O2ECOLOGY

Spring Creek (Galilee Coal Project)
Supplemental Flora and Vegetation Assessments

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Executive Summary

This executive summary is presented as an overarching summary of both Rob Friend and Associates' (2012) and O2 Ecology's (2012) additional flora and vegetation assessments. These technical studies form a part of a Supplementary Environmental Impact Statement over Waratah Coal's Galilee Coal Project and were primarily driven by specific comments on the technical studies undertaken in the Environmental Impact Statement process (Unidel 2010).

The area of these additional technical studies encompasses the northern portions of EPC1040 and part of EPC1079 within the Barcaldine Regional Council administration area. Specific properties covered with these studies include: Kia Ora (lot 1 on BF2); Monklands (lots 2 on SP136836, 3 on BF802451, 1 on BF17); Glen Innes (lot 4 on BF22); Saltbush (lots 8 on BF16, 7 on BF16); the far south-western corner of Gadwell (lot 6 on BF16); and the eastern strip of Milangavie (lot 9 on BF28) (all surveyed by Rob Friend and Associates (2012)) and Spring Creek (lot 11 on BF25); Cavendish (lot 10 on RP894235); Lambton Meadows (lot 626 on MX806585) (all surveyed by O2 Ecology (2012)). All properties apart from Kia Ora, Cavendish and Spring Creek stations are leasehold. All properties which form part of these additional studies are primarily used for pastoral production. Glen Innes station has also been designated under s 46 of the Nature Conservation Act 1992 (NC Act) as a Nature Refuge (Bimblebox Nature Refuge). The Bimblebox Nature Refuge is listed in Schedule 5 of the Nature Conservation (Protected Areas) Regulation 1994.

Rob Friend and Associates (2012) identified 80 sites to assess as part of supplementary flora and vegetation assessments (see Rob Friend and Associates (2012) Figure 7, Appendix A). These were largely additional to Unidel's (2010) sites assessed as part of the EIS process or were sites that were surveyed previously but where new assessments were required to extend or improve the existing information. Rob Friend and Associates (2012) were only able to sample 66 of these 80 sites due to weather constraints with O2 Ecology (2012) surveying the remaining 14. All 80 sites fall within the Jericho subregion (DEU04) of the Desert Uplands Bioregion.

Flora and vegetation assessments undertaken as part of these additional studies include secondary, tertiary and quaternary level Corveg assessments (Neldner *et al*. 2012), BioCondition assessments (Eyre *et al*. 2011), targeted rare plant searches and traverses. Corveg assessments were employed as the most appropriate method for assessing vegetation communities at the site and validating the certified Regional Ecosystem (RE) mapping (v 6.0b). The BioCondition method was applied to determine the condition of the vegetation at the sampling site and for use as part of ecological equivalency for determining environmental offsets.

Key Findings

The study area contains a mixture of vegetation biodiversity values including eucalypt open forest, acacia woodlands, and riparian communities as well as regrowth and cleared areas. Rob Friend and Associates (2012) undertook 34 secondary level and 32 quaternary level Corveg assessments with 33 of these sites being utilised for BioCondition assessments. Within the 14 sites, O2 Ecology (2012) undertook 13 secondary level and four tertiary level Corveg assessments with 11 of these site assessed with the BioCondition method. Results of these assessments confirms the presence of 23 REs occurring within the study area all of which are classed as Least Concern under the provisions of the *Vegetation Management Act 1999* (VM Act).

Some inconsistencies exist between the certified RE mapping covering the study area and results of the field surveys. Inaccuracies in the mapping are both systematic (related to limits from the spatial scale and precision at which the mapping is undertaken (1:100,000)) or are more random errors in the attribution of mapped polygons (i.e. misinterpretation of remotely sensed landform or vegetation patterns). Additionally,

v6.0b of the RE mapping is based on the vegetation extent in 2006. Some areas of mapped RE may have been altered since that time. The main reasons for polygon attribution errors were related to either incorrect land zone determination or misinterpretation of vegetation patterns with incorrect determination of dominant species present within the ecologically dominant layers. Section 7.1 (Rob Friend and Associates, 2012) and Table 6 (this report) detail specific sites where the certified RE mapping and results of the site assessments differ.

A total of 44 BioCondition assessments were undertaken across the study area during both additional vegetation surveys. Only two published benchmarks for DEU REs are publically available, neither of which were recorded within the study area. Due to time constraints no reference sites were assessed to derive benchmarks for comparison of the BioCondition assessments. As a consequence no BioCondition score were calculated for the sites surveyed. However, both studies have included raw BioCondition data for which ecological equivalence can be determined.

Desktop assessments predict one EPBC listed species and records four NC Act species from the study area. One conservation significant flora species was recorded during the field surveys by Rob Friend and Associates (2012), this being the *Desmodium macrocarpum* (listed as Near Threatened under the NC Act). This species was not recorded during the O2 Ecology (2012) surveys. While not recorded, the species *Micromyrtus rotundifolia* (listed as Vulnerable under the NC Act) and *Acacia spania* (listed as Near Threatened under the NC Act) both have the potential to occur in vegetation communities of the study area.

1. Introduction

1.1. Project Overview

O2 Ecology was engaged by Waratah Coal to undertake additional vegetation assessment within the area covered by Exploration Permit (Coal) (EPC) 1079 herein referred to as the "study area". Waratah Coal's Galilee Coal Project is an integrated coal project proposed over part of EPCs 1079 and 1040.

Rob Friend and Associates Pty Ltd (2012) were commissioned by Waratah Coal to undertake additional vegetation assessments as part of a Supplementary Environmental Impact Statement (SEIS). However, due to uncharacteristic weather conditions at the time of field surveys, Rob Friend and Associates (2012) were unable to complete vegetation assessments of 14 sites on Spring Creek (lot 11 on BF25), Cavendish (lot 10 on RP894235) and Lambton Meadows (lot 626 on MX806585) stations. O2 Ecology completed assessment of the 14 sites and this technical report has been prepared as part of the SEIS process to complement the additional vegetation survey work undertaken by Rob Friend and Associates (2012).

1.2. Study Area

The study area refers to approximately 163 km² of EPC 1079 covered by Spring Creek, Cavendish and Lambton Meadows properties. The area includes the 14 sites identified by Rob Friend and Associates (2012) but not surveyed during their assessments. The study area is located approximately 50 km north-west (straight line) of the township of Alpha. The land use of the study area is predominantly cattle production.

1.3. Objective of Study

The objectives of this study are to:

- Describe the flora values and vegetation communities from the 14 sites surveyed;
- Investigate, prepare and compile a description of the terrestrial flora and vegetation communities of the study area, including the compilation of records of threatened species listed under the Nature Conservation (Wildlife) Regulation 2006 (NCWR) and the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Identify the presence or likely presence of any threatened species or species' habitats within the study area, their regional status and abundance and broad distribution patterns species;
- Confirm the extent and attribution of the Department of Environment and Heritage Protection's (DEHP) remnant vegetation and certified Regional Ecosystems (RE) mapping within the study area; and
- Undertake BioCondition assessments of all sites surveyed.

The approach in undertaking the botanical assessment included:

- Desktop assessment and literature review of available information relating to the flora and vegetation of the region; and
- Field survey to confirm and provide additional data to the desktop information collected.

The report is structured as follows:

- Section 2 - Description of the methods used to assess the existing environmental values;
- Section 3 - Description of existing environmental values of the study area; and
- Section 4 – Results of these supplementary surveys.

2. Methods

This section outlines the methods undertaken to describe the existing environmental values of the study area. A combination of desktop assessments and field surveys were conducted as part of this study. The desktop assessments included a review of relevant literature and mapping, database searches and previously prepared technical reports. Flora field surveys were conducted to obtain specific ecological information relevant to the study area and to ground-truth results from desktop assessments. This section also outlines the terminology and nomenclature used in this technical report and describes the procedures and guidelines used for assessing the vegetation and flora values of the study area.

2.1. Background Searches

Desktop assessments of State and Commonwealth databases were undertaken prior to the commencement of the field survey to identify records or potential occurrences of conservation significant flora species and threatened ecological communities for the study area. The desktop assessment of the flora and vegetation of the study area utilised the following databases and literature sources:

- The Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) Protected Matters search tool was used to identify threatened ecological communities (TECs) and species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that may occur within the search area. The Protected Matters search tool is a predictive database that identifies EPBC Act listed flora species that may occur in a given search area based on bioclimatic modelling.
- The Queensland Department of Environment and Heritage Protection (EHP) certified Regional Ecosystem (RE) mapping (Version 6.0b, 2009). This mapping database is administered by the EHP and identifies areas of mapped remnant vegetation, describes the REs within the study area, and specifies their status under Queensland's *Vegetation Management Act 1999* (VM Act). Additionally it outlines areas designated as essential habitat for endangered, vulnerable or near threatened species (both flora and fauna). This database was examined to determine the type and extent of REs present and whether any essential habitat is present;
- EHP's regulated regrowth vegetation mapping (Version 2.0, 2009) to determine if any areas within the study area support high-value regrowth vegetation protected under the VM Act.
- EHP's Environmentally Sensitive Areas mapping to determine whether any Environmentally Sensitive Areas as defined in the Environmental Protection Regulation 2008 are present within the study area;
- EHP's Wildlife Online database provided a catalogue of flora species that have been historically recorded from or surrounding the study area, including species listed as threatened under Queensland's *Nature Conservation Act 1992* (NC Act). This database is derived from numerous sources including State government, consultants, academic facilities and community groups. Records were returned for a 20 km search area around a central point;
- Queensland Herbarium (DSITIA) HERBRECS specimen database to identify any previously recorded flora species located within the study area, including NC Act listed species; and
- The former Department of Environment and Resource Management's (DERM) Burdekin Natural Resource Management Region Back on Track report (DERM, 2010) identifies priority species in the Burdekin (NQ Dry Tropics) NRM region, details the regional threatening processes impacting upon these species, and proposes a range of actions to address regional threats.

In addition to the above searches, various reports were also reviewed as part of a literature review:

- Mitchell, C., Egan, S. and Leverington, A. (2002).Biodiversity Audit – Bioregional Case Study. Desert Uplands Bioregion, Queensland. Environmental Protection Agency, Queensland Government.
- Fisher, A. and Kutt, A. (2006) Biodiversity and land condition in tropical savanna rangelands: technical report. Tropical Savannas CRC, Darwin.
- Mathieson, M. and Venz, M. (2007) Flora and fauna assessment of Lambton Meadows. Environmental Protection Agency, Brisbane.
- Worley Parsons (2009) Flora and fauna survey report – EPC 1040 – Glen Innes, Central Queensland. Unpublished report prepared for Waratah Coal.
- Unidel (2010) China First Project: Mine site terrestrial flora and fauna assessment. WAR003-ENV-RPT-0001. Unpublished report prepared for Waratah Coal.
- DERM (2012a) Biodiversity Planning Assessment, Desert Uplands Bioregion Flora Expert Panel Report, Central West Region. Department of Environment and Resource Management, Queensland Government.
- DERM (2012b) Biodiversity Planning Assessment, Desert Uplands Bioregion Landscape Expert Panel Report, Central West Region. Department of Environment and Resource Management, Queensland Government.
- Rob Friend and Associates (2012) Flora and vegetation report. Galilee Coal Project (Northern Export Facility). Unpublished report prepared for Waratah Coal.

2.2. Field Survey

A field survey was conducted to identify species and vegetation within the study area and to verify the certified RE mapping. Survey sites were selected by Rob Friend and Associates (2012) to improve the vegetation mapping data and to include areas which were not formally surveyed by Unidel (2010) during the EIS phase. Verification of the certified RE mapping was based on direct observations of flora and vegetation, including soils, geology and landforms.

2.2.1. Timing of Field Surveys

Flora surveys were undertaken in the period between and inclusive of the 27th and 31st of October 2012 (late dry season).

2.2.2. Site Selection

Three of the 14 sites were originally surveyed during Unidel's (2010) floristic assessment as part of the EIS process (sites identified as BB06, BB07 and BB26). Rob Friend and Associates (2012) identified these three sites and an additional 11 sites in the north-west corner of the area but was unable to assess them along with the other 66 sites they surveyed due to the onset of poor weather during their survey program.

2.2.3. Field Survey Methods

Targeted floristic surveys were conducted using methods defined by the Queensland Herbarium (DSITIA) for mapping REs and vegetation communities (Neldner *et al*., 2012). Flora surveys were conducted in areas of remnant vegetation including mapped REs. Flora sampling methods included:

- CORVEG sampling (Neldner *et al*., 2012);
- BioCondition assessment (Eyre *et al*., 2011); and
- Site species lists.

CORVEG Sampling

A total of 14 late dry season survey sites were assessed across the study area. Sites were surveyed by secondary and/or tertiary level CORVEG plots, as necessary to verify the extent and attribution of the

certified RE and to assist with determination of remnant status. Secondary sites (n = 13) provided comprehensive data on vegetation structure and composition. The less detailed tertiary sites (n = 4) recorded key attributes of vegetation structure and composition to assist in verifying the certified RE within the study area. Survey site locations are shown in **Figure 1**.

The remnant/non-remnant status of native vegetation was determined by comparing the existing predominant canopy of a site with that in a normal or undisturbed state. The predominant canopy is defined by the Queensland Herbarium as the ecologically dominant layer (EDL) or that layer of the vegetation which contains the most above ground biomass. The EDL can be defined in terms of growth form, height, cover density and species. In the majority of cases, the EDL is equivalent to the upper stratum of Walker and Hopkins (1990).

BioCondition Assessment

BioCondition assessments were undertaken at 11 of the 14 sites in accordance with methods prescribed in the BioCondition Assessment Manual, version 2.1 (Eyre *et al*. 2011). No reference site assessments were undertaken to form benchmarks for the site attributes measured in BioCondition.

Site species lists

At each of the sampling sites, a comprehensive species inventory was prepared together with any ecologically significant characteristics, including the presence of threatened species or vegetation communities (or potential habitats) and threatening processes (such as significant weed infestations).

Plant species were either identified *in situ* or collected for later identification. For those species for which identification or confirmation was required, a specimen was sent to the Queensland Herbarium for verification.

2.3. Nomenclature

Scientific names for terrestrial flora are consistent with those used in the Census of the Queensland Flora (Bostock and Holland, 2010) and botanical binomials presently accepted by the Queensland Herbarium, DERM. An asterisk (*) preceding a species name indicates a non-native exotic species. The description of REs follows that of the Regional Ecosystem Description Database (REDD, Version 7.0 (Queensland Herbarium, 2012)).

2.4. Coordinate System and Map Datum

Positional data was collected with a handheld Garmin Global Positioning System (GPS), with accuracy between 4 and 8 m. Locations were recorded using the UTM coordinate system with a GDA94 datum. All locations presented in this report are within UTM zone 55K.

2.5. Limitations of the Survey

The major constrain of this study was that the BioCondition assessment was undertaken during the late dry season and represents a suboptimal period for sampling of flora species. Some short-lived annual species would not be present at this stage of the dry season. Furthermore, due to timing constraints, no reference sites were assessed to form benchmarks for comparison of the BioCondition assessments. As such no BioCondition score can be determined. Only two benchmark documents are published for Desert Upland REs, these being 10.3.1 and 10.3.14a.

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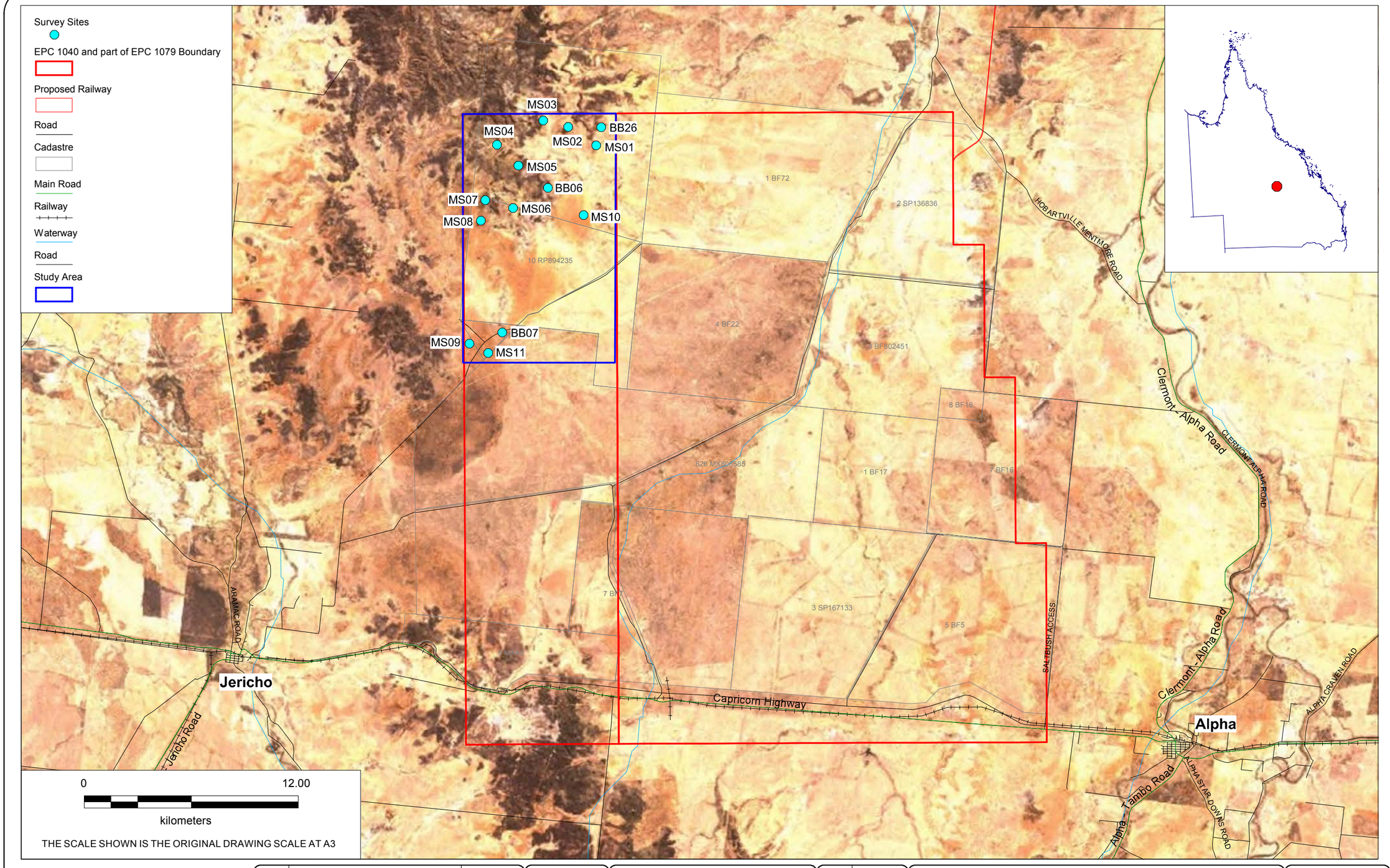

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Alpha Coal Regional Ecosystem and BioCondition Survey	December 2012
Figure 1 Location	ECOSC12-0041
Waratah Coal	ECOSC12-0041-01

3. Existing Environmental Values

The study area is located to the north-west of the township of Alpha, approximately 50 km to the south-east. The study area falls in the Barcaldine Regional Council local government area and lies entirely in the NQ Dry Tropics NRM region.

3.1. Geology and Geomorphology

Geology mapping covering the study area (Jericho SF5514 1:250,000) indicates that six distinct geologies occur across the study area (**Table 1**).

