <planning.support@ehp.qld.gov.au>

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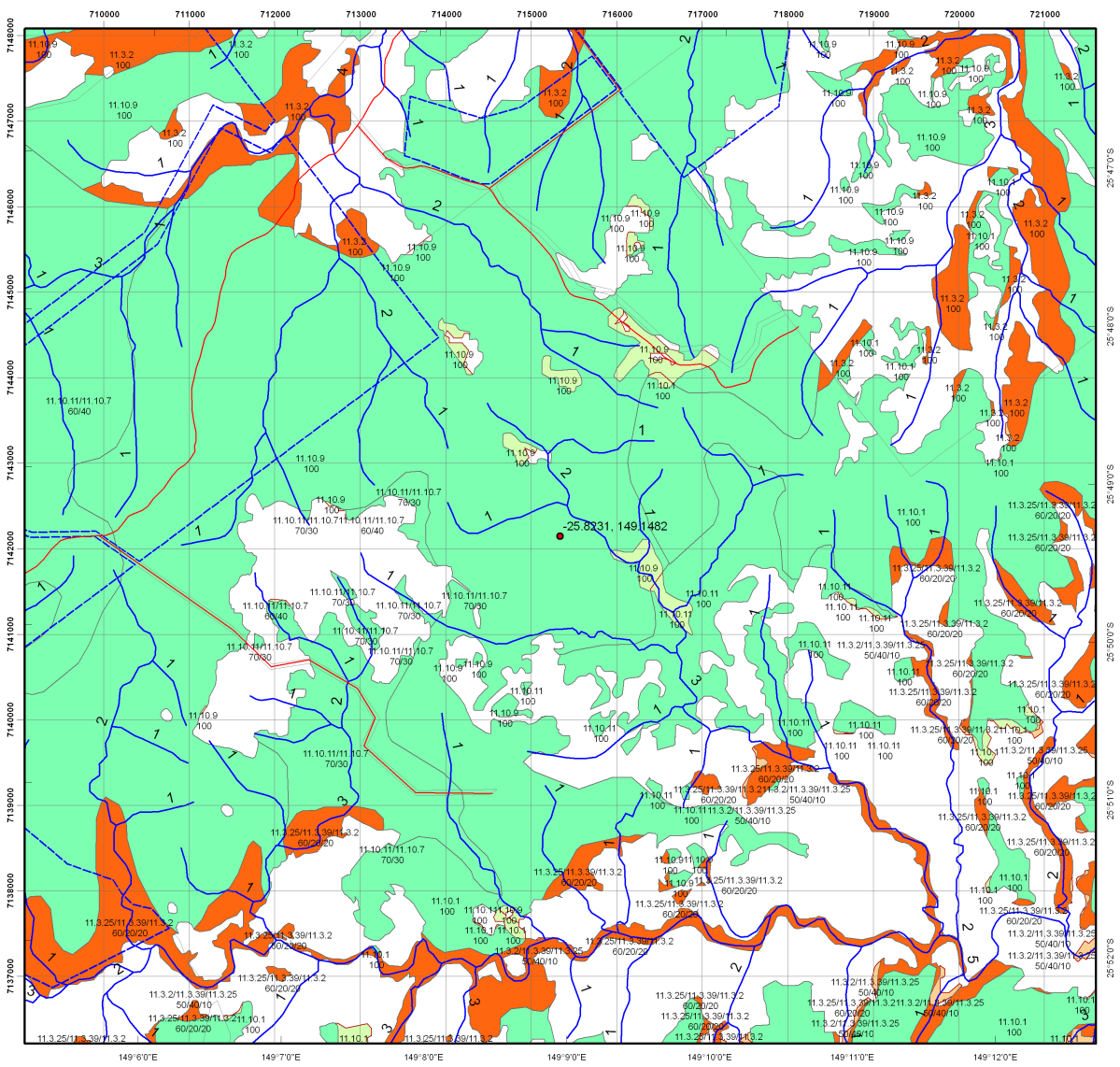
Attachment 8.4 - DEHP Vegetation Management Supporting Map

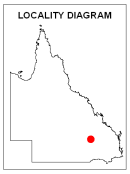


Vegetation Management Supporting Map

Legend

- Coordinates
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category A or B area containing remnant vegetation
- Category A or B area under Section 20AH
  These areas are edged in yellow and filled with the remnant RE Status
- Category C area containing endangered regional ecosystems
- Category C area containing of concern regional ecosystems
- Category C area that is a least concern regional ecosystem
- Category C area containing high value regrowth vegetation
- Category C area under Section 20AI
  These areas are edged in purple and filled with the remnant RE Status
- Non Remnant
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourse on the vegetation management watercourse map
  (Stream order shown as black number against stream where available)
- Roads
  © Pitney Bowes Software Pty Ltd
- National Parks, State Forest and other reserves
- Cadastral line
  Property boundaries shown are
  provided as a locational aid only

LOCALITY DIAGRAM



N

0 490 980 1,470 1,960 2,450 m

This product is projected into:
GDA 1994 MGA Zone 55

Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines and Pitney Bowes Software, makes no representations or warranties about its accuracy, reliability, completeness or suitability or any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incurr as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.dnrm.qld.gov.au or contact the Department of Natural Resources and Mines.

Digital data for the vegetation management watercourse map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

Vegetation Management Act 1999 - Extract from the essential habitat database - version 4.0

Essential habitat is required for assessment under the:

- State Development Assessment Provisions - Module 8: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Sustainable Planning Act 2009*; and
- Self-assessable vegetation clearing codes made under the *Vegetation Management Act 1999*

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s or on and within 2.2 km of an identified coordinate on the accompanying essential habitat map.