Table 1. Major Geologies Mapped from the Study Area (Source: Jericho SF5514 1:250,000 geology map)

Map Unit	Age	Description
Qa	Quaternary	Alluvium, some gravel
Qs	Quaternary	Sand, gravel, rubble
T	Tertiary	Argillaceous sandstone, sandy mudstone, limestone; partially laterised
TRm	Middle to Upper Triassic	Mudstone, sandstone, siltstone, shale
TRe	Lower to Middle Triassic	Quartz sandstone, minor siltstone and mudstone
TRld	Lower Triassic	Labile sandstone, siltstone, mudstone

The landform across the study area can be described as gently undulating intersected by a number of incised waterways. A series of sandstone hills occur in the north-western portion of Spring Creek station.

The study area falls entirely in the Belyando River catchment. The major watercourses of Spring Creek, Pebbly Creek, and Malcolm Creek are all prominent riparian features in the landscape of the study area and provide the only other marked change in the land surface profile other than the areas identified above.

3.2. Soils

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australian Soil and Resources Information System (CSIRO Land and Water, 2009) has mapped the major soil types occurring in the study area at 1:2,000,000 scale (**Table 2**).

Table 2. Major Soils Mapped from the Study Area (Source: CSIRO Digital Atlas of Australian Soils, 2009)

Soil Map Unit	Description and General Characteristics
Fz7	Strongly undulating to low hilly lands: dominant soils are shallow stony loams (Um1.43) and (Um1.41), (Um4.1), and (Um5.5). Associated are shallow sandy soils (Uc2.12), (Uc3.12), and (Uc1.21). On some slopes shallow duplex soils (Dr2.33), (Dr2.32), (Dy3.43), and (Dy3.42) occur; in valley floors deeper sandy soils (Uc1.21 and Uc1.23) and (Uc5.21 and Uc5.22) occur. Small areas of sandy red earths (Gn2.12 and Gn2.11) and yellow earths (Gn2.22 and Gn2.21) are also included in the unit
My19	Level or very gently undulating plains: dominant soils are sandy or loamy red earths (Gn2.12 and Gn2.11) with some yellow earths (Gn2.22 and Gn2.21). Associated are deep red sands (Uc1.23 and Uc1.22), often in the form of low dunes. Broad shallow drainage lines often have loamy duplex soils associated, chiefly (Dy3.42), (Dy2.42), or (Dr2.32). In other depressed areas shallow red earths are underlain by a clay D horizon. Small areas of clay soils (unit li1) may be included

Soil Map Unit	Description and General Characteristics
My26	Gently undulating or level plains: dominant soils are hard loamy red earths (Gn2.12) and yellow earths (Gn2.22), (Gn2.32), and (Gn2.62). The red and yellow earths may vary locally in dominance, the former occurring mainly on slightly higher sites. Associated broad shallow drainage lines have loamy duplex soils, (Dy3.33) and (Dy3.43), similar (Dy2) soils, and small areas of (Dr2.13). Also included in the unit are some low laterite or sandstone scarps with shallow stony loams (Um1.43), and occasional eroded mottled rock pavements
MS1	Gently undulating or level plains: dominant soils are sandy or, less commonly, loamy yellow earths (Gn2.22), occasionally (Gn2.21 and Gn2.24). These soils are mostly underlain by nodular or concretionary laterite at shallow to moderate depths and occasionally outcropping. Closely associated are sandy to loamy red earths (Gn2.12) and (Gn2.42), which are much deeper. In broad shallow drainage lines loamy duplex soils (Dy2.43), (Dy2.42), (Dy3.33), (Dy3.43), and (Dy3.42) occur. Throughout the unit are small areas of earthy sands (Uc5.22)

4. Results

4.1. Review of Previous Studies

The results of a literature review of studies and reports related to study area are summarised below.

Environmental Protection Agency (Mathieson and Venz, 2007)

The Environmental Protection Agency (Mathieson and Venz, 2007) undertook standardised surveys of terrestrial vertebrate fauna and associated flora and habitat condition as part of the Desert Channels Sustainable Grazing Project. Eighteen standardised sites were established in a number of different RE types in various states of condition on Lambton Meadows (lot 626 on MX806585), south of Glen Innes. Vegetation of the sites tended to be silver-leaved ironbark (*Eucalyptus melanophloia*) and/or poplar box (*E. populnea*) woodlands with eight sites located in remnant RE 10.5.5a/10.5.12, six in recently pulled areas and four located in non-remnant (long pulled) areas.

Flora, habitat and ecosystem condition of the sites was assessed with an early version of BioCondition (v1.5, Eyre et al. 2006). The Department of Primary Industries "Stocktake" grazing land condition assessment was used at 11 of the 18 sites. "Stocktake" aims to measure pasture, soil and woodland condition against a set of criteria resulting in a score of A, B, C or D where A is in best condition and D in the worst.

Results of this study included 169 plant species recorded including 157 native and 12 non-native species (Mathieson and Venz, 2007). No EVNT or regionally significant flora species were recorded in this study. Habitat and ecosystem condition data was collected for all 18 sites surveyed, including data on structure, coarse woody debris, plant species richness, organic litter cover and presence of weeds. No BioCondition were calculated as no published benchmarks for the RE surveyed were available. Most sites recorded a Stocktake result of A or B (with one C) (Mathieson and Venz 2007).

Worley Parsons (2009)

Worley Parsons (2009) undertook an assessment of key flora and fauna values within Bimblebox Nature Refuge (Glen Innes station) for Waratah Coal. This study also detailed perceived impacts on these key values associated with proposed exploration works. The Bimblebox Nature Refuge falls entirely within Glen Innes station (lot 4 on BF22). This Nature Reserve was gazetted in 2003, acknowledging the high remnant vegetation cover, relatively good condition and high biodiversity values. The Bimblebox Nature Refuge is identified as containing "special biodiversity values" and is of value as a 'wildlife refugia'. It is also mapped as being of local significance within the Desert Uplands Biodiversity Planning Assessment (EPA 2005).

Worley Parsons (2009) undertook assessments at 18 sites across Glen Innes. All sites were assessed via a tertiary level Corveg assessment to assist with validating the certified RE mapping. Targeted searches for threatened flora species identified through the desktop searches. These were undertaken in known locations and potentially suitable habitat within the project area.

Worley Parsons (2009) found that at the sites that were surveyed in their study, the vegetation and land zones generally conformed to the certified RE mapping (version 5.0 at the time of the survey) and that over 96% of the project area support remnant vegetation as defined by the VM Act. Dominant vegetation communities encountered included eucalypt woodlands characterised by poplar box (*E. populnea*), silver-leaved ironbark (*E. melanophloia*) and/or western long-fruited bloodwood (*Corymbia plena*) and brigalow (*Acacia harpophylla*) communities. All of the REs confirmed during the Worley Parsons (2009) study were classed as Not of Concern (now Least Concern) under the VM Act. The project area did not support any EPBC listed TEC or any Endangered or Of Concern REs. Although not objectively assessed, Worley Parsons

(2009) concluded that remnant vegetation within the project area was generally in a good to average condition.

The Worley Parsons (2009) study recorded a total of 104 plant species including 94 native and 10 non-native species. Five populations of around 50 to 60 individuals of large-podded tick-trefoil (*Desmodium macrocarpum* – Near Threatened under the NC Act) were recorded during field surveys. No other EVNT or regionally significant flora were recorded during this survey with the three other threatened species identified as possibly occurring in the region in the database searches not being recorded within the wider study area and suitable habitat being absent from the study area.

Three of the 10 non-native species recorded by Worley Parsons (2009) are also listed as weeds under the LP Act, these being: rubber vine (**Cryptostegia grandiflora*), arsenic weed (**Senna obtusifolia*) and velvet tree pear (**Opuntia tomentosa*). The exotic pasture species, buffel grass (**Cenchrus ciliaris*) was also observed throughout the project area in open, disturbed and remnant forested areas, often forming the dominant species of the ground layer.

Unidel (2010)

Unidel (2010) was commissioned by Waratah Coal to undertake detailed flora and fauna assessment across the entire proposed mine site (some 69,777 ha) for the China First project (including the area covered by EPC 1040 and part of 1079). These studies were undertaken to address the Terms of Reference and as specialist studies for input into the Environmental Impact Study (EIS) for the project. Specifically, the Unidel (2010) study was to assess the existing flora and fauna assemblages through both desktop and field studies, identify potential and actual impacts on the terrestrial flora and fauna and recommend appropriate mitigation measures to assist in avoiding or minimising potential impacts on these values. The area covered by the Unidel (2010) study included both the Worley Parsons (2009) project area and the Environmental Protection Agency case study property (Mathieson and Venz, 2007).

Unidel's (2010) field surveys included ground-truthing of 31 sites via tertiary level Corveg sites, targeted searches of threatened flora species, general observations of the local environment surrounding the study area and recording distributions of declared weed species. Results of the Unidel (2010) site assessments indicate that a significant portion of the study area was non-remnant vegetation and used for pastoral production. These areas were characterised by established buffel grass pastures.

Results of Unidel's (2010) field surveys confirmed the certified RE mapping (version 6.0) was generally accurate with minor areas in conflict with the certified mapping. Of the 21 REs mapped in proximity to the study area, 10 were identified as occurring within the mine surface clearing footprint (Unidel 2010). All 10 REs are listed under the VM Act as Least Concern. While three EPBC TECs were predicted to occur within the defined search area, field surveys determined that not TECs were present within the study area. Unidel (2010) also report that although minor occurrences of brigalow (*Acacia harpophylla*) dominant and co-dominant REs (REs 10.3.3 and 10.4.3) were found to be present within the study area, these REs are not included within the definition of the Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community. The mine surface clearance footprint did not contain any areas mapped as high-value regrowth.

Woodlands occurring on Cavendish station (lot 10 on RP894253) to the west of Glen Innes were found to have relatively high conservation values with generally similar suite of plant species and fauna to those found in the Bimblebox Nature Refuge (Unidel, 2010).

A total of 93 flora species were recorded from all 31 sites surveyed by Unidel (2010) including 85 native and eight non-native species. All native flora species recorded during Unidel's (2010) survey are classed as Least Concern. No EVNT or regionally significant flora species were recorded from any of the sites surveyed by

Unidel (2010). Of the eight non-native plant species recorded by Unidel (2010), three are declared weeds under the LP Act, these being these being: rubber vine (*_Cryptostegia grandiflora_*), arsenic weed (*_Senna obtusifolia_*) and velvet tree pear (*_Opuntia tomentosa_*).

Rob Friend and Associates (2012)

Rob Friend and Associates (2012) were commissioned by Waratah Coal to undertake additional vegetation assessments as part of a Supplementary Environmental Impact Statement (SEIS). These additional assessments were undertaken to build upon and augment the previous vegetation and flora assessments undertaken by Unidel (2010) as part of the EIS process. This additional work was primarily driven by comments on the China First EIS. Based on these comments, Rob Friend and Associates were engaged to undertake BioCondition assessments at all site surveyed originally by Unidel (2010), survey additional sites to extend or improve the existing vegetation community assessment and undertake targeted searches for EVNT species that may occur within the study area.

Rob Friend and Associates (2012) identified 80 sites to assess as part of additional flora and vegetation assessments (see Rob Friend and Associate (2012) Figure 7, Appendix A). These were largely additional to Unidel's (2011) sites assessed as part of the EIS process or were sites that were surveyed previously but where new assessments were required to extend or improve the existing information. Rob Friend and Associates (2012) were only able to sample 66 of these 80 sites due to weather constraints. The remaining 14 unsurveyed sites occurred mainly on sandstone areas in the vicinity of Spring Creek.

Rob Friend and Associates (2012) undertook 34 secondary level and 32 quaternary level Corveg assessments with 33 of these sites being utilised for BioCondition assessments. Of the 17 REs identified in the certified mapping (version 6.0), Rob Friend and Associates (2012) confirmed the presence of 12 REs. The majority of the unconfirmed REs were associated with the sandstone areas on Spring Creek.

No threatened ecological communities or flora species listed under the EPBC were recorded within the study area (Rob Friend and Associates, 2012). Rob Friend and Associates (2012) also found that the remnant/non-remnant extent as depicted in the certified RE mapping is generally consistent to the on-ground situation. Some inconsistencies between site survey results and the certified mapping were noted and were largely related to scale and precision at which the mapping is undertaken (1:100,000) or are more random errors in the attribution of mapped polygons (i.e. misinterpretation of remotely sensed landform or vegetation patterns). Additionally, v6.0b of the RE mapping is based on the vegetation extent in 2006. Some areas of mapped RE may have been altered since that time. The main reasons for polygon attribution errors were related to either incorrect land zone determination or misinterpretation of vegetation patterns with incorrect determination of dominant species present within the ecologically dominant layers. Section 7.1 (Rob Friend and Associates, 2012) detail specific sites where the certified RE mapping and results of the site assessments differ.

Rob Friend and Associates (2012) also completed 33 BioCondition surveys across the study area. However, no published benchmarks for the REs assessed are publically available and since no reference sites were assessed as part of this study, no comparison of measured site attributes to benchmark values was possible. As a result no BioCondition score could be calculated for the sites assessed. However, Rob Friend and Associates (2012) do make some comments based on their BioCondition assessments, mainly that some consistency exists in calculated ranges for the various site based attributes from sites located within the same RE.

Results of targeted searches of EVNT and regionally significant flora added to the previously recorded populations of large-podded tick-trefoil (*_Desmodium macrocarpum_*), identifying a further 19 locations within the study area (Rob Friend and Associates, 2012). A likelihood of occurrence assessment of the

remaining EVNT species identified during desktop searches indicates that suitable habitat may be present within the sandstone areas of Spring Creek.

In terms of non-native plant species, Rob Friend and Associates (2012) found that apart from introduced pasture grasses such as buffel grass (**Cenchrus ciliaris*) and red natal (**Melinis repens*) the incidence and impact of non-native species is considered to be relatively low. They also found that the declared weed (arsenic weed – **Senna obtusifolia*) was primarily restricted to disturbed areas on Lambton Meadows with evidence that landholders are actively managing this species.

Biodiversity Planning Assessment, Desert Uplands Bioregion Flora Expert Panel Report (DERM, 2012a)

The Biodiversity Planning Assessment, Desert Uplands Bioregion Flora Expert Panel Report (DERM, 2012a) summarises the proceedings and output of an expert panel identification and discussion of the flora values of the Desert Uplands Bioregion. The panel reviewed 61 plant taxa and confirmed the presence of 40 EVNT species within the DEU and proposed treating a further non-EVNT species as priority species. *Desmodium macrocarpum* was one of the taxa review by the panel (DERM, 2012a).

In addition to reviewing EVNT plant taxa, the panel were asked to identify areas with special biodiversity values within the DEU. Values included centres of endemism, wildlife refugia, disjunct populations, high species richness, among other factors. REs 10.5.1 and 10.3.14 were identified as having regional significance (DERM, 2012a) both of which have been confirmed as occurring within the study area. RE 10.5.1 was included by the panel as it supports high overall species diversity and is an area of concentration of EVNT flora and fauna with biogeographic interest and other priority species (DERM, 2012a). RE 10.3.14 was included by the panel as it supports very high overall species diversity of DEU species and is an area of concentration of EVNT flora species.

Biodiversity Planning Assessment, Desert Uplands Bioregion Landscape Expert Panel Report (DERM, 2012b)

The Biodiversity Planning Assessment, Desert Uplands Bioregion Landscape Expert Panel Report (DERM, 2012b) summarises the proceedings and output of an expert panel identification and discussion of the landscape values of the Desert Uplands Bioregion. Of particular note to the study area, RE 10.3.12 was listed among other riparian REs as having State significance because of very high special biodiversity values. These riparian REs function as important refuges for many species of flora and fauna because of the relatively high nutrient levels associated with most of these areas, their greater moisture balance, and generally well developed vegetation (DERM, 2012b).

4.2. Desktop Assessment

4.2.1. Regional Ecosystems

In Queensland, native vegetation is classified into Regional Ecosystems (REs). REs are discrete vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil. Each RE has a number that serves as a shorthand description of its characteristics and locations, for example, RE 10.3.3. The first number, 10, indicates the bioregion which the RE is located within, in this case the Desert Uplands bioregion. The second number, 3, indicates the land zone on which the ecosystem is found, in this case alluvium associated with river and creek flats. The third number, 3, is the ecosystem number and relates to the dominant vegetation, in this case *Acacia harpophylla* and/or *Eucalyptus cambageana* low open woodland to open woodland on alluvial plains.

The Queensland Herbarium, which is part of the Department of Science, Information Technology, Innovation, and the Arts (DSITIA), is responsible for mapping REs, using a combination of remotely sensed data sets and on-ground studies. Each RE is assigned a vegetation management class, which is based on its

current and pre-clearing areal extent (how much of it remains) within a bioregion. RE class definitions are set out in the *Vegetation Management Act 1999* and are defined as follows:

- Endangered:
  - If less than 10% of the pre-clearing extent remains; or
  - If 10-30% of the pre-clearing extent remains (if the remnant extent of the RE within the bioregion is less than 10,000 ha).
- Of Concern:
  - If 10-30% of the pre-clearing extent remains; or
  - More than 30% of the pre-clearing extent remains (if the extent of the RE within the bioregion is less than 10,000 ha).
- Least Concern:
  - If more than 30% of the pre-clearing extent remains; and,
  - If the remnant extent of the RE within the bioregion is more than 10,000 ha.

Furthermore, the DEHP assigns a non-legislative biodiversity status to REs according to the condition of the RE and its perceived threats, in addition to its pre-clearing and remnant extent. Under this process a RE is:

- Endangered if it has:
  - less than 10% of the pre-clearing extent unaffected by severe degradation and/or biodiversity loss[1]; or
  - 10 - 30% of the pre-clearing extent unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10 000 hectares; or,
  - a rare[2] RE subject to a threatening process[3].
- Of Concern if it has:
  - 10 - 30% of the pre-clearing extent unaffected by moderate degradation[4] and/or biodiversity loss.
- No Concern at Present if it:
  - does not meet the degradation criteria listed for Endangered and Of Concern REs.

Remnant vegetation is defined in the *Vegetation Management Act 1999* as vegetation shown on a Regional Ecosystem or remnant map. Woody vegetation is mapped as remnant where the dominant canopy has:

- >50% of the predominant canopy cover that would exist if the vegetation community were undisturbed; and
- >70% of the height of the predominant canopy that would exist if the vegetation community were undisturbed; and
- composed of the same floristic species that would exist if the vegetation community were undisturbed.

This definition is known as the '50-70-species rule'.

[1] Floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example by loss of A horizon, surface expression of salinity, surface compaction, loss of organic matter or sheet erosion
2 Pre-clear extent less than 1000 ha or patch size 100 ha and of limited extent across its range
3 For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing, or infrastructure development
[3] Floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded

Bioregion and Subregion

The study area occurs within the Desert Uplands bioregion of central northern Queensland between Blackall and Pentland. The Desert Uplands bioregion covers a total area of 70,320 km² and is characterised by sandstone ranges and sand plains with soils that are typically of poor structure and low fertility (Morgan, 1999). The climate is semi-arid (Morgan, 1999). *Eucalyptus whitei, Eucalyptus similis* and *Corymbia trachyphloia* woodlands are the predominant vegetation communities in the Desert Uplands (SEWPAC, 2009). Vegetation clearing has historically occurred in the south-east of the bioregion, corresponding with areas of acacia vegetation on heavier soils (Morgan, 1999). More recently, eucalypt woodlands on less fertile sand plains have experienced clearing (Morgan, 1999). Introduced buffel grass (**Cenchrus ciliaris*) forms extensive stands in the bioregion (Morgan, 1999). Approximately 2.3% of the total area of the bioregion is under conservation tenure (SEWPAC, 2009). Four subregions comprise the Desert Uplands Bioregion with the study area occurring entirely within the Jericho subregion (DEU04).