This report identifies essential habitat in Category A, B and Category C areas.

The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.

Essential habitat is compiled from a combination of species habitat models and buffered species records.

The Department of Natural Resources and Mines website (http://www.dnrm.qld.gov.au) has more information on how the layer is applied under the State Development Assessment Provisions - Module 8: Native vegetation clearing and the *Vegetation Management Act 1999*.

Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.

Essential habitat, for protected wildlife, means a category A area, a category B area or category C area shown on the regulated vegetation management map-

(a) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or

(b) in which the protected wildlife, at any stage of its life cycle, is located.

Essential habitat identifies endangered or vulnerable native wildlife prescribed under the *Nature Conservation Act 1994*.

Essential habitat in Category A and B (Remnant vegetation species record) areas:2200m Species Information - (no results)

Essential habitat in Category A and B (Remnant vegetation species record) areas:2200m Regional Ecosystems Information - (no results)

Essential habitat in Category A and B (Remnant vegetation) areas:2200m Species Information - (no results)

Essential habitat in Category A and B (Remnant vegetation) areas:2200m Regional Ecosystems Information - (no results)

Essential habitat in Category C (High value regrowth vegetation) areas:2200m Species Information - (no results)

Essential habitat in Category C (High value regrowth vegetation) areas:2200m Regional Ecosystems Information - (no results)

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Attachment 8.5 - Flora Species List

Common name	Scientific name	Status		Qld Declared Plant Category	WONS	NEAL	Type A Species
		NC Act	EPBC Act				
Pretty wattle	*Acacia decora*	LC	-	-	-	-	-
Ironwood	*Acacia excelsa*	LC	-	-	-	-	-
Black wattle	*Acacia leiocalyx*	LC	-	-	-	-	-
Acacia	*Acacia* sp.	LC	-	-	-	-	-
Bulloak	*Allocasuarina luehmannii*	LC	-	-	-	-	-
Cockatoo grass	*Alloteropsis semialata*	LC	-	-	-	-	-
Red ash	*Alphitonia excelsa*	LC	-	-	-	-	-
Smooth-barked apple	*Angophora leiocarpa*	LC	-	-	-	-	-
Warrior bush	*Apophyllum anomalum*	LC	-	-	-	-	-
Dark wiregrass	*Aristida calycina*	LC	-	-	-	-	-
Many Headed Wiregrass	*Aristida caput-medusae*	LC	-	-	-	-	-
Jericho wiregrass	*Aristida jerichoensis*	LC	-	-	-	-	-
White wood	*Atalaya hemiglauca*	LC	-	-	-	-	-
Tall wire grass	*Aristida holathera*	LC	-	-	-	-	-
Slender bamboo grass	*Austrostipa verticillata*	LC	-	-	-	-	-
Kurrajong	*Brachychiton populneus*	LC	-	-	-	-	Type A
Narrow-leaved bottle tree	*Brachychiton rupestris*	LC	-	-	-	-	Type A
White cypress pine	*Callitris glaucophylla*	LC	-	-	-	-	-
Wild Orange	*Capparis canescens*	LC	-	-	-	-	-
Wait-a-while	*Capparis lasiantha*	LC	-	-	-	-	-
Currant bush	*Carissa ovata*	LC	-	-	-	-	-
Belah	*Casuarina cristata*	LC	-	-	-	-	-
Buffel grass	*Cenchrus ciliaris*	*	-	-	-	-	-

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Common name	Scientific name	Status		Qld Declared Plant Category	WONS	NEAL	Type A Species
		NC Act	EPBC Act				
Mulga fern	*Cheilanthes sieberi*	LC	-	-	-	-	-
Clarkson's bloodwood	*Corymbia clarksoniana*	LC	-	-	-	-	-
Carbeen	*Corymbia tessellaris*	LC	-	-	-	-	-
Black orchid	*Cymbidium caniculatum*	LC	-	-	-	-	Type A
Green couch	*Cynodon dactylon*	LC	-	-	-	-	-
Bunchy sedge	*Cyperus polystachyos*	LC	-	-	-	-	-
Slender flat sedge	*Cyperus gracilis*	LC	-	-	-	-	-
Sticky hop bush	*Dodonaea viscosa*	LC	-	-	-	-	-
Curly windmill grass	*Enteropogon ramosus*	LC	-	-	-	-	-
False sandalwood	*Eremophila mitchellii*	LC	-	-	-	-	-
Baradine red gum	*Eucalyptus chloroclada*	LC	-	-	-	-	-
Silver leaved ironbark	*Eucalyptus melanophloia*	LC	-	-	-	-	-
Poplar box	*Eucalyptus populnea*	LC	-	-	-	-	-
Wilga	*Geijera parviflora*	LC	-	-	-	-	-
Hairy Glycine	*Glycine tomentella*	LC	-	-	-	-	-
Beefwood	*Grevillea striata*	LC	-	-	-	-	-
Dysentery plant	*Grewia latifolia*	LC	-	-	-	-	-
Bootlace oak	*Hakea lorea*	LC	-	-	-	-	-
Black speargrass	*Heteropogon contortus*	LC	-	-	-	-	-
Common rush	*Juncus* sp.	LC	-	-	-	-	-
Spiny-head Mat-rush	*Lomandra longifolia*	LC	-	-	-	-	-
Slug herb	*Murdannia graminea*	LC	-	-	-	-	-
Monkey rope vine	*Parsonsia straminea*	LC	-	-	-	-	-

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Common name	Scientific name	Status		Qld Declared Plant Category	WONS	NEAL	Type A Species
		NC Act	EPBC Act				
Quinine	*Petalostigma pubescens*	LC	-	-	-	-	-
Myrtle tree	*Psydrax oleifolius*	LC	-	-	-	-	-
Sandalwood	*Santalum lanceolatum*	LC	-	-	-	-	-
Galvanised burr	*Sclerolaena birchii*	LC	-	-	-	-	-
Spiny headed sida	*Sida acuta*	LC	-	-	-	-	-
Spiked sida	*Sida subspicata*	LC	-	-	-	-	-
Wild oats grass	*Themeda avenacea*	LC	-	-	-	-	-
Kangaroo grass	*Themeda triandra*	LC	-	-	-	-	-
Tall themeda	*Themeda* sp.	LC	-	-	-	-	-
Tridax daisy	*Tridax procumbens*	LC	-	-	-	-	-
Vine tree	*Ventilago viminalis*	LC	-	-	-	-	-
Everlasting daisy	*Xerochrysum bracteata*	LC	-	-	-	-	-

*Introduced species

Key

Nature Conservation Act 1992

E - Endangered
V - Vulnerable
NT – Near Threatened
SLC – Special Least Concern
LC – Least Concern

Environment Protection and Biodiversity Act 1999

Ex – Extinct
EW – Extinct in the wild
CE – Critically endangered
E – Endangered
V – Vulnerable

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Attachment 8.6 - Fauna Species List

Common Name	Species Name	Status	
		EPBC	NC Act
Birds			
Coracina novaehollandiae	Black-faced cuckoo shrike	-	LC
Corvus coronoides	Australian raven	-	LC
Cracticus nigrogularis	Pied butcherbird	-	LC
Dacelo novaeguineae	Laughing kookaburra	-	LC
Malurus melanocephalus	Red-backed fairy-wren	-	LC
Pardalotus striatus	Striated pardalote	-	LC
Philemon corniculatus	Noisy friarbird	-	LC
Platycercus adscitus	Pale-headed Rosella	-	LC
Pomatostomus temporalis	Grey-crowned babler	-	LC
Struthidea cinerea	Apostlebird	-	LC
Mammals			
*Oryctolagus cuniculus**	European rabbit	-	-
Macropus giganteus	Eastern grey kangaroo	-	LC
Macropus rufogriseus	Red necked wallaby	-	LC
Reptiles			
Ctenotus robustus	Eastern striped skink	-	LC
Carlia sp.	Skink	-	LC

* Declared Pest species under LP Act

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Attachment 8.7 - Habitat Assessment and Likelihood of Occurrence of MNES and EVNT Species

Flora

Scientific Name	***Cadellia pentastylis***	 Source: The Codley One 2007 (Flickr)
Common name	**Ooline**	
Status	Vulnerable - EPBC and NC Reg	
Regional Ecosystem Associations	RE 11.7.1, RE11.7.2, RE11.9.4, RE 11.9.5	
Habitat requirements	As detailed in the GLNG CSG Fields SSMP, *Cadellia pentastylis* grows in dry rainforest, semi-evergreen vine thickets and sclerophyll woodlands of Bendee (*Acacia catenulata*), Brigalow (*A. harpophylla*) and Mountain Yapunyah (*Eucalyptus thozetiana*), often locally dominant or as an emergent (TSSC 2008b).	
Habitat supported on Site	Given that no suitable habitat for this species occurs on Site and that this species was not identified during the survey it is considered unlikely to occur. The Site is considered unlikely habitat for this species.	
Likelihood of occurrence	Unlikely	
General habitat	No	

Fauna

Scientific Name	***Erythrotriorchis radiatus***
Common name	**Red goshawk**
Status	Vulnerable - EPBC, Endangered - NC Reg
Regional Ecosystem Associations	RE 11.3.2, RE 11.3.25
General / Indicative habitat	Inhabits open forests, woodlands especially near rivers, wetlands and rainforest fringes in coastal and sub-coastal north and northeast Australia from the Kimberley (WA) to the Queensland / New South Wales border (Pizzey and Knight 2007).
Essential microhabitat	The Red Goshawk occurs in woodlands and forests, ideally with a mosaic of vegetation types and permanent water, particularly riverine forests. The species also occurs in natural grasslands and open paddocks, but avoids both very dense and very open habitats (DOTE 2013). Essential microhabitat includes any active nests.
Habitat supported on Site	The majority of the Site did support woodland and open forest vegetation communities analogous with RE 11.10.9 containing potential nesting trees within 1km of a stream order 3 watercourse (area containing permanent water). Given no active nests were recorded within the Site and the Site is not located near a river, wetland, and rainforest fringe it is considered this species is unlikely to occur within the Site.
Likelihood of occurrence	Unlikely
General habitat	No

Source: Collaertsbrothers, 2007 (Flickr)