Land Zones

Land zones represent significant differences in geology and the associated landforms, soils and physical processes and generally correspond to broad geological and geomorphological categories. Four land zones (**Table 3**) are mapped from the study and are broadly consistent with the geology mapping.

Table 3. Land zones and associated geologies occurring in the study area.

Land zone	Description	Associated geology
3	Recent Quaternary alluvial systems, including closed depressions, paleo-estuarine deposits currently under freshwater influence, inland lakes and associated wave built lunettes. Excludes colluvial deposits such as talus slopes and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols; also with Dermosols, Kurosols, Chromosols, Kandosols, Tenosols, Rudosols and Hydrosols; and Organosols in high rainfall areas.	Qa
5	Tertiary-early Quaternary extensive, uniform near level or gently undulating plains with sandy or loamy soils. Includes dissected remnants of these surfaces. Also includes plains with sandy or loamy soils of uncertain origin, and plateau remnants with moderate to deep soils usually overlying duricrust. Excludes recent Quaternary alluvial systems (land zone 3), exposed duricrust (land zone 7), and soils derived from underlying bedrock (land zones 8 to 12). Soils are usually Tenosols and Kandosols, also minor deep sandy surfaced Sodosols and Chromosols. There may be a duricrust at depth.	Qs
7	Cainozoic duricrusts formed on a variety of rock types, usually forming mesas or scarps. Includes exposed ferruginous, siliceous or mottled horizons and associated talus and colluvium, and remnants of these features, for example low stony rises on downs. Soils are usually shallow Rudosols and Tenosols, with minor Sodosols and Chromosols on associated pediments, and shallow Kandosols on plateau margins and larger mesas.	Duricrusted T; duricrusted TRm
10	Medium to coarse grained sedimentary rocks, with little or no deformation, forming plateaus, benches and scarps. Includes siliceous (quartzose) sandstones, conglomerates and minor interbedded volcanics, and springs associated with these rocks. Excludes overlying Cainozoic sand deposits (land zone 5). Soils are predominantly shallow Rudosols and Tenosols of low fertility, but include sandy surfaced Kandosols, Kurosols, Sodosols and Chromosols.	T, TRm, TRe, TRld

Regional Ecosystems

The latest certified Regional Ecosystem (RE) mapping (Version 6.0b, including pre-clearing and 2006 remnant REs) was obtained for the study area (**Appendix A**). The remnant REs present at each site are described in **Table 4**. Version 6.0b of the certified RE mapping indicates that the study sites occur in has 15 REs mapped across the study area.

Of the 15 mapped remnant REs, one has been classed as Of Concern and the remainder are classed as Least Concern under the provisions of the VM Act. Biodiversity status is assessed by EHP when considering development applications to clear vegetation. It is not a regulatory status in its own right, unless the biodiversity status includes Essential Habitat for specific threatened fauna/flora species.

Table 4. Remnant REs mapped from the study sites. Descriptions as per the Regional Ecosystem Description Database (Queensland Herbarium, 2012).

Site	Mapped RE	RE	Description	VM Act Class	Biodiversity Status
BB06	10.10.1/10.10.4/10.7.3/10.7.5	10.10.1	*Acacia shirleyi* and/or *A. catenulata* dominate the sparse to very sparse small tree layer+/-- *Corymbia lamprophylla*. Sparse ground cover of *Triodia* spp. Occurs on rocky hills or pediments to talus below cliffs with skeletal soils to shallow earths on sandstone ranges.	Least Concern	No Concern at Present
		10.10.4	*Corymbia leichhardtii* dominates the very sparse tree layer with a ground cover of *Triodia* spp. Occurs on slopes of rocky hills with sandy to skeletal soils on sandstone ranges.	Least Concern	No Concern at Present
		10.7.3	*Acacia shirleyi* and/or *A. catenulata* and /or *Corymbia lamprophylla* and/or *C. leichhardtii* dominate the sparse low tree layer. Includes small areas *Acacia microcybe* and *Corymbia blakei* in the far west, and *A. burdekensis* in White Mtns NP. Also, there are small areas of *A. shirleyi* and rarely *A. catenulata*. Occurs on the exposed mottled zone on scarps with skeletal soils, and above scarps with red earths usually on ferricrete, at the margins of Tertiary plateaus.	Least Concern	No Concern at Present
		10.7.5	*Eucalyptus thozetiana* dominates the mostly very sparse and sometimes sparse tree layer. *Eremophila mitchellii* is sometimes present as scattered small trees (2.5-6m tall). *Carissa lanceolata* and *Eremophila deserti* are frequently present as scattered shrubs (0.5-2m tall). *Triodia pungens* usually dominates the very sparse to sparse ground layer. *Enchylaena tomentosa* is frequently present. Occurs on scarps with skeletal soils and on pediments below scarps of lateritised plateaus with shallow texture contrast soils. (BVG1M: 12a)	Least Concern	Of Concern
MS04 MS05 MS06	10.10.4/10.7.5/10.7.3	10.10.4	*Eucalyptus exilipes* and/or *Corymbia leichhardtii* open-woodland on sandstone ranges	Least Concern	No Concern at Present
		10.7.5	*Eucalyptus thozetiana* open-woodland on scarps and on pediments below scarps	Least Concern	Of Concern
		10.7.3	*Acacia shirleyi* woodland or *A. catenulata* low woodland at margins of plateaus	Least Concern	No Concern at Present
MS03	10.10.5/10.10.4/10.10.7/10.10.1	10.10.5	Mostly bloodwoods dominate the tree layer including *Corymbia trachyphloia* subsp. *trachyphloia* or *C. lamprophylla*. Occurs on slopes or in valley floors of rocky hills with sandy to skeletal soils on sandstone ranges.	Least Concern	No Concern at Present
		10.10.4	*Eucalyptus exilipes* and/or *Corymbia leichhardtii* open-woodland on sandstone ranges	Least Concern	No Concern at Present
		10.10.7	*Eucalyptus cloeziana* dominates the very sparse tree layer. *Corymbia trachyphloia* is sometimes codominant. *Corymbia leichhardtii* is usually present. A very sparse shrub layer is present. *Triodia pungens* usually dominates the very sparse	Of Concern	Of Concern

Site	Mapped RE	RE	Description	VM Act Class	Biodiversity Status
			to sparse ground layer. Occurs in valleys and on slopes of hills with shallow sandy to skeletal soils on sandstone ranges. (BVG1M: 12a)		
		10.10.1	*Acacia shirleyi* woodland or *A. catenulata* low open-woodland on sandstone ranges	Least Concern	No Concern at Present
BB07	10.3.28/10.3.27/10.3.14	10.3.28	*Eucalyptus melanophloia* or *Eucalyptus crebra* dominate the very sparse tree layer. *Eucalyptus melanophloia* dominates the very sparse to sparse canopy. *Corymbia dallachiana* is occasional present in the canopy or subcanopy. A low tree layer or shrub layer are usually absent although there can be scattered small trees and shrubs present. *Aristida benthamii*, *Sehima nervosum*, *Digitaria brownii*, *Chrysopogon fallax*, *Enneapogon polyphyllus*, *Schizachyrium fragile* and *Eriachne mucronata* occur as dominants and some codominants. Occurs on sandy alluvial fans with yellow earth and duplex soils formed from outwash from sandstone hills.	Least Concern	No Concern at Present
		10.3.27	*Eucalyptus populnea* dominates the very sparse tree layer occasionally with understorey of *Archidendropsis basaltica*. Occurs on alluvial plains with sandy duplex soils and sometimes clayey soils.	Least Concern	Of Concern
		10.3.14	*Eucalyptus camaldulensis* and/or *E. coolabah* dominate the very sparse to sparse canopy on channels, levees and floodplains. *Acacia harpophylla* or *A. cambagei*, may be present as clumps or scattered trees. Occurs on channels, levees and flood plains with sandy to clayey soils along larger watercourses.	Least Concern	Of Concern
MS09 MS11	10.5.1/10.5.10	10.5.1	Largely *Eucalyptus similis* and/or *Corymbia brachycarpa* and/or *Corymbia setosa* dominate the very sparse low tree layer. There is frequently a dense shrub layer. Small areas of *Eucalyptus chartaboma* and/or *E. tetrodonta*, or *E. drepanophylla* or *Lysicarpus angustifolius* occur in the north. Occurs on deep red earths on Tertiary sandplain.	Least Concern	No Concern at Present
		10.5.10	*Corymbia leichhardtii* often with *C. brachycarpa* or *Eucalyptus drepanophylla* dominate the very sparse tree canopy in the south with sparse hummock grass ground layer of *Triodia* spp. or in the extreme north low open-woodland to mostly open-woodland of *Eucalyptus exilipes* with or without *C. leichhardtii* and/or *C. brachycarpa* with sparse hummock grass ground layer of *Triodia* spp. *Corymbia leichhardtii* dominates the very sparse canopy. *Corymbia brachycarpa* is frequently occurring and sometimes codominant in the canopy. *Eucalyptus drepanophylla* is commonly present in some areas. *Acacia*	Least Concern	No Concern at Present

Site	Mapped RE	RE	Description	VM Act Class	Biodiversity Status
			leptostachya, *Jacksonia ramosissima* and *Carissa lanceolata* are commonly present and sometimes dominant in the very sparse to sparse shrub layer. *Triodia pungens* is frequently dominant in the very sparse to sparse ground layer. *Eriachne mucronata* and *Aristida* spp. are frequently present and sometimes dominant. Occurs on flat to gently sloping terrain usually on perimeter of sandplain plateaus often with shallow duplex soils. (BVG1M: 18a)		
MS08	10.5.5/10.5.4/10.5.1/10.7.3	10.5.5	Mostly *Eucalyptus melanophloia* dominates the very sparse tree layer with very sparse ground layer of *Aristida* spp. and/or *Triodia* spp. Occasionally present are small areas of *Acacia sericophylla* or *Archidendropsis basaltica* or rarely grassland. Occurs on loamy red and yellow earths on undulating sandplains.	Least Concern	No Concern at Present
		10.5.4	*Eucalyptus crebra* or *E. drepanophylla* usually with *Corymbia dallachiana* and/or *C. brachycarpa* dominate the very sparse tree layer. Occurs on sandy red and yellow earths on undulating sandplain.	Least Concern	No Concern at Present
		10.5.1	*Eucalyptus similis* and/or *Corymbia brachycarpa* and/or *Corymbia setosa* low open-woodland on sand plains	Least Concern	No Concern at Present
		10.7.3	*Acacia shirleyi* woodland or *A. catenulata* low woodland at margins of plateaus	Least Concern	No Concern at Present
MS10	10.5.5./10.5.12	10.5.5	*Eucalyptus melanophloia* open-woodland on sand plains	Least Concern	No Concern at Present
		10.5.12	*Eucalyptus populnea* dominates the very sparse tree layer with sparse ground layer of *Triodia pungens* and/or tussock grasses. Intermediates between *E. populnea* and *E. brownii* occur in some areas such as to the south of Barcaldine. *Eucalyptus populnea* dominates the very sparse canopy. *Archidendropsis basaltica* and/or *Eremophila mitchellii* occasionally dominate the very sparse to sparse low tree layer and *Lysiphyllum carronii*, *Acacia excelsa*, *Ventilago viminalis*, *Geijera parviflora*, *Grevillea striata* and *Acacia sericophylla* are frequently present. *Carissa lanceolata* frequently dominates the very sparse to sparse shrub layer and *Erythroxylon australe* and *Psydrax oleifolia* are often present. *Olearia subspicata* occurs occasionally. *Triodia pungens* often dominates the very sparse to mid-dense ground layer. Occurs on undulating terrain with sandy loam to sandy clay soils on Cainozoic sandplains. (BVG1M: 17a)	Least Concern	No Concern at Present
MS07	10.7.3/10.5.1	10.7.3	*Acacia shirleyi* woodland or *A. catenulata* low woodland at margins of plateaus	Least Concern	No Concern at Present
		10.5.1	*Eucalyptus similis* and/or *Corymbia brachycarpa* and/or *Corymbia setosa* low open-woodland on sand plains	Least Concern	No Concern at Present

Site	Mapped RE	RE	Description	VM Act Class	Biodiversity Status
BB26 MS01	10.7.3/10.7.5/10.3.3	10.7.3	*Acacia shirleyi* woodland or *A. catenulata* low woodland at margins of plateaus	Least Concern	No Concern at Present
		10.7.5	*Eucalyptus thozetiana* open-woodland on scarps and on pediments below scarps	Least Concern	Of Concern
		10.3.3	Low open-woodland of *Acacia harpophylla* +/- *Eucalyptus cambageana* emergents or open-woodland of *Eucalyptus cambageana* +/- understorey of *Acacia harpophylla* over a very open tussock grassland ground layer. Occurs on alluvial plains.	Least Concern	No Concern at Present
MS02	10.7.5	10.7.5	*Eucalyptus thozetiana* open-woodland on scarps and on pediments below scarps	Least Concern	Of Concern

4.2.2. Regulated Regrowth Vegetation

The Queensland Government has arrangements applying to the clearing of high-value regrowth on freehold and leasehold lands. These arrangements also regulate clearing of regrowth vegetation within 50 m of identified watercourses in priority reef catchments of the Burdekin, Mackay/Whitsundays and Wet Tropics.

Clearing of regrowth mapped as either high-value regrowth or regrowth watercourse vegetation is controlled by the Regrowth Vegetation Code. Regulated regrowth vegetation is defined under the VM Act as regrowth vegetation:

a) identified on the regrowth vegetation map as high value regrowth vegetation; or

b) located within 50 m of a watercourse identified on the regrowth vegetation map as a regrowth watercourse; or

c) contained in a category C area shown on a PMAV.

'High value regrowth vegetation' is defined as mature regrowth of native vegetation that has not been subsequently cleared since December 31 1989. Regrowth watercourse vegetation is all native woody vegetation that is located within 50 m of identified regrowth watercourses in priority reef catchment areas.

The Department of Environment and Heritage Protection (EHP) High Value Regrowth Vegetation mapping (Version 2) was obtained for the study area (**Appendix B**). Approximately 34.5 ha of the study area are mapped as supporting high value regrowth. This includes 0.99 ha of regrowth containing Of Concern RE and 33.47 ha of regrowth containing Least Concern RE. All watercourses occurring in the study area are mapped as regrowth watercourses. No regrowth essential habitat is mapped as occurring in the study area.

High value regrowth vegetation areas have been mapped using analysis of remotely sensed data to determine the proportion of the ground that is covered by foliage (Foliage Projective Cover - FPC). A FPC of at least 11% was used in preparation of the high-value regrowth vegetation maps as this proportion is most likely to equate to similar measures under national standards that define a forest.

The regrowth vegetation map may show some areas where no regrowth occurs or where the vegetation was legitimately cleared since 2007. This is because the remotely sensed data is not able to discriminate between the foliage of native trees and non-native trees, and also because the best available imagery is from 2006–07. EHP acknowledges that this is an inevitable result of the method used to create the map.

In areas where there is no native woody vegetation regrowth, the Regrowth Vegetation Code does not apply. For example, in areas mapped as high value regrowth but which are dominated by non-native woody species, these can be cleared without having to refer to the code. In most situations, corrections to the regrowth vegetation maps are not required. However, the boundaries of the mapped regrowth vegetation can be modified via the Property Map of Assessable Vegetation (PMAV) process at no cost.

Many exemptions apply to the regrowth regulations, including:

- clearing regrowth vegetation for routine management and essential management e.g. fire management lines, fire breaks and fence;
- establishing necessary built infrastructure in areas less than two hectares;
- clearing areas of regulated regrowth vegetation for extractive industry within a key resource area or for a significant community project; or
- burning vegetation to reduce hazardous fuel loads.

The full list of exemptions is contained in the *Guide to exemptions under the vegetation management framework* (available from the EHP website).

4.2.3. Threatened Ecological Communities

Ecological communities are naturally occurring biological assemblages that occur in a particular type of habitat. Threatened ecological communities (TECs) are ecological communities that have been assessed and assigned to a particular category related to the status of the threat to the community at a national scale, i.e. extinct, critically endangered, endangered, vulnerable and conservation dependant. TECs are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Based on the EPBC Protected Matters Search Tool (**Appendix C**) one endangered TEC may occur within the study area, this being Weeping Myall Woodlands.

The Weeping Myall Woodlands TEC range in structure from open woodlands to woodlands, generally 4 – 12 m high, in which Weeping Myall (*Acacia pendula*) trees are the sole or dominant overstorey species. In Queensland, TECs are linked to certain REs which are identified in the listing advice of each TEC. The Weeping Myall Woodlands threatened ecological community corresponds to REs 11.3.2 and 11.3.28 and form small parts of RE 11.9.3a and 4.9.6. According to v6.0b of the certified RE mapping none of these REs are mapped from the study area.

4.2.4. Essential Habitat

To manage clearing and prevent loss of biodiversity, the EHP has mapped areas designated as essential habitat for species listed as Endangered, Vulnerable, or Near Threatened under the NC Act. There is no essential habitat identified as occurring within the study area.

4.2.5. Environmentally Sensitive Area

The study area does not contain any Category A Environmentally Sensitive Areas as defined in Section 25 of the Environmental Protection Regulation 2008 (**Appendix D**). However, Category C Environmentally Sensitive Areas occur within the vicinity of the study area, specifically the Bimble Box Nature Reserve. Towards the west of the study area includes an area mapped as Wild River High Preservation Area.

4.2.6. Threatened Species

Threatened flora species are defined as those species listed under the provisions of the EPBC Act (Cwlth) and/or the Queensland Nature Conservation (Wildlife) Regulation 2006, the regulation to the *Nature Conservation Act 1992* (NC Act). **Table 5** lists all threatened flora species recorded in the EPBC Protected Matters, the EHP Wildlife Online and the Queensland Herbarium's HERBRECS database searches and their respective conservation status.

A likelihood of occurrence ranking was attributed to each conservation significant species, based on the following framework:

- **Unlikely to occur**: species has not been recorded in the region (no records from desktop searches) AND/OR current known distribution does not encompass study area AND/OR suitable habitat is generally lacking from the study area.
- **May occur**: species has been recorded in the region (desktop searches) however suitable habitat is generally lacking from the study area OR species has not been recorded in the region (no records from desktop searches) however potentially suitable habitat occurs at the study area.
- **Likely to occur**: species has been recorded in the region (desktop searches) and suitable habitat is present at the study area.
- **Confirmed present**: species recorded during field surveys at the study area.

EPBC Protected Matters

The EPBC Protected Matters Search Tool identified the general region which includes the study area as having potential habitat for one nationally threatened flora species listed under the EPBC Act (**Table 5**; **Appendix C**), this being *Acacia ramiflora* (Vulnerable).

It should be noted that the EPBC online search gives details of species that are predicted to be present with the defined area based on bioclimatic modelling. As such, these species have not necessarily been observed within the study area. **Table 5** lists all protected flora species recorded in the EPBC Protected Matters and the EHP Wildlife Online database searches and their respective threat status.

Wildlife Online

Species listed under Queensland legislation that may be present in vicinity of the study area were obtained from the EHP Wildlife Online database and the Queensland Herbarium's specimen database (HERBRECS).

A query of the EHP Wildlife Online database (**Appendix E**) returned 78 plant species that have been historically recorded within the study area. These included 75 native species and three exotic species. Three threatened flora species has been recorded within the search area, these being:

- *Desmodium macrocarpum* (Near Threatened);
- *Acacia spania* (Near Threatened); and
- *Micromyrtus rotundifolia* (Vulnerable).

It should be noted that the Wildlife Online database consists of observations that come from a wide range of public sources. As a consequence there is no control over quality and the veracity of individual records may vary.