Scientific Name	***Geophaps scripta scripta***
Common name	**Squatter pigeon (southern)**
Status	Vulnerable - EPBC and NC Reg
Regional Ecosystem Associations	RE 11.3.2 , RE 11.3.3 , RE 11.3.4 , RE 11.3.14 , RE 11.3.18 , RE 11.3.19 , RE 11.3.25 , RE 11.3.27 , RE 11.3.39, RE 11.10.1 , RE 11.10.3 , RE 11.10.4, RE 11.10.9 , RE 11.10.11 , RE 11.10.13 , RE 11.10.14
General / Indicative habitat	The Squatter Pigeon (southern) is never far from water in grassed woodlands; foothills, watercourses, riverflats, grassy plains; environs of homesteads (Pizzey and Knight 2007). The Squatter Pigeon has been observed foraging along roads and railway lines (DOTE 2013) and is known to inhabit other disturbed habitats associated with CSG infrastructure e.g. gas wells, flowlines and camps.
Essential microhabitat	The species occurs in open dry sclerophyll woodland with grassy understorey, near permanent water (DEWHA 2010a). Essential microhabitat for this species is defined as sites that are highly likely or known to be actively utilised for breeding.
Habitat supported on Site	The Site is not within close proximity of permanent water and has not been recorded as being utilised for breeding .The majority of the site contains RE 11.9.10 (a vegetation community associated with supporting general habitat for this species) and is within the vicinity of previously recorded siting's of this species, therefore this species is considered likely to occur.
Likelihood of occurrence	Likely
General habitat	Yes

Source: Joe McKenna 2011 (Flickr)

Scientific Name	***Rostratula australis (aka Rostratula benghalensis (sensu lato))***
Common name	**Australian Painted Snipe**
Status	Endangered – EPBC, Vulnerable - NC Reg
Regional Ecosystem Associations	RE 11.3.10, RE 11.3.12, RE 11.3.15, RE 11.3.2, RE 11.3.24, RE 11.3.25, RE 11.2.27, RE 11.3.3, RE 11.3.31, RE 11.3.38, RE 11.3.4, RE 11.4.3, RE 11.4.8, RE, 11.5.17, RE 11.5.3
General / Indicative habitat	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (Marchant & Higgins 1993).
Essential microhabitat	They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. Typical sites include those with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum *Muehlenbeckia* or canegrass or sometimes tea-tree (*Melaleuca*) (Marchant & Higgins 1993).
Habitat supported on Site	This species is considered unlikely to occur due to an absence of suitable wetland habitat. The Site is therefore regarded as unlikely habitat for this species.
Likelihood of occurrence	Unlikely
General habitat	No

Source: Eric SJ Tan, 2011 (Flickr)

Scientific Name	***Neochmia ruficauda ruficauda***
Common name	**Star Finch**
Status	Endangered - EPBC and NC Reg
Regional Ecosystem Associations	RE 11.3.2, RE 11.3.12, RE 11.3.25, RE 11.3.27, RE 11.3.37, RE 11.5.14
General / Indicative habitat	The Star Finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water (Garnett 1993)
Essential microhabitat	Essential microhabitat consists mainly of woodland. These habitats are dominated by trees that are typically associated with permanent water or areas that are regularly inundated; the most common species are *Eucalyptus coolabah, E. tereticornis, E. tessellaris, Melaleuca leucadendra, E. camaldulensis and Casuarina cunninghamiana* (Holmes 1996).
Habitat supported on Site	This species is considered to be locally extinct within the area (EPA 2003) and thus unlikely to occur on Site.
Likelihood of occurrence	Unlikely
General habitat	No

Source: Roger Smith 2011 (Flickr)

Scientific Name	***Dasyurus hallucatus***	 Source: Henry Cook, 2012 (Flickr)
Common name	**Northern quoll**	
Status	Endangered - EPBC	
Regional Ecosystem Associations	RE 11.8.3, RE 11.9.4, RE 11.9.5, RE 11.10.1, RE 11.10.2, RE 11.10.3, RE 11.10.4, RE 11.10.13, RE 11.3.2, RE 11.3.39, RE 11.7.1, RE 11.7.2, RE 11.7.4, RE 11.7.6, RE11.7.7 RE 11.9.8, RE 11.10.7, RE 11.10.8, RE 11.10.9, RE 11.10.11	
General / Indicative habitat	The Northern Quoll occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Northern Quoll are also known to occupy non rocky lowland habitats such as beach scrub communities in Queensland and are more likely to be present in high relief areas that have shallower soils, greater cover of boulders, less fire impact and closer to permanent water (DOTE 2013). They make dens in rock crevices and tree hollows (Menkhorst and Knight 2004).	
Essential microhabitat	Essential microhabitat for the Northern Quoll includes Intact Eucalypt woodlands, shrublands or grasslands with rocky areas including mesas, gorges, boulder fields or breakaways that are known or highly likely to support this species.	
Habitat supported on Site	The majority of the Site supports general habitat features including forests and woodlands analogous with RE 11.10.9. Essential microhabitat features likely to support this species were limited (not entirely void) providing sub optimal habitat for this species.	
Likelihood of occurrence	Possible	
General habitat	Yes	

Scientific Name	***Nyctophilus corbeni***
Common name	**South-eastern long-eared bat**
Status	Vulnerable - EPBC and NC Reg
Regional Ecosystem Associations	RE 11.3.2, RE 11.3.39, RE 11.5.1, RE 11.10.1, RE 11.10.9, RE 11.3.3, RE 11.3.25, RE11.5.4, RE 11.9.5, RE 11.10.1, RE 11.10.4, RE 11.10.7, RE 11.10.13
General / Indicative habitat	This species occurs in a range of inland woodland vegetation types, including Box, Ironbark, Cypress Pine, Mallee, Bulloak, Brigalow and Belah woodlands / forests and will roost in tree hollows, crevices and under loose bark within these communities, particularly in larger remnants with a well-developed understory (DOTE 2013). The South-eastern Long-eared Bat forages within 3 km from the roost in the understorey of the above mentioned communities, including the ground (Churchill 2010, (DOTE 2013).
Essential microhabitat	Essential microhabitat includes cavities, overhangs, caves and holes among sandstone outcrops, escarpments and remnant vegetation with hollow-bearing trees that are known or highly likely to support this species.
Habitat supported on Site	This site is largely void of optimal microhabitat features including cavities, overhangs, caves and holes among sandstone outcrops, escarpments and remnant vegetation, however, the site does supports remnant RE 11.10.9 and therefore this species is considered as possible to occur.
Likelihood of occurrence	Possible
General habitat	Yes

Source: Office of Environment and Heritage, 2005 (Michael Murphy).