HERBRECS Retrieval

The Queensland Herbarium's (DSITIA) specimen database (HERBRECS) search returned 78 records of 67 species for the general area (a 10 km buffer around the study area). This count is not exclusive, and is based on limited field collections. Of these 67 records one species is a non-native exotic species and three species are listed as threatened under the NC Act:

- *Desmodium macrocarpum* (Near Threatened);
- *Acacia spania* (Near Threatened); and
- *Micromyrtus rotundifolia* (Vulnerable).

Burdekin Natural Resource Management Region Back on Track

The Burdekin Natural Resource Management (NRM) region Back on Track report (DERM, 2010) identifies 21 priority plant species for the region. As the Burdekin (NQ Dry Tropics) NRM region encompasses a large area of central Queensland, the majority of plant species and some impacts listed in the Back on Track report are not relevant to the study area. Out of the 21 priority plant species listed in the report none have been previously recorded in the general region of the study area as indicated by the HERBRECS database retrieval.

Table 5. Threatened flora previously recorded or predicted to occur within the study area

Taxa	Common Name	Status		Previous recording*	Habitat characteristics	Likelihood of occurrence
		EPBC	NCA			
Acacia ramiflora		V	LC		Slender shrub to low tree 3 - 6 m tall growing on sandstone hills.	Unlikely to occur. Study area occurs well to the south of the known range of this species
Acacia spania	Western rosewood	NL	NT	Y	Tree to 15 m tall growing in eucalypt woodland or lancewood woodland over *Triodia pungens* on gently undulating plains to escarpment areas with sandy soils.	Likely to occur. Suitable habitat occurs in the study area and the species has been recorded in the region.
Desmodium macrocarpum	Large-podded trefoil	NL	NT	Y	Subshrub to 60 cm tall occurring in *Eucalyptus melanophloia* and *E. populnea* woodlands to open forests on sand plains.	Likely to occur. Suitable habitat occurs in the study area and the species has been recorded in the region.
Micromyrtus rotundifolia	Round-leafed heath-myrtle	NL	V	Y	Shrub to 2.5 m recorded from *Acacia catenulata* or *Acacia shirleyi* woodlands on level areas of jump-ups or hilly areas.	Likely to occur. Suitable habitat occurs in the study area and the species has been recorded in the region.

EPBC –*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth); V – Vulnerable; NL – Not Listed

NCA –*Nature Conservation Act 1992* (QLD), E – Endangered; V – Vulnerable; N – Near Threatened; LC –Least Concern.

* Previously recorded within 10 km of the study area (Wildlife Online and HERBRECS databases).

4.3. Field Survey Results

4.3.1. Vegetation Communities

Vegetation communities were surveyed across the study area and included eucalypt woodlands, acacia woodlands, and cleared sites associated with pastoral land use. Detailed description of the vegetation communities present within the study area are detailed below. The vegetation communities delineated on site are broadly consistent with the mapped REs. Plant taxa observed during the field surveys are listed in **Appendix F**.

1. *Acacia catenulata* (bendee) open forest

The *Acacia catenulata* (bendee) vegetation community (**Figure 2**) was recorded from hills in the central southern section of Spring Creek station on clayey sands with scattered rocks. The ecologically dominant layer is characterised by *Acacia catenulata* (bendee) open forest 11 – 14.5 m in height over an open to sparse shrubland of *Acacia catenulata*, *Everistia vacciniifolia* and *Spartothamnella juncea* and a sparse ground layer. The species composition, land form and soil type correspond with the description of RE 10.10.1 (VM Act Class: Least Concern). Corresponding site: BB06.

2. *Acacia shirleyi* (lancewood) woodland with emergent *Corymbia dallachiana*

The *Acacia shirleyi* (lancewood) woodland with emergent *Corymbia dallachiana* vegetation community (**Figure 2**) was recorded from the gentle slopes near plateau crests owards the central part of Spring Creek station on shallow soils with abundant rock present on the surface. The ecologically dominant layer is characterised by *Acacia shirleyi* (lancewood) woodland 9 – 11 m in height with occasional emergent individuals of *Corymbia dallachiana* to 17 m. An open shrub layer of *Erythroxylon australe* with other species is present with a mid-dense grassland mainly of *Cleistochloa subjuncea*. The species composition, land form and soil type correspond with the description of RE 10.10.1a (VM Act Class: Least Concern). Corresponding sites: MS03.

Figure 2. Vegetation communities: *Acacia catenulata* open forest (left) and *Acacia shirleyi* woodland (right)

3. *Corymbia leichhardtii* (rustyjacket) woodland

The *Corymbia leichhardtii* (rustyjacket) woodland vegetation community (**Figure 3**) was recorded from the south western part of Spring Creek and the north western portion of Cavendish stations on plains and slopes with clayey sands. The ecologically dominant layer is characterised by *Corymbia leichhardtii* woodland 10-14 m in height over a sparse shrub layer. A subcanopy layer *of C. leichhardtii* and *Lysicarpus*

angustifolia may occasionally be present. The ground layer is moderately dense and characterised by grass species. Where this community occurs on unconsolidated Cainozoic sediments it corresponds with the description of RE 10.5.10 (VM Act Class: Least Concern). Where this community occurs on sandstone derived landscapes it corresponds with the description of RE 10.10.4a (VM Act Class: Least Concern). Corresponding sites: MS04, MS06, MS08.

A number of subunits of this vegetation community were present in the study area and are described below.

3a. *Corymbia leichhardtii* and *C. lamprophylla* woodland

This subunit has *Corymbia leichhardtii* and *C. lamprophylla* as co-dominants in the ecologically dominant layer between 9 and 12 m tall over a very sparse shrub layer of *Lysicarpus angustifolius* to 6 m tall growing on shallow stony sands (**Figure 3**). The ground layer was sparse and characterised by *Triodia pungens*. The species composition, land form and soil type correspond with the description of RE 10.10.4a (VM Act Class: Least Concern). Corresponding site: MS05.

Figure 3. Vegetation communities: *Corymbia leichhardtii* woodland (left) and *C. leichhardtii* and *C. lamprophylla* woodland (right)

3b. *Corymbia leichhardtii* and *C. brachycarpa* woodland

This subunit has *Corymbia leichhardtii* and *C. brachycarpa* as co-dominants in the ecologically dominant layer between 10 and 14 m tall over a sparse to mid-dense shrub layer of mixed species to 6 m tall growing on shallow stony sands (**Figure 4**). The ground layer was sparse and characterised by *Triodia pungens*. The species composition, land form and soil type correspond with the description of RE 10.10.4a (VM Act Class: Least Concern). Corresponding site: MS07, MS11b.

3c. *Corymbia leichhardtii* woodland over *Acacia shirleyi* open woodland

This subunit has *Corymbia leichhardtii* in the ecologically dominant layer between 10 and 12 m tall over a sparse second tree layer of *Acacia shirleyi* to 9 m tall growing on skeletal soils (**Figure 4**). The ground layer was moderately dense and characterised by *Aristida* spp. The species composition, land form and soil type correspond with the description of RE 10.7.3 (VM Act Class: Least Concern). Corresponding site: BB26.

Figure 4. Vegetation communities: *Corymbia leichhardtii* and *C. brachycarpa* woodland (left) and *C. leichhardtii* woodland over *Acacia shirleyi* (right)

4. *Eucalyptus crebra* (narrow leaf ironbark) communities

4a. *Eucalyptus crebra* and *Corymbia leichhardtii* mixed woodland

This subunit has *Eucalyptus crebra* codominant with *Corymbia leichhardtii* in the ecologically dominant layer between 10 and 13 m in height occurring on sand plains (**Figure 5**). *Corymbia brachycarpa* may occasionally be present. The understorey tends to be sparse with a moderately dense ground layer of *Triodia pungens*. The species composition, land form and soil type correspond with the description of RE 10.5.4 (VM Act Class: Least Concern). Corresponding site: MS11a.

4b. *Eucalyptus crebra* woodland with *Corymbia brachycarpa*

This subunit has *Eucalyptus crebra* codominant with *Corymbia brachycarpa* in the ecologically dominant layer between 10 and 13 m in height occurring on sand plains (**Figure 5**). The shrub layer tends to be sparse with a moderately dense ground layer of *Triodia pungens*. The species composition, land form and soil type correspond with the description of RE 10.5.4a (VM Act Class: Least Concern). Corresponding site: MS09.

Figure 5. Vegetation communities: *Eucalyptus crebra* and *Corymbia leichhardtii* mixed woodland (left) and *Eucalyptus crebra* woodland with *Corymbia brachycarpa* (right)

4c. *Eucalyptus crebra* and *Acacia shirleyi* open forest

This subunit has *Eucalyptus crebra* codominant with *Acacia shirleyi* in the ecologically dominant layer between 8 and 12 m in height occurring on crest of weathered sandstone hills (**Figure 6**). The shrub layer tends to be very sparse with a very sparse ground layer of *Aristida* spp. The species composition, land form and soil type correspond with the description of RE 10.7.3 (VM Act Class: Least Concern). Corresponding site: MS01.

5. *Eucalyptus melanophloia* woodland

The *Eucalyptus melanophloia* (silver leaf ironbark) vegetation community (**Figure 6**) was recorded from undulating plains of sands to clayey sands. The ecologically dominant layer is characterised by Eucalyptus melanophloia woodland 14 – 17 m in height over a sparse understorey and a dense ground layer. The species composition, land form and soil type correspond with the description of RE 10.5.5 (VM Act Class: Least Concern). Corresponding site: BB07a, BB07b, BB07c.

Figure 6. Vegetation communities: *Eucalyptus crebra* and *Acacia shirleyi* open forest (left) and *Eucalyptus melanophloia* woodland (right)

6. *Eucalyptus thozetiana* woodland to open woodland

Eucalyptus thozetiana woodland to open woodland vegetation community (**Figure 7**) on rocky slopes beneath Mesozoic sandstone hills. The ecologically dominant layer is characterised by *Eucalyptus thozetiana* woodland 10 – 17 m in height over a secondary tree layer. The species composition, land form and soil type correspond with the description of RE 10.7.5 (VM Act Class: Least Concern). Corresponding site: MS02.

7. Non-remnant area

Site MS10 was located in a cleared paddock supporting a sparse shrubland of *Persoonia falcata* with occasional emergent *Brachychiton populifolia* to 13 m in height. There were clear signs on site indicating pulling of vegetation.

Figure 7. Vegetation communities: *Eucalyptus thozetiana* woodland to open woodland (left) and cleared pasture area (right)

4.3.2. Inaccuracies in Certified RE Mapping

Some inconsistencies exist between the certified RE mapping covering the study area and results of the field surveys. Inaccuracies in the mapping are both systematic (related to limits from the spatial scale and precision at which the mapping is undertaken (1:100,000)) or are more random errors in the attribution of mapped polygons (i.e. misinterpretation of remotely sensed landform or vegetation patterns). Additionally, v6.0b of the RE mapping is based on the vegetation extent in 2006. Some areas of mapped RE may have been altered since that time. Results of the site surveys that are not consistent with the certified RE mapping are included in Table 6. Errors in the certified RE mapping can be corrected through preparation of a PMAV over the lots in question or a RE mapping report can be prepared as part of the Environmental Authority process which describes areas where there is conflict between the certified RE mapping and the on-ground situation. The vegetation community mapping layer produced as a result of this project can be used to generate an amended RE map for the study area.

4.3.3. BioCondition

BioCondition assessments were undertaken at 10 of the 14 sites surveyed. This represents condition assessments undertaken within seven discrete REs (assessment units). Since no benchmarks are published for these REs, no comparison can be made of the assessed site attributes to the benchmark value. However, the results of the BioCondition assessments are presented in **Table 7**. These values can be used as part of the ecological equivalence assessments needed for environmental offsets.

4.3.4. Flora

A total of 156 plant taxa (**Appendix F**) were recorded from all sites surveyed across the study area. These include 151 native and five exotic or weed species. No EPBC or NC Act listed threatened species were recorded from any of the sites assessed during this survey.

4.3.5. Weeds

Of the 156 plant species recorded from all sites surveys during the field inspections **(Appendix F**), only five (3%) are exotic or weed species. No LPA declared plant species were recorded during the site visits.

Table 6. Summary of site assessments.

Site	Easting	Northing	CORVEG	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Determined RE	Notes
BB06	428182	7415445	2º	10.10.1/10.10.4/10.7.3/10.7.5	TRld	10	*Acacia catenulata* open forest	10.10.1	As mapped
BB07a BB07b BB07c	425670 425445 425356	7407439 7407311 7407225	3º 3º 2º	10.3.28/10.3.27/10.3.14	Qs	5	*Eucalyptus melanophloia* woodland	10.5.5	Differs from mapped RE. No alluvial features found in this polygon during survey. Scattered (2-3) individuals of *Eucalyptus camaldulensis* seen in polygon and *Themeda avenacea* occurs in patches. Suspect this is an old sandsheet eroded away by periodic flooding with depressions in places carrying or holding water at times.
BB26	431204	7418872	2º	10.7.3/10.7.5/10.3.3	Duricrusted T	7	*Corymbia leichhardtii* woodland over *Acacia shirleyi* open woodland	10.7.3	REs mapped as 10.7.3b (*Acacia shirleyi* with *Eucalyptus exilipes*), site survey supports the root RE 10.7.3 (no *Eucalyptus exilipes* on or near site).
MS01	430789	7417747	2º	10.7.3/10.7.5/10.3.3	Duricrusted T	7	*Eucalyptus crebra* and *Acacia shirleyi* open forest	10.7.3	As mapped. Firm LZ 7, white weathered material present on and around site, geology map notes lateritization in this map unit.
MS02	429352	7418599	2º	10.7.5	Duricrusted TRld	7	*Eucalyptus thozetiana* woodland to open woodland	10.7.5	As mapped.
MS03	427811	7419014	2º	10.10.5/10.10.4/10.10.7/10.10.1	TRld	10	*Acacia shirleyi* woodland with emergent *Corymbia dallachiana*	10.10.1a	As mapped.
MS04	425322	7417806	2º	10.10.4/10.7.5/10.7.3	TRld	10	*Corymbia leichhardtii* woodland	10.10.4a	As mapped.
MS05	426626	7416772	2º	10.10.4/10.7.5/10.7.3	TRld	10	*Corymbia leichhardtii* and *C. lamprophylla* woodland	10.10.4a	As mapped. *Corymbia lamprophylla* at this site rather than *C. brachycarpa* found at most others.
MS06	426247	7414359	2º	10.10.4/10.7.5/10.7.3	Qs	5	*Corymbia leichhardtii* woodland	10.5.10	Differs from mapped RE.

Site	Easting	Northing	CORVEG	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Determined RE	Notes
MS07	424694	7414731	2º	10.7.3/10.5.1	TRe	10	*Corymbia leichhardtii* and *C. brachycarpa* woodland	10.10.4a	As mapped.
MS08	424487	7413593	2º	10.5.5/10.5.4/10.5.1/10.7.3	Qs	5	*Corymbia leichhardtii* woodland	10.5.10	Differs from mapped RE.
MS09	423748	7406767	2º	10.5.1/10.5.10	Qs	5	*Eucalyptus crebra* woodland with *Corymbia brachycarpa*	10.5.4a	Differs from mapped RE. This RE common in mapped polygon. Adjacent polygon with this RE mapped.
MS10	430156	7413825	3º	10.5.5./10.5.12	Qs	5	Pasture with sparse *Persoonia falcata* shrubland	Non-remnant	Differs from mapped RE. Obvious signs of mechanical clearing including ruts and ridges. *Brachychiton populneus* left standing.
MS11a	424826	7406291	3º	10.5.1/10.5.10	Qs	5	Mixed woodland of *Eucalyptus crebra* and *Corymbia leichhardtii*	10.5.4	Differs from mapped RE. Site supports woodland dominated by narrow leaf ironbark.
MS11b	424215	7406550	2º	10.5.1/10.5.10	Qs	5	*Corymbia leichhardtii* and *C. brachycarpa* woodland	10.5.10	As mapped.

Table 7. Summary of BioCondition assessments undertaken across the study area

Attribute	Site:	BB06	BB26	MS01	MS02	MS03	MS04	MS05	MS06	MS07	MS08	MS09
	RE:	10.10.1	10.7.3	10.7.3	10.7.5	10.10.1a	10.10.4a	10.10.4a	10.5.10	10.10.4a	10.5.10	10.5.4a
Large trees												
Eucalypts		0	5 (10/ha)	1 (2/ha)	22 (44/ha)	2 (4/ha)	11 (22/ha)	7 (14/ha)	3 (6/ha)	1 (2/ha)	6 (12/ha)	2 (4/ha)
Non-eucalypts		18 (36/ha)	0	13 (26/ha)	0	8 (16/ha)	0	0	0	0	0	0
Tree canopy height (m)												
Canopy		12.4	11.8	11.0	14.7	11.4	11.8	10.8	12.2	14.2	12.0	11.0
Sub-canopy		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Recruitment of canopy species (%)		100	100	50	100	100	100	100	100	100	100	100
Tree canopy cover (%)												
Canopy		59.9	20.6	25.3	28.4	50.6	27.8	27.5	16.2	26.2	52.0	9.6

Attribute	Site:	BB06	BB26	MS01	MS02	MS03	MS04	MS05	MS06	MS07	MS08	MS09
	RE:	10.10.1	10.7.3	10.7.3	10.7.5	10.10.1a	10.10.4a	10.10.4a	10.5.10	10.10.4a	10.5.10	10.5.4a
Sub-canopy		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Shrub cover (%)		13.9	0	4	30.4	8.4	8.6	7.7	13.7	27.3	9.7	1.6
Coarse woody debris (m/ha)		993	201	994	840	987	108	223	58	71	39	149
Native plant spp. richness												
Trees		1	4	6	4	5	4	3	4	4	6	3
Shrubs		8	4	2	9		5	9	4	9	11	8
Grass		11	11	10	8	9	4	5	9	6	8	10
Other/forbs		13	8	7	9	7	8	5	9	7	17	5
Non-native plant cover (%)		0	0	0	30	0	0	0	0	0	0	1
Native perennial grass cover (%)		1.6	6	18	0	24	24	13	12.4	10	6.4	28
Organic litter cover (%)		56	23	41	28	47	31	10.4	29	16	39	19

5. Conclusion & Recommendations

The study area refers to areas of Spring Creek (lot 11 on BF25), Cavendish (lot 10 on RP894235) and Lambton Meadows (lot 626 on MX806585) stations covered by Exploration Permit (Coal) (EPC) 1079 in the Galilee Basin, central Queensland. The study area falls entirely in the Desert Uplands Bioregion. The study area contains a mixture of vegetation biodiversity values including eucalypt open forest and woodlands and Acacia woodlands, as well as regrowth and cleared areas. The condition of the remnant vegetation of the study area varies substantially according to historical land management practices including grazing.

Despite this, some ecological values were noted following investigations. The current certified RE mapping (Version 6.0b) identified 15 REs within the study area (**Table 4**) comprising one RE classed as Of Concern and the remainder classed as Least Concern. Vegetation communities of the study area were defined and identified 12 discreet remnant vegetation types including one non-remnant type. Verification of the certified RE mapping indicated that six of the 14 sites surveyed supported REs that differed from the certified mapping (**Table 6**).

No TECs protected under the EPBC Act were found in the study area during these supplementary surveys.

Four threatened flora species were identified through desktop searches within a 10 km buffer of the study area. No conservation significant flora species were recorded in the study area during these supplementary surveys. Habitat assessments and likelihood of occurrence analysis based on species requirements suggested that *Desmodium macrocarpum*, *Acacia spania* and *Micromyrtus rotundifolia* all have the potential to occur within the study area.