Scientific Name	***Phascolarctos cinereus***
Common name	**Koala (combined populations Qld, NSW, ACT)**
Status	Vulnerable – EPBC, Special least concern – NC Act
Regional Ecosystem Associations	Entire Brigalow Belt Bioregion
General / Indicative habitat	On the western slopes, tablelands and plains in Queensland, NSW and Victoria, Koalas are found in sub-humid *Eucalyptus*-dominated forests and woodlands in riparian and non-riparian environments, and some *Acacia*-dominated forests and woodlands in non-riparian environments (Koala Workshop 2012; Melzer et al. 2000).
Essential microhabitat	Essential microhabitat for the Koala includes vegetation communities dominated by known Koala food trees where there is evidence of Koala being present.
Habitat supported on Site	The Site is considered sub-optimal habitat for the Koala and no evidence of koala activity was observed on Site during the pre-clearance survey. The Site does support remnant RE 11.10.9 containing Koala food trees and is therefore considered possible habitat for this species.
Likelihood of occurrence	Possible
General habitat	Yes

Source: Eugenijus Mockaitis, 2010 (Flickr)

Scientific Name	***Chalinolobus dwyeri***	 Source: Michael Pennay, Flickr
Common name	**Large-eared pied bat**	
Status	Vulnerable - EPBC and NC Reg	
Regional Ecosystem Associations	RE 11.10.1, RE 11.10.2, RE 11.10.3, RE 11.10.4, RE 11.10.13 , RE 11.3.2, RE 11.3.25 , RE 11.3.39, RE 11.9.5	
General / Indicative habitat	Known foraging habitat includes Cypress-pine dominated forest, tall open eucalypt forest with a rainforest sub-canopy, sub-alpine woodland, and sandstone outcrop country. In southeast Queensland the species has primarily been recorded from higher altitude, moist, tall, open forest adjacent to rainforest (DOTE 2013).	
Essential microhabitat	Roosts are primarily in cavities, overhangs, caves and holes among sandstone outcrops/escarpments, however this species has been observed roosting in disused mine shafts and disused Fairy Martin (*Hirundo ariel*) nests. It also possibly roosts in the hollows of trees in dry and wet sclerophyll forest ((DOTE 2013). Essential microhabitat for the Large-eared Pied Bat includes cavities, overhangs, caves and holes among sandstone outcrops/escarpments and remnant vegetation with hollow-bearing trees that are known, or highly likely to support this species.	
Habitat supported on Site	The majority of the Site did contain White cypress – pine dominated woodland and forest that may be utilised for foraging however roosting habitat for this species (overhangs, caves, mine shafts and abandoned fairy martin nests) which this species depends were not recorded within the Site. Subsequently, the Site is considered unlikely habitat for the Large-eared pied bat.	
Likelihood of occurrence	Possible (During foraging)	
General habitat	Yes	

Scientific Name	***Delma torquata***	
Common name	**Collared delma**	
Status	Vulnerable - EPBC and NC Reg	
Regional Ecosystem Associations	RE 11.10.1, RE 11.10.3, RE 11.10.4, RE 11.10.7, RE 11.10.9, RE 11.10.11, RE 11.10.13 RE 11.3.2	
General / Indicative habitat	This species has been recorded in eucalypt-dominated woodlands and open-forests, within remnant and disturbed habitats. It occurs in a variety of woodland types, with dominant species often including Spotted Gum, Narrow-leaved Ironbark, Smooth-barked Apple, and Poplar Box. It is found under rocks, logs and other ground cover. The Collared delma is a burrowing species, found about 15cm below the ground (DOTE 2013); Cogger (2000).	 Source: Angus McNab, 2013 (Flickr)
Essential microhabitat	Important microhabitats include sandstone slabs, loose rocks, fallen bark sheets, logs, dense leaf litter and grass tussocks (Wilson & Swan 2008). Essential microhabitat includes intact RE's comprising large hollow logs, tree stumps, root cavities, loose rocks, dense ground cover and many grass tussocks that are known or highly likely to support this species.	
Habitat supported on Site	Given that the Site supports important microhabitats, essential microhabitats within remnant RE 11.10.9, but has not previously been recorded within the vicinity of the Site, this species may occur within the Site.	
Likelihood of occurrence	Possible	
General habitat	Yes	

Scientific Name	***Denisonia maculata***	 Source: Stephen Zozaya, 2013 (Flickr)
Common name	**Ornamental snake**	
Status	Vulnerable - EPBC and NC Reg	
Regional Ecosystem Associations	RE 11.3.3, RE 11.3.25, RE 11.3.27, RE 11.3.2, RE 11.3.4, RE 11.3.17, RE 11.3.21, RE11.3.22, RE 11.4.3, RE 11.4.7, RE 11.4.8, RE 11.9.1, RE 11.9.3, RE 11.9.5	
General / Indicative habitat	The Ornamental Snake's habitat is within, or close to habitat that is favoured by its prey, frogs. The species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions, but also lake margins and wetlands. Ornamental Snake habitat is likely to be found in Brigalow, Gidgee (*Acacia cambagei*), Blackwood (*Acacia argyrodendron*) or Coolibah (*Eucalyptus coolabah*) dominated vegetation communities, or pure grassland associated with gilgais (SEWPaC 2010d).	
Essential microhabitat	Ornamental Snakes show a preference for moist areas and need ample ground cover in the form of fallen timber, thick shrub and ground cover and dense tussock grasses. They also show a preference for melon holes and depressions (DOTE 2013). Essential microhabitat is defined as intact moist areas, including wetlands and lakes, in suitable vegetation communities known or highly likely to support this species.	
Habitat supported on Site	The Site does not support moist areas and other associated microhabitat this species requires. Therefore the site is regarded as unlikely habitat for this species.	
Likelihood of occurrence	Unlikely	
General habitat	No	