Identified impacts and mitigation measures as described by Unidel (2010) and Rob Friend and Associates (2012) is summarised in **Table 8.**

Table 8. Summary of Mitigation and Management Recommendations for Impacts to Flora

Management Strategies and Measures	Project Phase				Impact Category			
	Clearing	Construction	Operational	Rehabilitation and Closure	Loss of Species or Habitat	Wildfire	Weed Management	Habitat Rehabilitation
No remnant vegetation removal shall occur until relevant approvals have been obtained.	X	X	X		X		X	
Fire fuel loads should be monitored and vehicle activities should be restricted to roads, access tracks and hardened surfaces to reduce the possibility of wildfire. Vehicles should be fitted with spark arrestors and fire fighting equipment should be available at all construction sites.	X	X	X			X		
Areas identified for vegetation clearance are to be clearly defined and detailed in site inductions.	X	X			X			
An offset strategy which compensates for all unavoidable clearing should be developed and implemented.	X	X	X					
An extensive ground survey should be undertaken by suitably experienced botanists prior to the commencement of all clearing operations to identify the location of any new specimens of EVNT flora species.	X	X	X		X			
All vegetation clearing boundaries should be clearly identified and marked in the field prior to clearing activities. Cleared areas should be digitally mapped upon completion of clearing activities.	X	X			X			X
All personnel will be educated through induction training to ensure understanding and compliance with environmental requirements, including the flora-relevant sections of management plans.	X	X	X		X	X	X	X
All EVNT specimens requiring relocation should be transplanted into a suitable area of similar vegetation and soil outside of any disturbance area. This area should be free from any grazing pressure and have no, or a controllable level, of **Cenchrus ciliaris* in the groundcover. All relocation and replanting actions are to comply with the relevant section in the Rehabilitation Management Plan.	X	X	X	X	X			X
All cleared vegetation should be reused within the offset areas or within the rehabilitation areas.	X	X						X

Management Strategies and Measures	Project Phase				Impact Category			
	Clearing	Construction	Operational	Rehabilitation and Closure	Loss of Species or Habitat	Wildfire	Weed Management	Habitat Rehabilitation
All areas not directly affected by construction or mining activities are to be delineated and no unauthorised disturbances should occur outside defined disturbance areas (e.g. dumping of excavated material).	X	X	X					
The locations of weed species should be recorded during pre-clearance surveys to identify areas requiring treatment. All weed infestations within the construction area are to be treated and/or removed from the clearing precinct prior to clearing.	X						X	
Stockpiling of topsoil will be undertaken in accordance with best practice storage guidelines to ensure that the seed bank in removed soil is preserved.	X				X			X
Remnant vegetation areas adjacent to the mine footprint should be monitored using the Queensland Government BioCondition Assessment method with the purpose of identifying the presence of edge effect impacts from the mine (e.g. dust and weeds) on these areas.		X	X		X		X	X
Infrastructure should be located away from remnant vegetation areas.		X	X		X		X	
Dust monitoring should be undertaken and dust reduction measures should be implemented. Measures may include but are not limited to: • Regular maintenance and wetting of tracks to minimise dust generation • Implementation and enforcement of a site speed limit to minimise dust generation • Revegetation and rehabilitation of cleared as soon as practicable		X	X		X			
Avoiding additional clearing of remnant vegetation for construction vehicle access tracks, truck turning areas and extra workspaces. A track plan is to be developed for areas of retained habitat and rehabilitation. Site protocols are to be established which restrict access to the approved track network identified by the plan.		X	X		X		X	X
All new infrastructures should, wherever practical, be located within previously cleared areas.		X	X		X		X	X

Management Strategies and Measures	Project Phase				Impact Category			
	Clearing	Construction	Operational	Rehabilitation and Closure	Loss of Species or Habitat	Wildfire	Weed Management	Habitat Rehabilitation
All diverted drainage lines should be designed to ensure that the bed and banks reflect a natural waterway and riparian vegetation can be established within these drainage lines. Watercourse diversion activities will be undertaken during the dry season utilising best practice methods to minimise risk of impact upon terrestrial and aquatic flora associated with these watercourses.		X			X		X	

Management Strategies and Measures	Project Phase				Impact Category			
	Clearing	Construction	Operational	Rehabilitation and Closure	Loss of Specimens or Habitat	Wildfire	Weed Management	Habitat Rehabilitation
Management Plans								
A detailed Vegetation Management Plan should be developed to guide tree clearing operations, transplantation of EVNT species where appropriate, management of commercially valuable species and the use of vegetation that has been cleared from the site. It should also include the management of vegetation within which EVNT species have been recorded and the development of a vegetation monitoring program within and around the mine site and operational areas, including over the underground mine. Good base line data must be collected to inform the monitoring program over the ensuing years.	X	X	X	X	X			X
A Fire Management Plan should be developed to provide the basis for the management of fuels and bushfire hazards within the lands managed by Waratah Coal. The plan will also outline the location and type of fire trail and firebreaks and controlled burning plan for remnant and regrowth vegetation to ensure both ecological and hazard mitigation outcomes.	X	X	X	X		X		
A significant Species Management Plan should be developed for Large-podded Tick-trefoil in accordance with DEHP requirements. This plan should include but is not limited to: • Proposed management measures including those identified for construction and operation of the mine • A monitoring and evaluation program for the species • Offset commitments relating to the species	X	X	X	X	X			X
A detailed Mine Rehabilitation and Closure Plan should be developed to guide the rehabilitation and restoration of disturbed areas within and around the mining operations. The plan should identify the intended final landforms and land use and ensure appropriate measures to facilitate the transplanting or relocation of all *Desmodium macrocarpum* that are located within the open cut mine footprint. A detailed Rehabilitation Monitoring and Evaluation Plan with a monitoring schedule (e.g. quarterly monitoring of areas under rehabilitation) should be included. Suitable completion criteria and indicators to measure the progress of rehabilitation might include 70% of cover of native and introduced species within each stratum as occurring on adjoining reference sites of the same land use type. At least two reference sites within the same sub-catchment should be established within		X	X	X	X			X

Management Strategies and Measures	Project Phase				Impact Category			
	Clearing	Construction	Operational	Rehabilitation and Closure	Loss of Specimens or Habitat	Wildfire	Weed Management	Habitat Rehabilitation
each land use (possibly including each RE depending on final land use objectives) to provide benchmarking of rehabilitation progress and completion. The creek diversions will have a specific Riparian Revegetation Management Plan which will specify the performance requirements and process for revegetation of the affected sections of those diverted waterways.								
A detailed Weed Management Plan that addresses construction, operation and rehabilitation phases of the project should be prepared and implemented prior to construction. This plan should include hygiene protocols to minimise the likelihood of introduction and spread of environmental, agricultural and declared weeds, including but not limited to: • The implementation of sediment control mechanisms to reduce the potential for the spread of weed species into sensitive areas • Ensuring that all vehicles moving into land managed by Waratah Coal have been properly cleaned and have appropriate approvals form Authorised Pest Plant Management Officers in Alpha or Jericho. A register of vehicle approval certification should be kept current. • Vehicle wash down and inspection • Regular monitoring for the prevalence of weed species in disturbed and adjacent areas (monitoring across disturbed areas on a monthly basis is recommended) Also included in the plan should be provisions for: • An eradication program to control all Class 1, 2 and 3 pest plants within the lands managed by Waratah Coal • The monitoring and management of all environmental weeds to ensure that there is no increase in distribution and dominance		X	X	X			X	

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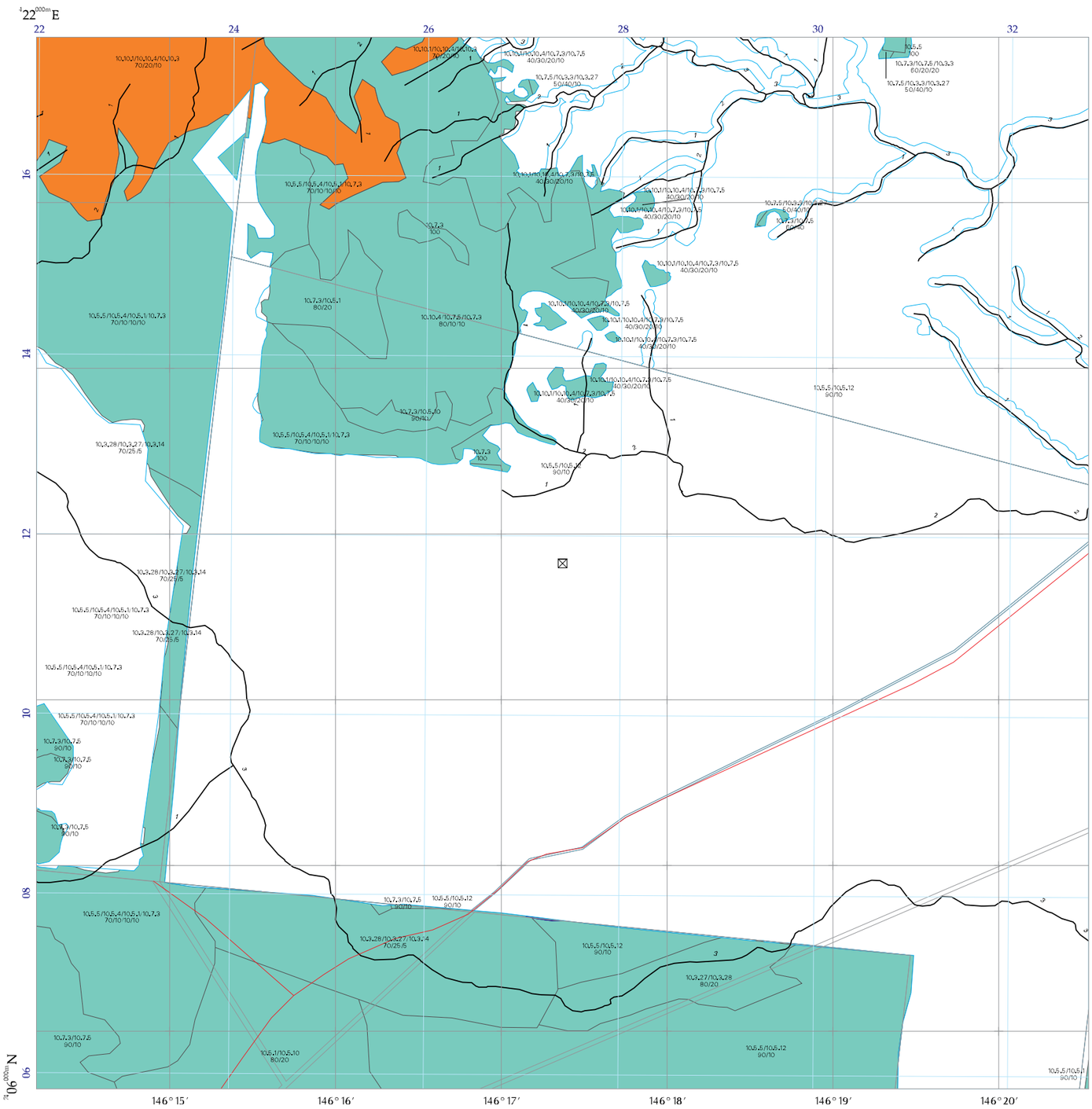
Appendix A Extract of Certified Regional Ecosystem Mapping

Version 6.0b

(Source: EHP, 2012)



Vegetation Management Act Regional Ecosystem and Remnant Map-Version 6.1

Based on 2006 Landsat TM imagery

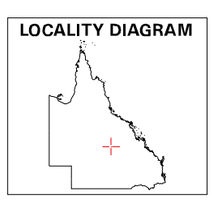
Requested By: ANDREW.FRANKS@O2ECOLOGY.COM.AU
Date: 22 Nov 12 Time: 14.19.18

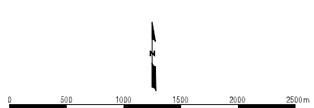
Centered on Coordinate:
Latitude: -23.4029 Longitude: 146.2895 (decimal degrees)
Bioregion: Desert Uplands

- Remnant vegetation containing endangered regional ecosystems
- Remnant vegetation containing of concern regional ecosystems
- Remnant vegetation that is a least concern regional ecosystem
- Remnant vegetation under Section 20AH of the VMA
- Non-remnant
- Plantation Forest
- Dam or Reservoir
- Remnant Vegetation
- PMAV Category X area
- Great Barrier Reef Wetlands
- Vegetation Management Act Essential Habitat
  For further information on VMA Essential Habitat, please see the attached VMA Essential Habitat map.
- Subject Lot
- Watercourse (Stream order shown as black number against stream where available)
- Bioregion boundary
- Roads
  © Pitney Bowes Software 2012
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

Queensland Government

LOCALITY DIAGRAM





Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

A remnant map covers areas not covered by a regional ecosystem map.

Defined map areas are labelled with the regional ecosystem (RE) code along with the percentage breakdown if more than one RE occurs within the area. Detailed definitions of regional ecosystems are available from www.derm.qld.gov.au/REDD. Defined map areas smaller than 5ha may not be labelled.

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. The extent of remnant regional ecosystems as of 2006, depicted on this map is based on rectified 2006 Landsat TM imagery (supplied by the Statewide Landcover and Trees Study (SLATS), Queensland Government).

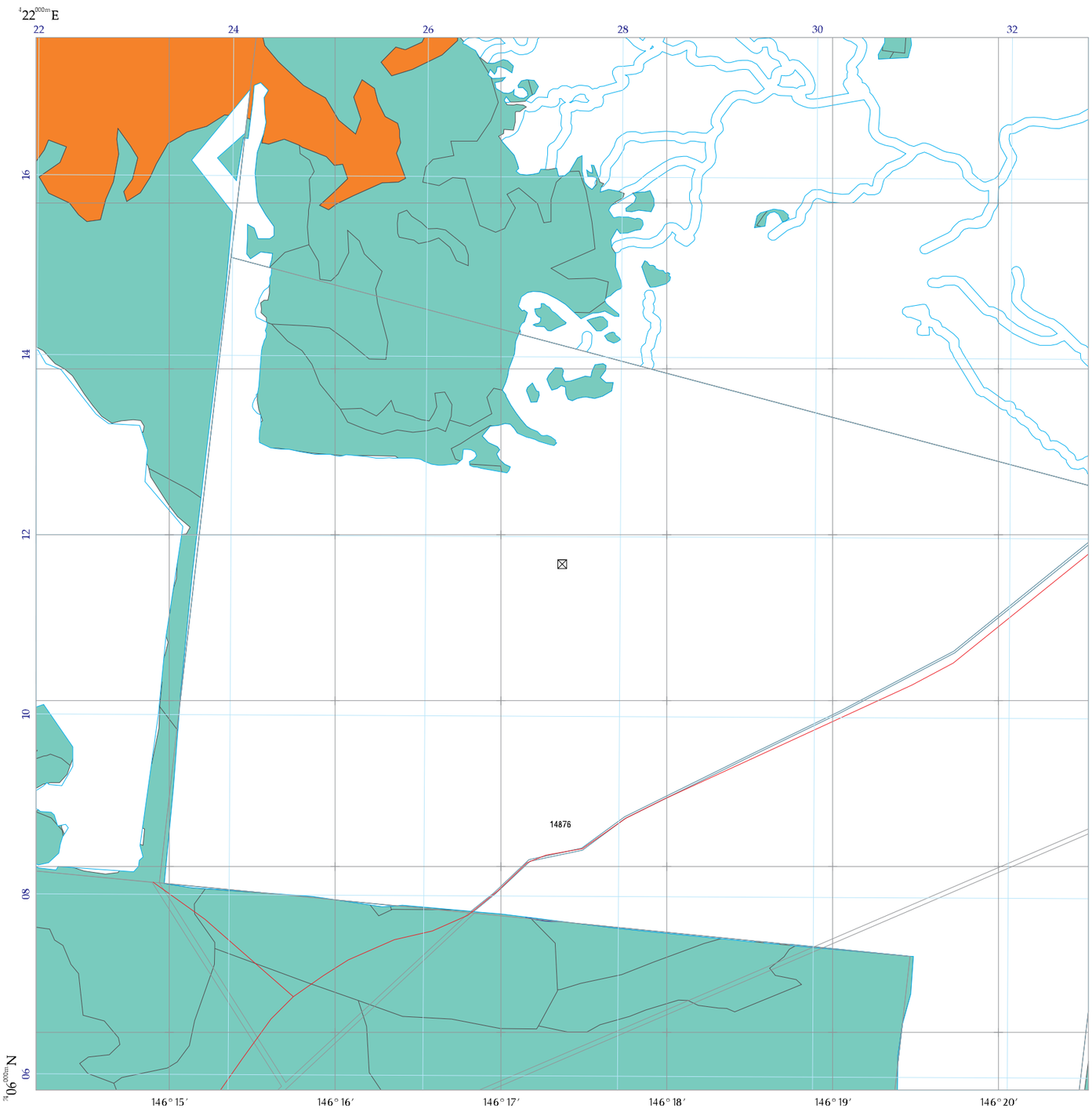
Some watercourse lines are derived from GeoScience Australia 1:250 000 mapping.

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines (DNRM) and Pitney Bowes Software, makes no representations or warranties about its accuracy, reliability, completeness or suitability for 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 incur as a result of the product being inaccurate or incomplete in any way and for any reason.

All datasets are updated as they become available to provide the most current information as of the date shown on this map.

Additional information is 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.derm.qld.gov.au/vegetation or contact the Department of Natural Resources and Mines.

Digital regional ecosystem data is available in shapefile format, for Lot on Plans from www.derm.qld.gov.au/REDATA or from DNRM for larger areas.



Vegetation Management Act Essential Habitat Map Version 3.1

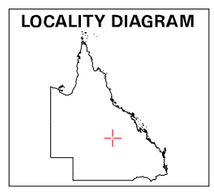
- Remnant vegetation containing endangered regional ecosystems
- Remnant vegetation containing of concern regional ecosystems
- Remnant vegetation that is a least concern regional ecosystem
- Remnant vegetation under Section 20AH of the VMA
- Non-remnant
- Plantation Forest
- Dam or Reservoir
- Remnant Vegetation
- PMAV Category X area
- Vegetation Management Act Essential Habitat
- Vegetation Management Act Essential Habitat Species Records
- Subject Lot
- Roads
  © Pitney Bowes Software 2012
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

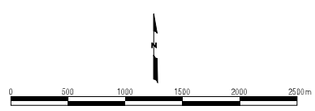
Requested By: ANDREW.FRANKS@O2ECOLOGY.COM.AU
Date: 22 Nov 12 Time: 14.19.20

Centered on Coordinate:
Latitude: -23.4029 Longitude: 146.2895 (decimal degrees)

Queensland Government

LOCALITY DIAGRAM





Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

Labels for the Vegetation Management Act Essential Habitat are centred on the subject lot (1.1km surrounding and including a Lot on Plan). Labels correlate to the label field in the attached essential habitat database.

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. The extent of remnant regional ecosystems as of 2006, depicted on this map is based on rectified 2006 Landsat TM imagery (supplied by SLATS, Queensland Government).

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Mines (DNRM) and Pitney Bowes Software, makes no representations or warranties about its accuracy, reliability, completeness or suitability for 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 incur as a result of the product being inaccurate or incomplete in any way and for any reason.

All datasets are updated as they become available to provide the most current information as of the date shown on this map.