Scientific Name	***Egernia rugosa***	 Source: Dan Lynch, 2012 (Flickr)
Common name	**Yakka skink**	
Status	Vulnerable - EPBC and NC Reg	
Regional Ecosystem Associations	RE 11.3.2, RE 11.4.3, RE 11.4.10, RE 11.4.12, RE 11.5.1, RE 11.5.4, RE 11.5.5, RE 11.7.1 RE 11.7.2, RE 11.7.4, RE 11.7.6, RE 11.7.7, RE 11.9.5, RE 11.9.7, RE 11.10.1, RE 11.10.9, RE 11.10.11, RE 11.3.6, RE 11.3.14, RE 11.3.17, RE 11.3.18, RE 11.3.19, RE11.3.39, RE 11.9.1, RE 11.9.2, RE 11.9.13	
General / Indicative habitat	The Yakka Skink is known to occur in open dry sclerophyll forest, woodland and scrub. This species often takes refuge in large hollow logs and has been known to excavate deep burrow systems, sometimes under dense ground vegetation.	
Essential microhabitat	Yakka Skinks are often found in cavities under and between partly buried rocks, hollow logs or tree stumps, root cavities and abandoned animal burrows. In cleared habitat, Yakka Skinks can persist where there are shelter sites such as raked log piles, deep gullies, tunnel erosion / sinkholes and rabbit warrens (Cogger 2000, Richardson 2008, DOTE 2013).	
Habitat supported on Site	Given that the Site supports important microhabitats, essential microhabitats within remnant RE 11.10.9, but has not previously been recorded within the vicinity of the Site, this species may occur within the Site.	
Likelihood of occurrence	Possible	
General habitat	Yes	

Scientific Name	***Furina dunmalli***	 Source: Dan Lynch, 2012 (Flickr)
Common name	**Dunmall's snake**	
Status	Vulnerable - EPBC and NC Reg	
Regional Ecosystem Associations	RE 11.5.1, RE 11.9.5, RE 11.10.1, RE 11.3.2, RE 11.3.14, RE 11.3.17, RE 11.3.18, RE11.3.19, RE 11.3.39, RE 11.4.3, RE 11.4.10, RE 11.4.12, RE 11.5.4, RE 11.5.5, RE11.7.1, RE 11.7.2, RE 11.7.4, RE 11.7.7, RE 11.9.7, RE 11.10.9	
General / Indicative habitat	Dunmall's Snake has been found in a broad range of habitats, including forests and woodlands on black alluvial cracking clay and clay loams dominated by Brigalow, other Wattles (*Acacia. burrowii, A. deanei, A. leiocalyx*), White Cypress Pine (*Callitris glaucophylla*), Bulloak (*Allocasuarina luehmannii*); Spotted Gum (*Corymbia citriodora*), Ironbark (*Eucalyptus crebra* and *E. melanophloia*) open forests and woodland associations on sandstone derived soils (DOTE 2013).	
Essential microhabitat	Essential microhabitat is defined as intact, remnant vegetation with limited ground cover vegetation and grassy tussocks and extensive microhabitat features such as large hollow logs, root cavities, or tree stumps that are highly likely or known to support this species (DOTE 2013).	
Habitat supported on Site	Given the site largely occurs within non-Brigalow, and does not support extensive microhabitat features but does contain White Cypress Pine (*Callitris glaucophylla*) forests and woodland associations on sandstone derived soils this Site is regarded as possible habitat for this species.	
Likelihood of occurrence	Possible	
General habitat	Yes	

Scientific Name	**Paradelma orientalis**	 Dan Lynch, 2011 (Flickr)
Common name	**Brigalow scaly-foot**	
Status	Vulnerable - NC Reg	
Regional Ecosystem Associations	RE 11.4.3, RE 11.5.1, RE 11.5.4, RE 11.9.4, RE 11.9.5, RE 11.10.1, RE 11.10.3, RE11.10.4 RE 11.10.7, RE 11.10.9, RE 11.10.11, RE 11.10.13	
General / Indicative habitat	Found on sandstone ridges, woodlands and vine thickets, including communities dominated by Brigalow, Narrow-leaved Ironbark, Lancewood, Spotted gum, White Cypress Pine and Bulloak (Wilson & Swan 2008).	
Essential microhabitat	Important microhabitats include sandstone slabs, loose rocks, fallen bark sheets, logs, dense leaf litter and grass tussocks (Wilson & Swan 2008). Essential microhabitat includes intact RE's comprising large hollow logs, tree stumps, root cavities, loose rocks, dense ground cover and many grass tussocks that are known or highly likely to support this species.	
Habitat supported on Site	Given that the Site supports important microhabitats, essential microhabitats within remnant RE 11.10.9, but has not previously been recorded within the vicinity of the Site, this species may occur within the Site.	
Likelihood of occurrence	Possible	
General habitat	Yes	