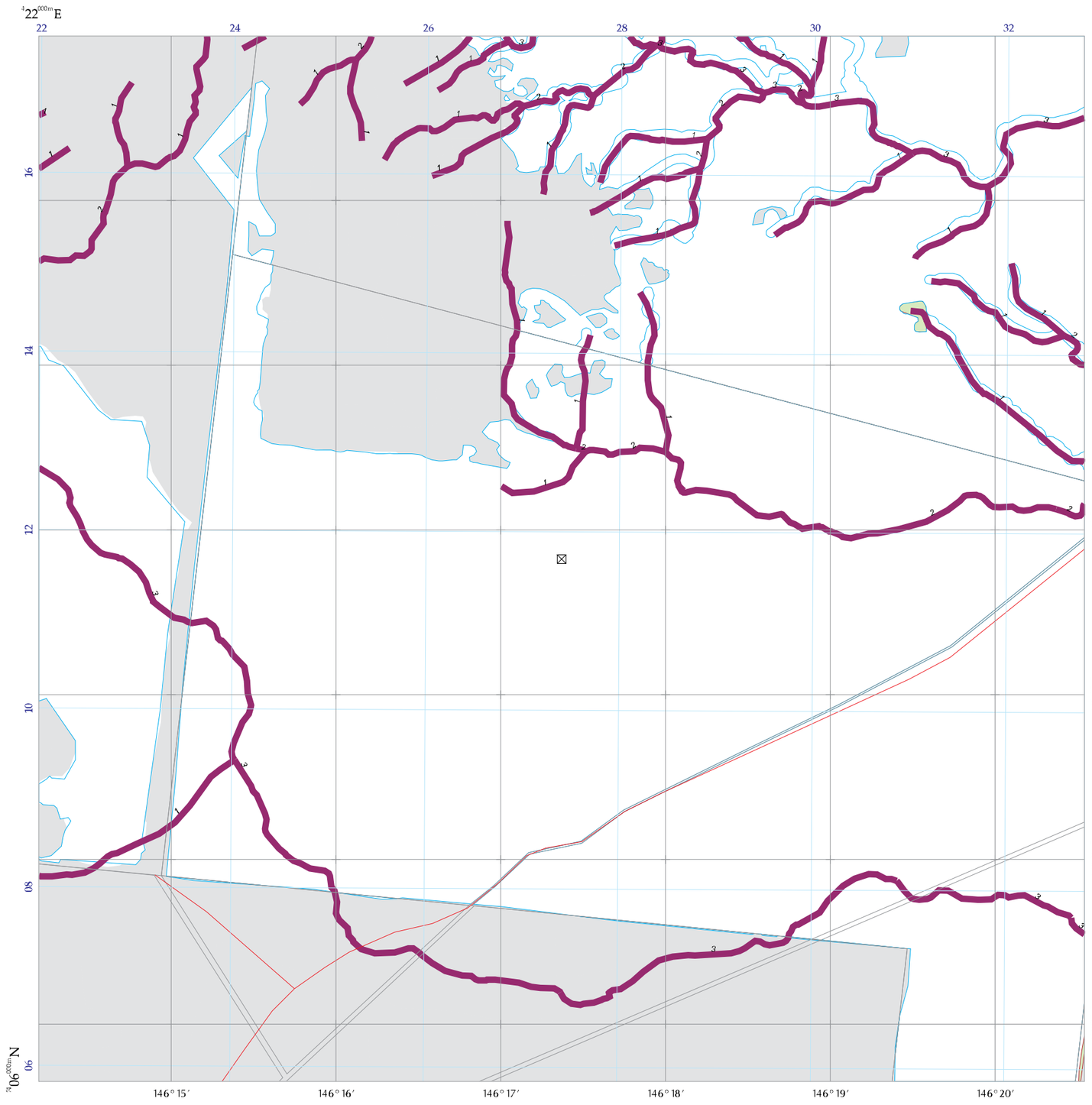
Additional information is required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.derm.qld.gov.au/vegetation or contact the Department of Natural Resources and Mines.

Digital regional ecosystem data is available in shapefile format, for Lot on Plans from www.derm.qld.gov.au/REDATA or from DNRM for larger areas.

Appendix B High Value Regrowth Vegetation Mapping

Version 2.0

(Source: EHP, 2012)



REGROWTH VEGETATION MAP - Version 2.1

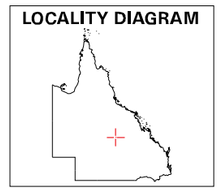
- 1087 Vegetation Management Act Essential Regrowth Habitat with example label number
- Great Barrier Reef Wetland Protection Area
- High value regrowth vegetation containing Endangered regional ecosystems
- High value regrowth vegetation containing Of Concern regional ecosystems
- High value regrowth vegetation that is a Least Concern regional ecosystem
- Remnant Vegetation (Refer to the Vegetation Management Act Regional Ecosystem and Remnant Map also available from the Department of Environment and Resource Management website for further information on these areas)
- Non-remnant
- PMAV Category X area
- Regrowth watercourse (Stream order shown as black number against stream)
- Other watercourse(Stream order shown as black number against stream where available)
- Subject Lot
- Roads © Pitney Bowes Software 2012
- Cadastral line Property boundaries shown are provided as a locational aid only.
- Towns
- ⊠ Coordinate entered

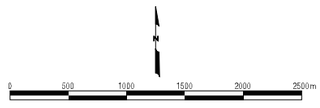
Requested By: ANDREW.FRANKS@O2ECOLOGY.COM.AU
Date: 22 Nov 12 Time: 14.19.47

Centered on Coordinate:
Latitude: -23.4029 Longitude: 146.2895 (decimal degrees)

Queensland Government

LOCALITY DIAGRAM





Labels for Vegetation Management Act Essential Regrowth Habitat are centred on the subject lot.
Labels correlate to the label field in the attached essential regrowth habitat database.

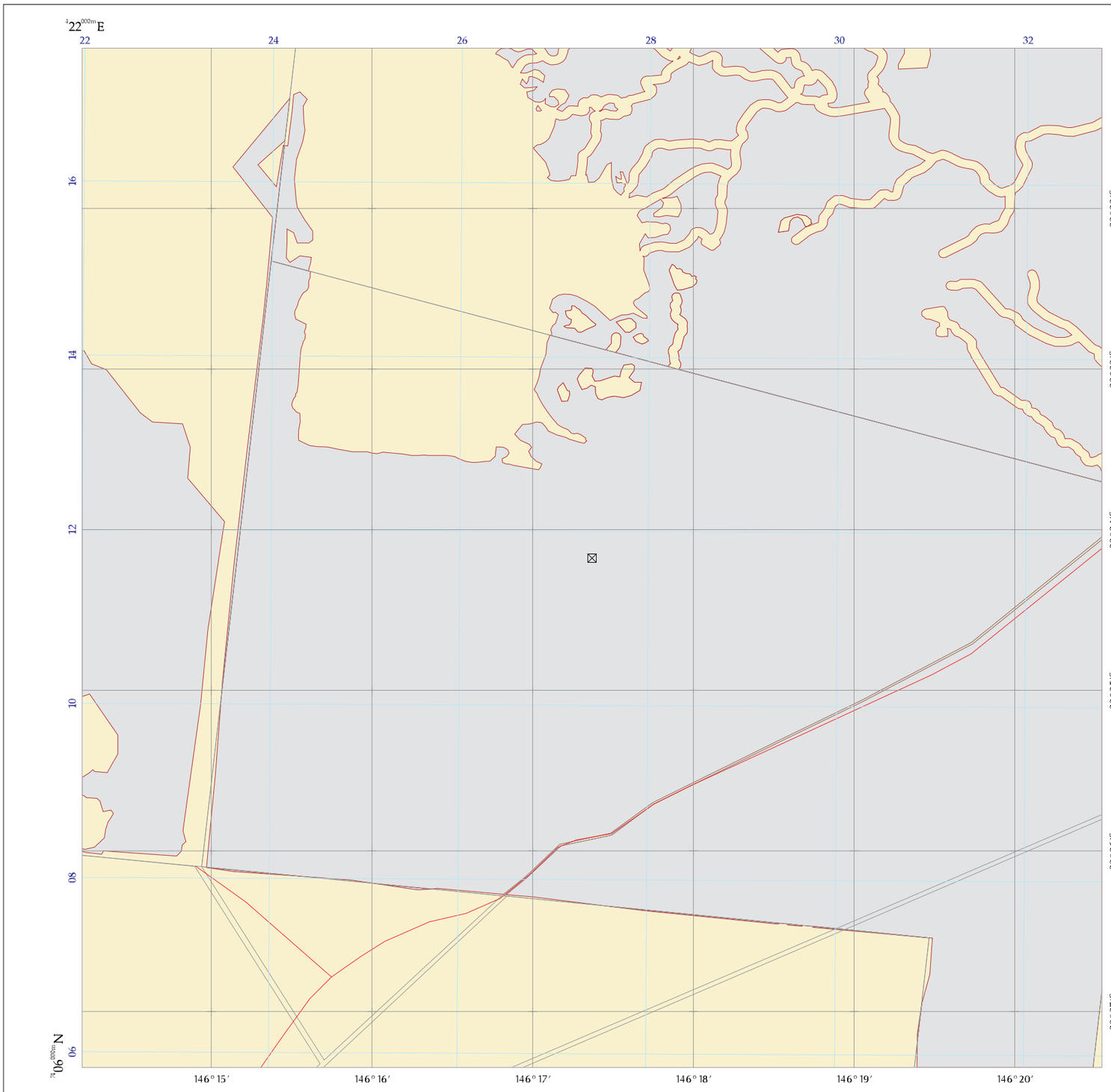
The high value regrowth, regrowth watercourse, other watercourse, Great Barrier Reef wetland protection area and essential regrowth habitat data shown on this map are representations of the preliminary data.

Some watercourse lines are derived from GeoScience Australia 1:250 000 mapping.

For further information go to the website: http://www.derm.qld.gov.au or contact Vegetation Management, Department of Natural Resources and Mines.

Areas covered by a Property Map of Assessable Vegetation (PMAV) are represented on the map attached as Page 2 to this Regrowth Vegetation Map and provided with it.

Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)



Property Maps of Assessable Vegetation (PMAVs)

Requested By: ANDREW.FRANKS@O2ECOLOGY.COM.AU
Date: 22 Nov 12 Time: 14.19.49

Centered on Coordinate:
Latitude: -23.4029 Longitude: 146.2895 (decimal degrees)

The PMAV data shown on this map are a representation of the data used to create certified PMAVs. Variations may occur between PMAV boundaries and cadastral boundaries. PMAV data incorporates cadastral boundary data as at the time of certification of the PMAV. The cadastral boundaries shown on this map may have shifted relative to the PMAV boundaries as more accurate cadastral boundary data have become available.

All datasets are updated as they become available to provide the most current information as of the date shown on this map.

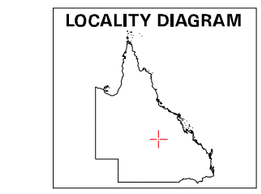
For further information go to the website:
http://www.derm.qld.gov.au/vegetation/index.html
or contact Vegetation Management, Department of Natural Resources and Mines

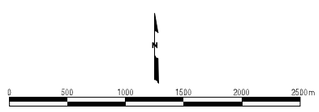
Property Map of Assessable Vegetation
Vegetation Category Area

- Category A area
- Category B area
- Category C area
- Category X area
- Area that is subject to other PMAVs or, if no PMAV exists, a regional ecosystem map, remnant map or regrowth vegetation map
- Subject Lot
- Roads
  © Pitney Bowes Software 2012
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

Queensland Government

LOCALITY DIAGRAM





Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

Appendix C EPBC Protected Matters Search Tool Results

(Source: DSEWPC, 2012)

Australian Government
Department of Sustainability, Environment, Water, Population and Communities

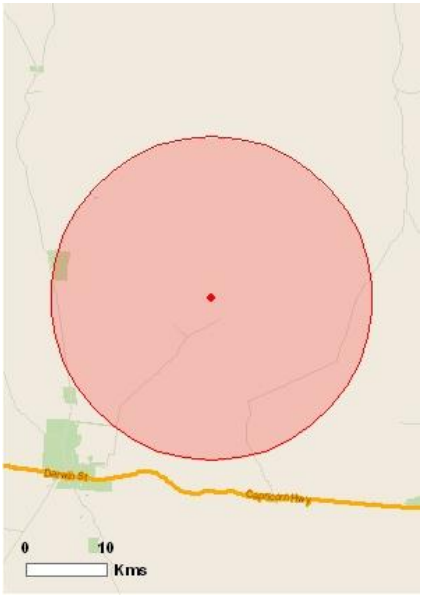
EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information about the EPBC Act including significance guidelines, forms and application process details can be found at http://www.environment.gov.au/epbc/assessmentsapprovals/index.html

Report created: 22/11/12 15:27:00



This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates
Buffer: 20.0Km

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance - see http://www.environment.gov.au/epbc/assessmentsapprovals/guidelines/index.html

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	1
Threatened Species:	10
Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage/index.html

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	7
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

Place on the RNE:	None
State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	8
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

Wetlands of International Significance (RAMSAR) [Resource Information]

Name	Proximity
Coongie lakes	Upstream from Ramsar

Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Weeping Myall Woodlands	Endangered	Community may occur

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence within area

Threatened Species [Resource Information]

Name	Status	Type of Presence
BIRDS		
Erythrotriorchis radiatus		
Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
Geophaps scripta scripta		
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
Neochmia ruficauda ruficauda		
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Vulnerable	Species or species habitat may occur within area
MAMMALS		
Macrotis lagotis		
Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)		
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
PLANTS		
Acacia ramiflora		
[7242]	Vulnerable	Species or species habitat may occur within area
REPTILES		
Denisonia maculata		
Ornamental Snake [1193]	Vulnerable	Species or species habitat may occur within area
Egernia rugosa		
Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Furina dunmalli		
Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area

Migratory Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Migratory Terrestrial Species		

Name	Threatened	Type of Presence
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area
Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato)		
Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Bimblebox	QLD

Invasive Species		[Resource Information]
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit,		
Name	Status	Type of Presence
Frogs		
Bufo marinus		
Cane Toad [1772]		Species or species habitat likely to occur within area
Mammals		
Felis catus		
Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Oryctolagus cuniculus		
Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Sus scrofa		
Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes		
Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Cryptostegia grandiflora		
Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Lantana camara		
Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parkinsonia aculeata		
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area

Coordinates

-23.40296 146.28957

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Acknowledgements

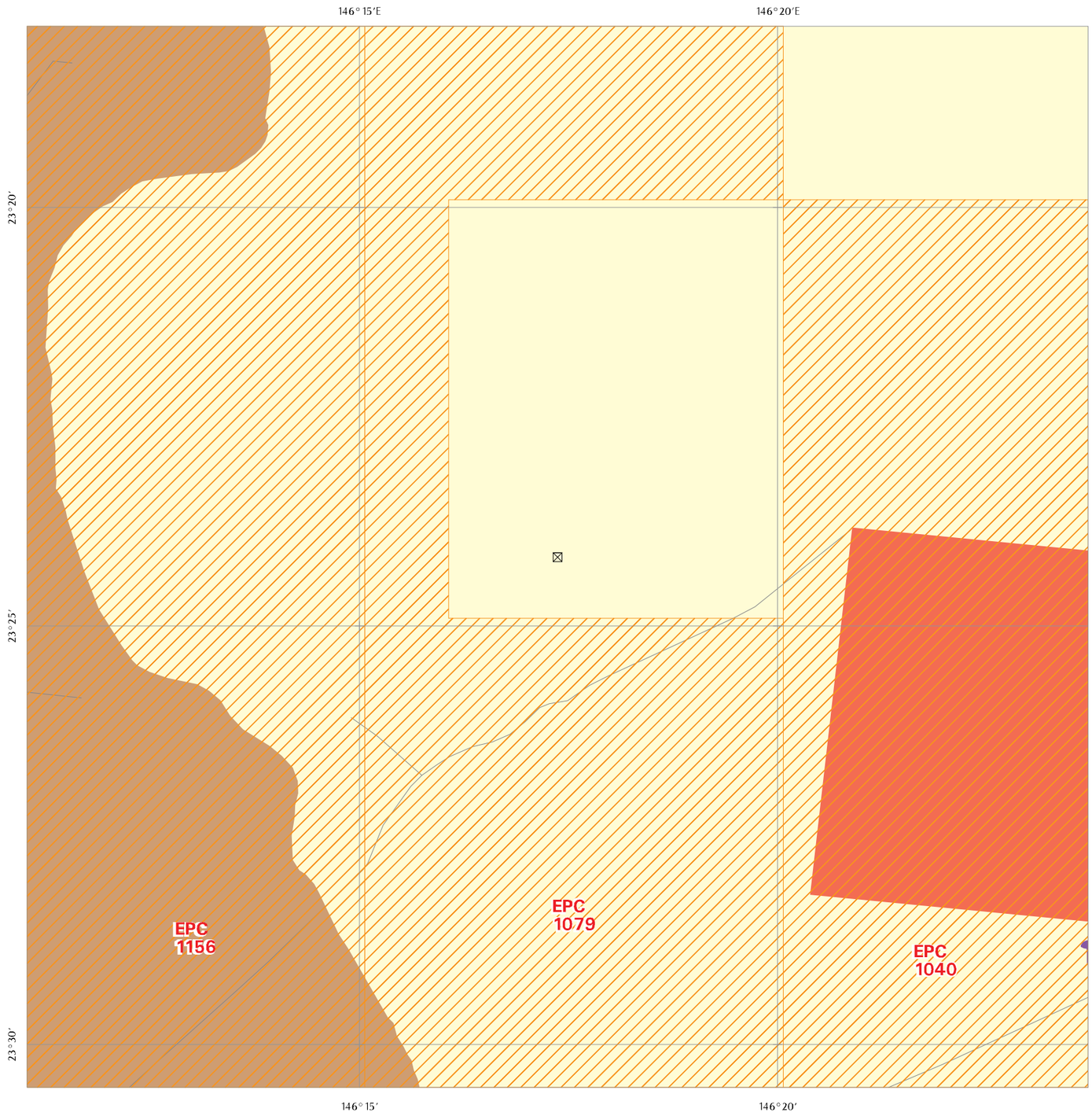
This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Department of Environment, Climate Change and Water, New South Wales
-Department of Sustainability and Environment, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment and Natural Resources, South Australia
-Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
-Environmental and Resource Management, Queensland
-Department of Environment and Conservation, Western Australia
-Department of the Environment, Climate Change, Energy and Water
-Birds Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-SA Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Atherton and Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
-State Forests of NSW
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Appendix D Environmental Sensitive Area Mapping

(Source: EHP, 2012)



ENVIRONMENTALLY SENSITIVE AREAS - Mining Activities

Requested By: ANDREW.FRANKS@O2ECOLOGY.COM.AU
Date: 22 Nov 12 Time: 14.23.05

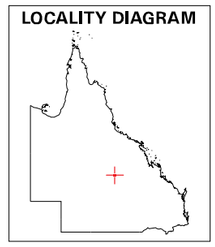
Centered on point position:
Latitude: -23.4029 Longitude: 146.2895
(decimal degrees)

Legend

- Exploration Permits Coal
- CATEGORY A
- National Parks
- Conservation Parks
- Forest Reserves
- Wet Tropics World Heritage Area
- Great Barrier Reef Marine Park Region
- Marine Parks other than General Use Zones
- CATEGORY B
- World Heritage Areas
- Queensland Heritage Register Places
- Ramsar Sites
- Cultural Heritage Registered Areas and DLA's other than Stanbroke
- Special Forestry Areas
- Fish Habitat Areas
- Koala Plan
- Coordinated Conservation Areas
- Endangered Regional Ecosystems (remnant(biodiversity status))
- General Use Zones of Marine Parks
- Marine Plants
- CATEGORY C
- Nature Refuges
- Resources Reserves
- Declared Catchment Areas
- Declared Irrigation Areas
- Drainage Areas
- River Improvement Areas
- Stanbroke DLA
- State Forests
- Timber Reserves
- Coastal Management District
- Dams and Weirs
- OTHERS
- Roads
  © Pitney Bowes Software 2012
- Towns
- Wild River Nominated Waterways
- Wild River High Preservation Areas
- Wild River Preservation Areas
- Mahogany Glider Habitat
- Directory of Important Wetlands
- Queensland

Queensland Government

LOCALITY DIAGRAM



This scale bar is approximate only
Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)
This product is unprojected and is not suitable for measuring distances

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NOTE TO USER: Themes presented in this map are indicative only. Field survey may be required to verify the 'true' spatial extent and value. Not all environmentally sensitive areas are presented in this map. A user should refer to the particular circumstances relevant to their situation to assess the 'completeness' of themes provided.