Scientific Name	***Rheodytes leukops***
Common name	**Fitzroy River Turtle**
Status	Vulnerable – EPBC and NC Reg
Regional Ecosystem Associations	RE 11.3.25
General / Indicative habitat	The Fitzroy River Turtle is found in rivers with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles. Preferred areas have high water clarity, and often with Ribbonweed (*Vallisneria* sp.) beds (Cogger et al. 1993). Riparian vegetation associated with the Fitzroy River Turtle includes Blue Gums (*Eucalyptus tereticornis*), River Oaks (*Casuarina cunninghamiana*), Weeping Bottlebrushes (*Melaleuca viminalis*) and Paperbarks (*Melaleuca linariifolia*) (Tucker et al. 2001).
Essential microhabitat	Microhabitat for the Fitzroy River Turtle includes rivers with large, deep, well oxygenated pools with rocky, gravelly or sandy substrates, connected by shallow riffles (SEWPaC 2011aa). The presence of ribbonweed is also a feature of essential microhabitat of this species. Essential microhabitat is defined as rivers with microhabitat features that are known or highly likely to support this species.
Habitat supported on Site	The Site does not provide suitable habitat for this species.
Likelihood of occurrence	Unlikely
General habitat	No

Source: Stephen Zozaya 2012 (Flickr)

Scientific Name	***Merops ornatus***
Common name	**Rainbow Bee-eater**
Status	Migratory Terrestrial and Marine - EPBC
Regional Ecosystem Associations	Entire Brigalow Belt Bioregion
General / Indicative habitat	This species inhabits open woodlands with sandy/loamy soils, sand ridges, sandpits, riverbanks, road cuttings, beaches, dunes, cliffs, mangroves and rainforest communities. On migration, the Rainbow bee-eater may also fly over the top of non-preferred habitats such as rainforest or treeless plains (DOTE 2013; Pizzey and Knight 2007).
Essential microhabitat	The Rainbow Bee-eater prefers areas with a good supply of accessible artificial structures, such as barns, sheds and bridges for nesting and plenty of overhead wires or bare branches and twigs for perching, sunning and preening (DOTE 2013). Essential microhabitat is defined as riparian woodlands, sandy creek banks, intact wetlands, and active nesting sites.
Habitat supported on Site	The Site contains general habitat, some essential microhabitat features and is within the vicinity of previously recorded siting's of this species, therefore this species is considered likely to occur.
Likelihood of occurrence	Likely
General habitat	Yes

Source: Julian Robinson 2009 (Flickr)

Scientific Name	***Myiagra cyanoleuca***
Common name	**Satin Flycatcher**
Status	Migratory Terrestrial and Marine - EPBC
Regional Ecosystem Associations	Entire Brigalow Belt Bioregion
General / Indicative habitat	This species inhabits heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests (DOTE 2013). Indicative habitat also includes swampy woodlands and mangrove communities.
Essential microhabitat	Essential microhabitat includes woodlands and mangrove communities which are in good condition and active nesting sites.
Habitat supported on Site	The majority of the Site supports general habitat features including forests and woodlands. Essential microhabitat features likely to support this species including a woodland community in good condition was present however no active nesting sites were recorded.
Likelihood of occurrence	Possible
General habitat	Yes

Source: Greg Miles, 2009 (Flickr)

Scientific Name	***Rhipidura rufifrons***
Common name	**Rufous Fantail**
Status	Migratory Terrestrial - EPBC
Regional Ecosystem Associations	Entire Brigalow Belt Bioregion
General / Indicative habitat	This species is known to inhabit the undergrowth of rainforests / wetter eucalypt forests / gullies, monsoon forests, gardens. During migration it will also inhabit disturbed areas (Pizzey and Knight 2007).
Essential microhabitat	Essential microhabitat is defined as rainforests, wetter eucalypt forests, gullies, monsoon forests and gardens in close proximity to gullies or watercourses and active nesting sites.
Habitat supported on Site	This species is considered unlikely to occur due to an absence of suitable habitat. The site is therefore regarded as unlikely habitat for this species.
Likelihood of occurrence	Unlikely
General habitat	No

Source: Kooragindi John (Flickr)

Scientific Name	***Ardea alba***	 Source: Arto hakola, 2009 (Flickr)
Common name	**Great egret**	
Status	Migratory Wetland and Marine - EPBC	
Regional Ecosystem Associations	RE 11.3.10, RE 11.3.12, RE 11.3.15, RE 11.3.2, RE 11.3.24, RE 11.3.25, RE 11.2.27, RE11.3.3, RE 11.3.31, RE 11.3.38, RE 11.3.4, RE 11.4.3, RE 11.4.8, RE 11.5.17, RE 11.5.3	
General / Indicative habitat	This species is a local migrant throughout Australia and inhabits shallow points of rivers, estuaries, mudflats, freshwater wetlands, irrigated pastures, dams and sewerage ponds (Pizzey and Knight 2007).	
Essential microhabitat	Essential microhabitat is defined as includes swampy woodlands and mangrove communities which are in good condition and active nesting sites. The Great Egret usually nests in colonies and builds its nest as a platform of sticks in treetops over water in swampy woodlands and mangrove communities (Pizzey and Knight 2007).	
Habitat supported on Site	This species is considered unlikely to occur due to an absence of suitable habitat. The site is therefore regarded as unlikely habitat for this species.	
Likelihood of occurrence	Unlikely	
General habitat	No	

Scientific Name	***Ardea ibis***	 Source: John C Avise, 2008 (Flickr)
Common name	**Cattle egret**	
Status	Migratory Wetland and Marine - EPBC	
Regional Ecosystem Associations	Preference for non-remnant vegetation within 3 km of a watercourse or wetland	
General / Indicative habitat	The Cattle Egret usually nests in colonies and builds its nest as a small, untidy platform of sticks in foliage in swampy woodlands (Pizzey and Knight 2007). Indicative habitat includes swampy woodlands, grazing paddocks and natural grasslands.	
Essential microhabitat	It uses predominately shallow, open and fresh wetlands, including; meadows and swamps with low emergent vegetation and abundant aquatic flora. They have sometimes been observed in swamps with tall emergent vegetation (DOTE 2013). It is commonly associated with the habitats of farm animals, particularly cow (*Bos taurus*), but also feral pigs, sheep (*Ovis* spp), horse (*Equus* spp) and deer (various species). Essential microhabitat is defined as good condition swampy woodlands, meadows and swamps and active nesting sites.	
Habitat supported on Site	Given this species association with cattle; this species is considered to possibly utilise the Site.	
Likelihood of occurrence	Possible	
General habitat	Yes	

Scientific Name	***Apus pacificus***	 Source: Rob Hutchinson 2008 (Flickr)
Common name	**Fork-tailed swift**	
Status	Migratory Marine - EPBC	
Regional Ecosystem Associations	Entire Brigalow Belt Bioregion	
General / Indicative habitat	This species spends night and day on the wing and flies over a range of habitats including rainforest to semi-desert (Morecombe 2004). The Fork-tailed Swift does not breed in Australia.	
Essential microhabitat	The fork-tailed swift does not rely on terrestrial microhabitats.	
Habitat supported on Site	Given that this species does not utilise terrestrial based habitats it is unlikely to occur within the Site. The Site is considered unlikely habitat for this species.	
Likelihood of occurrence	Unlikely	
General habitat	No	

Scientific Name	***Haliaeetus leucogaster***	 Source: Richard Waring, 2013 (Flickr)
Common name	**White-bellied sea-eagle**	
Status	Migratory Terrestrial and Marine - EPBC	
Regional Ecosystem Associations	Marine, estuarine, lacustrine and palustrine wetland REs	
General / Indicative habitat	This species is a local migrant throughout Australia and inhabits coastal areas, islands, estuaries, inlets, rivers, inland lakes and nearby woodlands. The nest of the White-bellied Sea eagle is quite large and often found in tall trees near water, remote coastal cliffs or on the ground on islands (Pizzey and Knight 2007).	
Essential microhabitat	Essential microhabitat is defined as remnant woodland nearby to rivers and inland lakes, tall trees near water with suitable breeding resources, rocky cliffs and active nesting sites.	
Habitat supported on Site	Given that the Site is void of these features, the Site is considered unlikely habitat for this species.	
Likelihood of occurrence	Unlikely	
General habitat	No	

Scientific Name	***Hirundapus caudacutus***
Common name	**White-throated needletail**
Status	Migratory Terrestrial and Marine - EPBC
Regional Ecosystem Associations	Entire Brigalow Belt Bioregion
General / Indicative habitat	This species is regularly observed flying over forests, woodlands, pastoral areas, floodplains, lakes and coastlines (Pizzey and Knight 2007). Indicative habitat also includes near margins of wetlands and human settlements.
Essential microhabitat	This species occurs over most types of habitat, as described above and may also fly between trees or in clearings, below the canopy, but are less commonly recorded flying above woodland ((DOTE 2013).Essential microhabitat is defined as forests, woodlands, lakes, coastlines and active nesting sites.
Habitat supported on Site	This species spends night and day on the wing and flies over a range of habitats (Morcombe 2004). Given that this species does not utilise terrestrial based habitats it is unlikely to occur within the Site. The Site is considered unlikely habitat for this species.
Likelihood of occurrence	Unlikely
General habitat	No

Source: http://generationtechhits.wordpress.com/tag/fastest-flying-bird-is-white-throated-needletail

Scientific Name	***Gallinago hardwickii***
Common name	**Latham's snipe**
Status	Migratory Wetland and Marine - EPBC
Regional Ecosystem Associations	RE 11.3.10, RE 11.3.12, RE 11.3.15, RE 11.3.2, RE 11.3.24, RE 11.3.25, RE 11.2.27, RE11.3.3, RE 11.3.31, RE 11.3.38, RE 11.3.4, RE 11.4.3, RE 11.4.8, RE 11.5.17, RE 11.5.3
General / Indicative habitat	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) (DOTE 2013).
Essential microhabitat	The structure and composition of the vegetation that occurs around these wetlands is not important in determining the suitability of habitat. As such, this snipe may be found in a variety of vegetation types or communities including tussock grasslands with rushes, reeds and sedges, coastal and alpine heathlands, lignum or tea-tree scrub, buttongrass plains, alpine herb fields and open forest (DOTE 2013). Essential microhabitat is defined as good condition open, freshwater wetlands with low, dense vegetation and active nesting sites.
Habitat supported on Site	This species is considered unlikely to occur due to an absence of suitable wetland habitat. The Site is therefore regarded as unlikely habitat for this species.
Likelihood of occurrence	Unlikely
General habitat	No

Source: Jun Matsui, 2010 (Flickr)

Key

Status

***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)**	**Nature Conservation (Wildlife) Regulation 2006 (NC Reg)**
Ex - Extinct **EW** - Extinct in the wild **CE** - Critically Endangered **E** - Endangered **V** - Vulnerable	**E** - Endangered **V** - Vulnerable **N** - Near Threatened **X** - Presumed Extinct

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