The user should note that some boundaries and indicated values are ambient and may change over time (e.g. regional ecosystem boundaries and conservation status, watercourse mapping etc).

The user should be aware that due to multiple overlapping themes/ layers present, some themes/layers may be obscured by others. Ordering in the Legend does not accurately reflect the order by which themes/layers are displayed.

Appendix E Wildlife Online Search Results

(Source: EHP, 2012)

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 23.403
Longitude: 146.2896
Distance: 20
Email: andrew.franks@o2ecology.com.au
Date submitted: Thursday 22 Nov 2012 14:20:58
Date extracted: Thursday 22 Nov 2012 14:30:04

The number of records retrieved = 311

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			8
animals	amphibians	Hylidae	*Cyclorana alboguttata*	greenstripe frog		C		1
animals	amphibians	Hylidae	*Cyclorana brevipes*	superb collared frog		C		2
animals	amphibians	Hylidae	*Litoria rubella*	ruddy treefrog		C		6
animals	amphibians	Hylidae	*Litoria inermis*	bumpy rocketfrog		C		1
animals	amphibians	Hylidae	*Cyclorana novaehollandiae*	eastern snapping frog		C		5
animals	amphibians	Hylidae	*Litoria caerulea*	common green treefrog		C		15
animals	amphibians	Limnodynastidae	*Limnodynastes peronii*	striped marshfrog		C		1
animals	amphibians	Limnodynastidae	*Notaden bennettii*	holy cross frog		C		12
animals	amphibians	Limnodynastidae	*Neobatrachus sudellae*	meeowing frog		C		1
animals	amphibians	Limnodynastidae	*Platyplectrum ornatum*	ornate burrowing frog		C		40
animals	amphibians	Limnodynastidae	*Limnodynastes terraereginae*	scarlet sided pobblebonk		C		2
animals	amphibians	Myobatrachidae	*Pseudophryne major*	great brown broodfrog		C		2
animals	amphibians	Myobatrachidae	*Uperoleia rugosa*	chubby gungan		C		2
animals	birds	Acanthizidae	*Gerygone fusca*	western gerygone		C		26
animals	birds	Acanthizidae	*Acanthiza apicalis*	inland thornbill		C		11
animals	birds	Acanthizidae	*Smicrornis brevirostris*	weebill		C		65
animals	birds	Acanthizidae	*Chthonicola sagittata*	speckled warbler		C		6
animals	birds	Acanthizidae	*Acanthiza uropygialis*	chestnut-rumped thornbill		C		2
animals	birds	Acanthizidae	*Acanthiza chrysorrhoa*	yellow-rumped thornbill		C		42
animals	birds	Acanthizidae	*Gerygone albogularis*	white-throated gerygone		C		6
animals	birds	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill		C		3
animals	birds	Accipitridae	*Accipiter cirrocephalus*	collared sparrowhawk		C		1
animals	birds	Accipitridae	*Haliastur sphenurus*	whistling kite		C		7
animals	birds	Accipitridae	*Aviceda subcristata*	Pacific baza		C		4
animals	birds	Accipitridae	*Accipiter fasciatus*	brown goshawk		C		4
animals	birds	Accipitridae	*Elanus axillaris*	black-shouldered kite		C		4
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		11
animals	birds	Aegothelidae	*Aegotheles cristatus*	Australian owlet-nightjar		C		15
animals	birds	Alaudidae	*Mirafra javanica*	Horsfield's bushlark		C		3
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		7
animals	birds	Anatidae	*Dendrocygna arcuata*	wandering whistling-duck		C		1
animals	birds	Anatidae	*Chenonetta jubata*	Australian wood duck		C		6
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		7
animals	birds	Anatidae	*Aythya australis*	hardhead		C		6
animals	birds	Anhingidae	*Anhinga novaehollandiae*	Australasian darter		C		1
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		5
animals	birds	Ardeidae	*Ardea modesta*	eastern great egret		C		5
animals	birds	Ardeidae	*Nycticorax caledonicus*	Nankeen night-heron		C		1
animals	birds	Ardeidae	*Ardea intermedia*	intermediate egret		C		1
animals	birds	Artamidae	*Cracticus torquatus*	grey butcherbird		C		55
animals	birds	Artamidae	*Artamus cyanopterus*	dusky woodswallow		C		5
animals	birds	Artamidae	*Artamus superciliosus*	white-browed woodswallow		C		10
animals	birds	Artamidae	*Cracticus nigrogularis*	pied butcherbird		C		42
animals	birds	Artamidae	*Artamus personatus*	masked woodswallow		C		12
animals	birds	Artamidae	*Artamus cinereus*	black-faced woodswallow		C		7

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Artamidae	*Artamus minor*	little woodswallow		C		9
animals	birds	Artamidae	*Cracticus tibicen*	Australian magpie		C		47
animals	birds	Burhinidae	*Burhinus grallarius*	bush stone-curlew		C		7
animals	birds	Cacatuidae	*Nymphicus hollandicus*	cockatiel		C		14
animals	birds	Cacatuidae	*Eolophus roseicapillus*	galah		C		19
animals	birds	Cacatuidae	*Calyptorhynchus banksii*	red-tailed black-cockatoo		C		3
animals	birds	Cacatuidae	*Cacatua galerita*	sulphur-crested cockatoo		C		10
animals	birds	Campephagidae	*Coracina novaehollandiae*	black-faced cuckoo-shrike		C		41
animals	birds	Campephagidae	*Coracina tenuirostris*	cicadabird		C		1
animals	birds	Campephagidae	*Coracina papuensis*	white-bellied cuckoo-shrike		C		6
animals	birds	Campephagidae	*Coracina maxima*	ground cuckoo-shrike		C		2
animals	birds	Campephagidae	*Lalage sueurii*	white-winged triller		C		12
animals	birds	Casuariidae	*Dromaius novaehollandiae*	emu		C		10
animals	birds	Charadriidae	*Vanellus tricolor*	banded lapwing		C		1
animals	birds	Charadriidae	*Elseyornis melanops*	black-fronted dotterel		C		1
animals	birds	Charadriidae	*Vanellus miles*	masked lapwing		C		3
animals	birds	Charadriidae	*Vanellus miles miles*	masked lapwing (northern subspecies)		C		1
animals	birds	Charadriidae	*Erythrogonys cinctus*	red-kneed dotterel		C		1
animals	birds	Ciconiidae	*Ephippiorhynchus asiaticus*	black-necked stork		NT		1
animals	birds	Climacteridae	*Climacteris picumnus*	brown treecreeper		C		83
animals	birds	Columbidae	*Geophaps scripta scripta*	squatter pigeon (southern subspecies)		V	V	2
animals	birds	Columbidae	*Geopelia cuneata*	diamond dove		C		8
animals	birds	Columbidae	*Geopelia striata*	peaceful dove		C		9
animals	birds	Columbidae	*Phaps chalcoptera*	common bronzewing		C		6
animals	birds	Columbidae	*Geopelia humeralis*	bar-shouldered dove		C		3
animals	birds	Columbidae	*Ocyphaps lophotes*	crested pigeon		C		17
animals	birds	Coraciidae	*Eurystomus orientalis*	dollarbird		C		13
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		33
animals	birds	Corcoracidae	*Corcorax melanorhamphos*	white-winged chough		C		2
animals	birds	Corvidae	*Corvus orru*	Torresian crow		C		38
animals	birds	Corvidae	*Corvus bennetti*	little crow		C		1
animals	birds	Corvidae	*Corvus coronoides*	Australian raven		C		27
animals	birds	Cuculidae	*Chalcites lucidus*	shining bronze-cuckoo		C		5
animals	birds	Cuculidae	*Scythrops novaehollandiae*	channel-billed cuckoo		C		4
animals	birds	Cuculidae	*Chalcites osculans*	black-eared cuckoo		C		2
animals	birds	Cuculidae	*Cacomantis pallidus*	pallid cuckoo		C		2
animals	birds	Cuculidae	*Eudynamys orientalis*	eastern koel		C		1
animals	birds	Cuculidae	*Cacomantis variolosus*	brush cuckoo		C		2
animals	birds	Cuculidae	*Centropus phasianinus*	pheasant coucal		C		1
animals	birds	Cuculidae	*Chalcites basalis*	Horsfield's bronze-cuckoo		C		13
animals	birds	Dicruridae	*Dicrurus bracteatus*	spangled drongo		C		1
animals	birds	Estrildidae	*Neochmia modesta*	plum-headed finch		C		4
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		34
animals	birds	Estrildidae	*Poephila cincta cincta*	black-throated finch (white-rumped subspecies)		E	E	1
animals	birds	Estrildidae	*Taeniopygia guttata*	zebra finch		C		10

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Falconidae	*Falco berigora*	brown falcon		C		18
animals	birds	Falconidae	*Falco cenchroides*	nankeen kestrel		C		18
animals	birds	Falconidae	*Falco subniger*	black falcon		C		6
animals	birds	Gruidae	*Grus rubicunda*	brolga		C		6
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		19
animals	birds	Halcyonidae	*Todiramphus macleayii*	forest kingfisher		C		1
animals	birds	Halcyonidae	*Dacelo leachii*	blue-winged kookaburra		C		1
animals	birds	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher		C		9
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		24
animals	birds	Hirundinidae	*Petrochelidon nigricans*	tree martin		C		6
animals	birds	Hirundinidae	*Petrochelidon ariel*	fairy martin		C		2
animals	birds	Maluridae	*Malurus melanocephalus*	red-backed fairy-wren		C		14
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		20
animals	birds	Megaluridae	*Cincloramphus mathewsi*	rufous songlark		C		13
animals	birds	Megaluridae	*Cincloramphus cruralis*	brown songlark		C		4
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		4
animals	birds	Meliphagidae	*Ptilotula penicillatus*	white-plumed honeyeater		C		33
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		18
animals	birds	Meliphagidae	*Melithreptus brevirostris*	brown-headed honeyeater		C		2
animals	birds	Meliphagidae	*Plectorhyncha lanceolata*	striped honeyeater		C		31
animals	birds	Meliphagidae	*Entomyzon cyanotis*	blue-faced honeyeater		C		13
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		80
animals	birds	Meliphagidae	*Ptilotula plumulus*	grey-fronted honeyeater		C		22
animals	birds	Meliphagidae	*Epthianura tricolor*	crimson chat		C		3
animals	birds	Meliphagidae	*Gavicalis virescens*	singing honeyeater		C		27
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		3
animals	birds	Meliphagidae	*Melithreptus gularis*	black-chinned honeyeater		NT		3
animals	birds	Meliphagidae	*Ptilotula keartlandi*	grey-headed honeyeater		C		2
animals	birds	Meliphagidae	*Nesoptilotis leucotis*	white-eared honeyeater		C		2
animals	birds	Meliphagidae	*Philemon corniculatus*	noisy friarbird		C		35
animals	birds	Meliphagidae	*Manorina melanocephala*	noisy miner		C		2
animals	birds	Meliphagidae	*Philemon citreogularis*	little friarbird		C		28
animals	birds	Meropidae	*Merops ornatus*	rainbow bee-eater		C		24
animals	birds	Monarchidae	*Grallina cyanoleuca*	magpie-lark		C		35
animals	birds	Monarchidae	*Myiagra inquieta*	restless flycatcher		C		22
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		9
animals	birds	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit		C		4
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		16
animals	birds	Neosittidae	*Daphoenositta chrysoptera*	varied sittella		C		12
animals	birds	Oriolidae	*Oriolus sagittatus*	olive-backed oriole		C		7
animals	birds	Oriolidae	*Sphecotheres vieilloti*	Australasian figbird		C		2
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		9
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		69
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		13
animals	birds	Pachycephalidae	*Oreoica gutturalis*	crested bellbird		C		26
animals	birds	Pardalotidae	*Pardalotus rubricatus*	red-browed pardalote		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Pardalotidae	*Pardalotus striatus*	striated pardalote		C		84
animals	birds	Pelecanidae	*Pelecanus conspicillatus*	Australian pelican		C		1
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		51
animals	birds	Petroicidae	*Petroica goodenovii*	red-capped robin		C		1
animals	birds	Petroicidae	*Melanodryas cucullata*	hooded robin		C		40
animals	birds	Phalacrocoracidae	*Phalacrocorax carbo*	great cormorant		C		1
animals	birds	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant		C		1
animals	birds	Phalacrocoracidae	*Microcarbo melanoleucos*	little pied cormorant		C		2
animals	birds	Phasianidae	*Coturnix ypsilophora*	brown quail		C		6
animals	birds	Podargidae	*Podargus strigoides*	tawny frogmouth		C		5
animals	birds	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe		C		2
animals	birds	Podicipedidae	*Podiceps cristatus*	great crested grebe		C		1
animals	birds	Pomatostomidae	*Pomatostomus temporalis*	grey-crowned babbler		C		72
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		26
animals	birds	Psittacidae	*Trichoglossus chlorolepidotus*	scaly-breasted lorikeet		C		1
animals	birds	Psittacidae	*Aprosmictus erythropterus*	red-winged parrot		C		13
animals	birds	Psittacidae	*Melopsittacus undulatus*	budgerigar		C		10
animals	birds	Psittacidae	*Platycercus adscitus*	pale-headed rosella		C		48
animals	birds	Ptilonorhynchidae	*Ptilonorhynchus maculatus*	spotted bowerbird		C		5
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		32
animals	birds	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail		C		51
animals	birds	Strigidae	*Ninox boobook*	southern boobook		C		11
animals	birds	Threskiornithidae	*Threskiornis molucca*	Australian white ibis		C		1
animals	birds	Turnicidae	*Turnix pyrrhothorax*	red-chested button-quail		C		2
animals	birds	Turnicidae	*Turnix velox*	little button-quail		C		4
animals	birds	Tytonidae	*Tyto javanica*	eastern barn owl		C		3
animals	insects	Nymphalidae	*Danaus plexippus plexippus*	monarch				1
animals	mammals	Bovidae	*Bos taurus*	European cattle	Y			27
animals	mammals	Canidae	*Canis lupus dingo*	dingo				2
animals	mammals	Dasyuridae	*Sminthopsis murina*	common dunnart		C		1
animals	mammals	Dasyuridae	*Sminthopsis macroura*	stripe-faced dunnart		C		2
animals	mammals	Emballonuridae	*Saccolaimus flaviventris*	yellow-bellied sheathtail bat		C		7
animals	mammals	Equidae	*Equus caballus*	horse	Y			2
animals	mammals	Felidae	*Felis catus*	cat	Y			5
animals	mammals	Leporidae	*Oryctolagus cuniculus*	rabbit	Y			32
animals	mammals	Macropodidae	*Lagorchestes conspicillatus*	spectacled hare-wallaby		C		3
animals	mammals	Macropodidae	*Macropus rufus*	red kangaroo		C		21
animals	mammals	Macropodidae	*Macropus robustus*	common wallaroo		C		3
animals	mammals	Macropodidae	*Macropus giganteus*	eastern grey kangaroo		C		75
animals	mammals	Macropodidae	*Wallabia bicolor*	swamp wallaby		C		1
animals	mammals	Molossidae	*Tadarida australis*	white-striped freetail bat		C		3
animals	mammals	Molossidae	*Mormopterus sp.*					1
animals	mammals	Muridae	*Pseudomys delicatulus*	delicate mouse		C		22
animals	mammals	Muridae	*Pseudomys desertor*	desert mouse		C		12
animals	mammals	Muridae	*Leggadina forresti*	Forrest's mouse		C		2
animals	mammals	Muridae	*Mus musculus*	house mouse	Y			14

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	mammals	Petauridae	*Petaurus breviceps*	sugar glider		C		1
animals	mammals	Phalangeridae	*Trichosurus vulpecula*	common brushtail possum		C		3
animals	mammals	Phascolarctidae	*Phascolarctos cinereus*	koala		C	V	6
animals	mammals	Potoroidae	*Aepyprymnus rufescens*	rufous bettong		C		8
animals	mammals	Suidae	*Sus scrofa*	pig	Y			2
animals	mammals	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna		C		26
animals	mammals	Vespertilionidae	*Nyctophilus bifax*	northern long-eared bat		C		1
animals	mammals	Vespertilionidae	*Chalinolobus morio*	chocolate wattled bat		C		2
animals	mammals	Vespertilionidae	*Scotorepens greyii*	little broad-nosed bat		C		5
animals	mammals	Vespertilionidae	*Chalinolobus gouldii*	Gould's wattled bat		C		4
animals	mammals	Vespertilionidae	*Scotorepens balstoni*	inland broad-nosed bat		C		1
animals	mammals	Vespertilionidae	*Vespadelus vulturnus*	little forest bat		C		1
animals	reptiles	Agamidae	*Diporiphora australis*			C		7
animals	reptiles	Agamidae	*Amphibolurus gilberti*	Gilbert's dragon		C		1
animals	reptiles	Agamidae	*Ctenophorus nuchalis*	central netted dragon		C		1
animals	reptiles	Agamidae	*Diporiphora nobbi*	nobbi		C		2
animals	reptiles	Agamidae	*Pogona barbata*	bearded dragon		C		7
animals	reptiles	Carphodactylidae	*Nephrurus asper*	spiny knob-tailed gecko		C		1
animals	reptiles	Chelidae	*Chelodina longicollis*	eastern snake-necked turtle		C		1
animals	reptiles	Colubridae	*Boiga irregularis*	brown tree snake		C		2
animals	reptiles	Diplodactylidae	*Diplodactylus conspicillatus*	fat-tailed diplodactylus		C		9
animals	reptiles	Diplodactylidae	*Lucasium steindachneri*	Steindachner's gecko		C		6
animals	reptiles	Diplodactylidae	*Strophurus williamsi*	soft-spined gecko		C		6
animals	reptiles	Diplodactylidae	*Amolosia rhombifer*	zig-zag gecko		C		2
animals	reptiles	Diplodactylidae	*Oedura monilis*			C		1
animals	reptiles	Diplodactylidae	*Rhynchoedura ornata sensu lato*	beaked gecko		C		2
animals	reptiles	Elapidae	*Brachyurophis australis*	coral snake		C		2
animals	reptiles	Elapidae	*Hoplocephalus bitorquatus*	pale-headed snake		C		6
animals	reptiles	Elapidae	*Suta dwyeri*			C		5/1
animals	reptiles	Elapidae	*Furina ornata*	orange-naped snake		C		1
animals	reptiles	Elapidae	*Cryptophis boschmai*	Carpentaria whip snake		C		4
animals	reptiles	Elapidae	*Demansia psammophis*	yellow-faced whip snake		C		6
animals	reptiles	Elapidae	*Pseudechis australis*	king brown snake		C		1
animals	reptiles	Gekkonidae	*Gehyra catenata*			C		27
animals	reptiles	Gekkonidae	*Gehyra dubia*			C		1
animals	reptiles	Gekkonidae	*Heteronotia binoei*	Bynoe's gecko		C		40
animals	reptiles	Pygopodidae	*Lialis burtonis*	Burton's legless lizard		C		2
animals	reptiles	Scincidae	*Ctenotus leonhardii*			C		8
animals	reptiles	Scincidae	*Morethia boulengeri*			C		18
animals	reptiles	Scincidae	*Ctenotus pantherinus*			C		6
animals	reptiles	Scincidae	*Morethia taeniopleura*	fire-tailed skink		C		1
animals	reptiles	Scincidae	*Cryptoblepharus pannosus*	ragged snake-eyed skink		C		42
animals	reptiles	Scincidae	*Eremiascincus richardsonii*	broad-banded sand swimmer		C		2
animals	reptiles	Scincidae	*Cryptoblepharus virgatus sensu lato*			C		2
animals	reptiles	Scincidae	*Tiliqua scincoides*	eastern blue-tongued lizard		C		3
animals	reptiles	Scincidae	*Ctenotus robustus*			C		26

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	reptiles	Scincidae	*Lerista fragilis*			C		13
animals	reptiles	Scincidae	*Carlia munda*			C		2
animals	reptiles	Scincidae	*Menetia greyii*			C		29
animals	reptiles	Varanidae	*Varanus tristis*	black-tailed monitor		C		19
plants	conifers	Cupressaceae	*Callitris glaucophylla*	white cypress pine		C		1/1
plants	ferns	Adiantaceae	*Cheilanthes sieberi subsp. sieberi*			C		1/1
plants	higher dicots	Asteraceae	*Camptacra barbata*			C		1/1
plants	higher dicots	Asteraceae	*Calotis cuneifolia*	burr daisy		C		1/1
plants	higher dicots	Asteraceae	*Rutidosis leucantha*			C		1/1
plants	higher dicots	Asteraceae	*Vittadinia pustulata*			C		2/2
plants	higher dicots	Asteraceae	*Centipeda minima subsp. minima*			C		1/1
plants	higher dicots	Boraginaceae	*Heliotropium moorei*			C		1/1
plants	higher dicots	Caesalpiniaceae	*Petalostylis labicheoides*			C		1/1
plants	higher dicots	Chenopodiaceae	*Dysphania melanocarpa forma melanocarpa*			C		1/1
plants	higher dicots	Euphorbiaceae	*Ricinocarpos linearifolius*			C		1/1
plants	higher dicots	Euphorbiaceae	*Euphorbia drummondii*			C		1/1
plants	higher dicots	Fabaceae	*Hovea tholiformis*			C		1/1
plants	higher dicots	Fabaceae	*Desmodium macrocarpum*			NT		4/3
plants	higher dicots	Fabaceae	*Stylosanthes scabra*		Y			1/1
plants	higher dicots	Fabaceae	*Indigofera colutea*	sticky indigo		C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia glabra*			C		1/1
plants	higher dicots	Goodeniaceae	*Goodenia hirsuta*			C		1/1
plants	higher dicots	Goodeniaceae	*Dampiera discolor*			C		1/1
plants	higher dicots	Malvaceae	*Abutilon otocarpum*			C		1/1
plants	higher dicots	Malvaceae	*Sida atherophora*			C		1/1
plants	higher dicots	Malvaceae	*Sida brachypoda*			C		1/1
plants	higher dicots	Malvaceae	*Sida corrugata*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus burtonii*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia melleodora*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia elachantha*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia complanata*	flatstem wattle		C		1/1
plants	higher dicots	Mimosaceae	*Acacia gnidium*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia platycarpa*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia sp. (Jericho G.R.Beeston 1065C)*			C		2/2
plants	higher dicots	Mimosaceae	*Acacia julifera subsp. curvinervia*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia leptostachya*	Townsville wattle		C		1/1
plants	higher dicots	Mimosaceae	*Acacia spania*			NT		1/1
plants	higher dicots	Myrtaceae	*Corymbia brachycarpa*			C		1/1
plants	higher dicots	Myrtaceae	*Micromyrtus rotundifolia*			V		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus drepanophylla*			C		8/8
plants	higher dicots	Myrtaceae	*Micromyrtus gracilis*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus cambageana*	Dawson gum		C		1/1
plants	higher dicots	Myrtaceae	*Ochrosperma adpressum*			C		1/1
plants	higher dicots	Pentapetaceae	*Melhania oblongifolia*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus*			C		1/1
plants	higher dicots	Phyllanthaceae	*Phyllanthus maderaspatensis var. maderaspatensis*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Proteaceae	*Hakea lorea subsp. lorea*			C		1/1
plants	higher dicots	Rubiaceae	*Spermacoce brachystema*			C		1/1
plants	higher dicots	Rutaceae	*Boronia odorata*			C		2/2
plants	higher dicots	Santalaceae	*Exocarpos sparteus*	slender cherry		C		1/1
plants	higher dicots	Sapindaceae	*Dodonaea filifolia*			C		1/1
plants	higher dicots	Solanaceae	*Solanum cleistogamum*			C		1/1
plants	higher dicots	Solanaceae	*Solanum ferocissimum*			C		1/1
plants	higher dicots	Stylidiaceae	*Stylidium eriorhizum*			C		1/1
plants	higher dicots	Stylidiaceae	*Stylidium eglandulosum*			C		1/1
plants	higher dicots	Thymelaeaceae	*Pimelea trichostachya*	flaxweed		C		1/1
plants	monocots	Cyperaceae	*Bulbostylis barbata*			C		1/1
plants	monocots	Cyperaceae	*Cyperus nervulosus*			C		1/1
plants	monocots	Laxmanniaceae	*Lomandra leucocephala subsp. leucocephala*			C		1/1
plants	monocots	Laxmanniaceae	*Lomandra leucocephala*			C		1/1
plants	monocots	Poaceae	*Chloris ventricosa*	tall chloris		C		1/1
plants	monocots	Poaceae	*Eragrostis sororia*			C		1/1
plants	monocots	Poaceae	*Eriachne mucronata*			C		1/1
plants	monocots	Poaceae	*Cymbopogon ambiguus*	lemon grass		C		1/1
plants	monocots	Poaceae	*Digitaria ammophila*	silky umbrella grass		C		1/1
plants	monocots	Poaceae	*Eragrostis speciosa*			C		1/1
plants	monocots	Poaceae	*Digitaria longiflora*			C		1/1
plants	monocots	Poaceae	*Eragrostis lacunaria*	purple lovegrass		C		1/1
plants	monocots	Poaceae	*Schizachyrium fragile*	firegrass		C		1/1
plants	monocots	Poaceae	*Setaria oplismenoides*			C		1/1
plants	monocots	Poaceae	*Enneapogon polyphyllus*	leafy nineawn		C		1/1
plants	monocots	Poaceae	*Eragrostis spartinoides*			C		1/1
plants	monocots	Poaceae	*Urochloa gilesii var. gilesii*			C		1/1
plants	monocots	Poaceae	*Aristida holathera var. holathera*			C		1/1
plants	monocots	Poaceae	*Enneapogon virens*			C		1/1
plants	monocots	Poaceae	*Cenchrus ciliaris*		Y			1/1
plants	monocots	Poaceae	*Aristida calycina*			C		1/1
plants	monocots	Poaceae	*Triraphis mollis*	purple plumegrass		C		2/2
plants	monocots	Poaceae	*Triodia pungens*			C		1/1
plants	monocots	Poaceae	*Setaria surgens*			C		1/1
plants	monocots	Poaceae	*Melinis repens*	red natal grass	Y			1/1
plants	monocots	Poaceae	*Eulalia aurea*	silky browntop		C		1/1

CODES

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

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

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

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

Appendix F Flora species recorded from Study Area

Family	Status	Taxon	Common Name	Life Form	Survey Sites
Acanthaceae		*Brunoniella australis*	blue trumpet	F	BB06, MS01
Adiantaceae		*Cheilanthes nudiuscula*		E	BB06, BB26, MS01
Adiantaceae		*Cheilanthes* sp.		E	MS02, MS03
Amaranthaceae		*Alternanthera nana*	hairy joyweed	F	MS07
Apocynaceae		*Alstonia constricta*	bitter bark	S	BB06, MS01, MS03
Apocynaceae		*Carissa ovata*	currant bush	S	BB07b, BB07c, MS02
Apocynaceae		*Marsdenia* sp.		L	MS01, MS03
Apocynaceae		*Marsdenia viridiflora*	native pear	L	BB06, MS02, MS08, MS11b
Asteraceae		*Calotis cuneifolia*	purple burr-daisy	F	BB06, MS03, MS11b
Asteraceae		*Calotis xanthosioidea*		F	BB07c, MS01, MS04, MS07, MS08, MS10
Asteraceae		*Centipeda minima*	spreading sneezeweed	F	BB07b
Asteraceae		*Chrysocephalum apiculatum*	yellow buttons	F	BB07a, MS02, MS04, MS09
Asteraceae		*Cyanthillium cinereum*	vernonia	F	BB06, BB07b, MS04, MS08
Asteraceae		indet		F	BB06, BB07a, BB07c, MS10
Asteraceae		*Peripleura hispidula*		F	MS08
Asteraceae		*Pluchea dentex*	bowl daisy	F	MS03
Asteraceae		*Pterocaulon serrulatum*	fruit-salad plant	F	BB06, BB07a
Asteraceae		*Streptoglossa* sp.		F	BB06
Bignoniaceae		*Pandorea pandorana*	wonga vine	L	BB06, BB07a, MS01, MS08
Boraginaceae		*Ehretia saligna*	coonta	S	MS02
Byttneriaceae		*Waltheria indica*	uhaloa	S	BB07a, BB07b
Caesalpiniaceae		*Chamaecrista exigua*		F	MS04, MS08, MS11b
Caesalpiniaceae	*	*Chamaecrista rotundifolia*	round-leaf cassia	F	MS10

Family	Status	Taxon	Common Name	Life Form	Survey Sites
Caesalpiniaceae		*Senna* sp.		S	MS11b
Campanulaceae		*Wahlenbergia gracilis*	Australian bluebell	F	MS04
Capparaceae		*Apophyllum anomalum*	warrior bush	S	MS09, MS11b
Capparaceae		*Capparis canescens*	wild orange	S	MS03, MS11a
Caryophyllaceae		*Polycarpaea corymbosa*	oldman's cap	F	MS05
Celastraceae		*Maytenus cunninghamii*	yellow-berry bush	S	MS02, MS08, MS11b
Chenopodiaceae		*Einadia hastata*	berry saltbush	F	MS02
Chenopodiaceae		*Enchylaena tomentosa*	ruby saltbush	S	MS02
Convolvulaceae		*Bonamia media*	Bonamia	L	MS02
Convolvulaceae		*Evolvulus alsinoides*	tropical speedwell	F	BB26
Cyperaceae		*Bulbostylis barbata*		V	MS05
Cyperaceae		*Schoenus ornithopodioides*	bog-rush	V	BB26
Cyperaceae		*Scleria brownii*		V	MS01
Cyperaceae		*Scleria* sp.		V	MS05
Erythroxylaceae		*Erythroxylum australe*	cocaine bush	S	BB06, BB07a, MS01, MS02, MS03, MS09, MS10, MS11b
Euphorbiaceae		*Croton phebalioides*	white croton	S	MS02
Euphorbiaceae		*Euphorbia drummondii*	caustic weed	F	MS06, MS07
Fabaceae		*Crotalaria medicaginea*	trefoil rattlepod	F	MS09
Fabaceae		*Crotalaria* sp. *?montana*		F	BB07a
Fabaceae		*Desmodium brachypodium*	large tick-trefoil	F	MS11b
Fabaceae		*Galactia tenuiflora*	Galactia	F	BB07b, MS08
Fabaceae		*Glycine tomentella*	woolly glycine	L	BB07b, BB07c, MS04, MS08, MS09, MS11b
Fabaceae		*Gompholobium foliolosum*	fern-leaved burtonia	F	MS04

Family	Status	Taxon	Common Name	Life Form	Survey Sites
Fabaceae		*Hovea* sp.		S	MS05
Fabaceae		*Indigofera baileyi*		F	MS02
Fabaceae		*Indigofera linnaei*	Birdsville indigo	F	BB07b
Fabaceae		*Indigofera pratensis*		F	MS08
Fabaceae	*	*Stylosanthes scabra*	shrubby stylo	S	BB06, BB07a, MS09, MS10
Fabaceae		*Tephrosia filipes*		S	MS09, MS11b
Fabaceae		*Tephrosia leptoclada*		S	MS10
Fabaceae		*Zornia* sp.			MS08
Fabaceae		indet			MS07
Goodeniaceae		*Goodenia glabra*	smooth goodenia	F	BB07a, BB07c, MS08, MS10, MS11b
Helicteraceae		*Helicteres semiglabra*			MS10
Hemerocallidaceae		*Dianella longifolia*	blue flax-lily	F	BB07b, BB07c, BB26, MS04, MS06, MS08, MS11b
Lamiaceae		*Clerodendrum floribundum*	lolly bush	ST	MS06, MS09
Lamiaceae		*Spartothamnella juncea*	square-stemmed broom	S	BB06, MS03
Lauraceae		*Cassytha filiformis*	false dodder	pL	BB07c
Laxmanniaceae		*Lomandra leucocephala*	woolly mat-rush	F	BB07a, MS04, MS06, MS08
Laxmanniaceae		*Lomandra multiflora*	many-flowered mat-rush	F	BB07b, MS06, MS07
Malvaceae	*	*Malvastrum americanum*	spiked malvastrum	F	MS06
Malvaceae		*Sida* sp.		S	BB06, MS01, MS03
Mimosaceae		*Acacia catenulata*	bendee	ST	BB06, MS01
Mimosaceae		*Acacia complanata*	flat-stemmed wattle	S	MS05, MS07
Mimosaceae		*Acacia coriacea*	wirewood	ST	MS11a
Mimosaceae		*Acacia cowleana*		ST	MS04, MS07

Family	Status	Taxon	Common Name	Life Form	Survey Sites
Mimosaceae		*Acacia cretata*		S	MS09
Mimosaceae		*Acacia harpophylla*	brigalow	ST	MS02
Mimosaceae		*Acacia leptostachya*	Townsville wattle	ST	MS05, MS08, MS11b
Mimosaceae		*Acacia platycarpa*		S	MS06, MS08, MS10
Mimosaceae		*Acacia shirleyi*	lancewood	ST	BB26, MS01, MS03
Moraceae		*Ficus rubiginosa*	small-leaved fig	T	MS02
Myoporaceae		*Eremophila mitchellii*	false sandalwood	S	MS02
Myrtaceae		*Calytrix microcoma*		S	MS10
Myrtaceae		*Corymbia brachycarpa*		T	BB07a, MS07, MS08, MS09, MS11a, MS11b
Myrtaceae		*Corymbia dallachiana*	Dallachy's gum	T	BB06, BB07a, MS01, MS03
Myrtaceae		*Corymbia lamprophylla*	shiny-leaved bloodwood	T	MS05
Myrtaceae		*Corymbia leichhardtii*	rustyjacket	T	BB06, BB26, MS03, MS04, MS05, MS06, MS07, MS08, MS11a, MS11b
Myrtaceae		*Corymbia setosa*	rough-leaved bloodwood	T	MS06
Myrtaceae		*Eucalyptus crebra*	narrow-leaved ironbark	T	BB07a, BB26, MS01, MS03, MS08, MS09, MS11a, MS11b
Myrtaceae		*Eucalyptus melanophloia*	silver-leaved ironbark	T	BB07a, BB07b, BB07c
Myrtaceae		*Eucalyptus thozetiana*	lapunyah	T	MS02
Myrtaceae		*Lithomyrtus microphylla*		S	MS05
Myrtaceae		*Lysicarpus angustifolius*	budgeroo	ST	BB07c, MS04, MS05, MS06, MS07, MS08, MS09, MS11a, MS11b

Family	Status	Taxon	Common Name	Life Form	Survey Sites
Myrtaceae		*Melaleuca nervosa*	paperbark	T	MS05
Myrtaceae		*Micromyrtus gracilis*		S	MS06
Oleaceae		*Jasminum didymum*	jasmine	L	MS02, MS08
Orchidaceae		*Cymbidium canaliculatum*	black orchid	eF	MS02
Phyllanthaceae		*Breynia oblongifolia*	coffee bush	S	BB26
Phyllanthaceae		*Phyllanthus fuernrohrii*	sand spurge	F	BB26
Phyllanthaceae		*Phyllanthus maderaspatensis*		F	BB07b, MS06, MS07, MS08, MS09, MS10, MS11b
Phyllanthaceae		*Phyllanthus virgatus*		F	MS07, MS08
Picrodendraceae		*Petalostigma pubescens*	bitter bark	ST	BB07a, MS06, MS08, MS09, MS11a, MS11b
Pittosporaceae		*Bursaria incana*	prickly pine	ST	BB07a, MS08, MS09, MS11b
Poaceae		*Ancistrachne uncinulata*	hooky grass	G	BB06, MS02
Poaceae		*Aristida calycina*		G	BB26, MS03, MS08, MS09, MS11b
Poaceae		*Aristida caput-medusae*	many-headed wiregrass	G	BB06, MS01, MS03, MS06
Poaceae		*Aristida holathera*	erect kerosene grass	G	BB07c, MS04, MS05, MS06, MS08, MS09, MS10
Poaceae		*Aristida latifolia*	feathertop wiregrass	G	BB07c, MS06, MS08, MS09, MS10
Poaceae		*Aristida queenslandica* var. *dissimilis*		G	MS03
Poaceae		*Aristida* sp. “gracile”		G	BB06, BB26, MS01, MS03
Poaceae		*Aristida* sp. *?jerichoensis*		G	
Poaceae	*	*Cenchrus ciliaris*	buffel grass	G	BB06, BB07a, MS02, MS03, MS09, MS11b
Poaceae		*Chloris* sp.		G	BB07b

Family	Status	Taxon	Common Name	Life Form	Survey Sites
Poaceae		*Chrysopogon fallax*	golden-beard grass	G	BB07b, BB26
Poaceae		*Cleistochloa subjuncea*		G	MS01, MS02, MS03
Poaceae		*Cymbopogon ambiguus*	scent grass	G	MS07, MS08
Poaceae		*Cymbopogon bombycinus*	silky oilgrass	G	BB06, BB07a, BB26, MS08, MS11a
Poaceae		*Cymbopogon obtectus*	silky-heads	G	MS02
Poaceae		*Cymbopogon refractus*	barbed-wire grass	G	BB07a, MS01, MS09, MS11b
Poaceae		*Digitaria ammophila*	silky umbrella grass	G	BB07c, BB26, MS04, MS06, MS08, MS09, MS10, MS11b
Poaceae		*Digitaria* sp. “gracile”		G	BB06, BB26, MS01
Poaceae		*Enneapogon lindleyanus*	conetop nineawn	G	MS01
Poaceae		*Enneapogon polyphyllus*	leafy nineawn	G	BB07b
Poaceae		*Enneapogon virens*		G	BB26
Poaceae		*Enteropogon acicularis*	windmill grass	G	MS02
Poaceae		*Eragrostis* sp. “gracile”		G	BB06, BB07c, MS01, MS03
Poaceae		*Eriachne obtusa*		G	BB26, MS07
Poaceae		*Eriachne pallescens* var. *pallescens*		G	MS05
Poaceae		*Heteropogon contortus*	black speargrass	G	BB06, BB07a, BB07b, BB07c, BB26, MS08, MS09, MS11a, MS11b
Poaceae	*	*Melinis repens*	red natal	G	BB07a, BB07c, MS02, MS04, MS09, MS11b
Poaceae		*Panicum effusum*	hairy panic	G	MS07, MS09
Poaceae		*Panicum simile*	two-colour panic	G	BB06, BB26, MS01, MS05, MS06, MS08, MS11b
Poaceae		*Paspalidium criniforme*		G	BB06

Family	Status	Taxon	Common Name	Life Form	Survey Sites
Poaceae		*Paspalidium* sp.		G	MS03
Poaceae		*Schizachyrium fragile*	firegrass	G	MS04, MS06, MS07, MS08, MS10
Poaceae		*Setaria surgens*	pigeon grass	G	MS04, MS06, MS09
Poaceae		*Themeda avenacea*	native oatgrass	G	BB07b
Poaceae		*Themeda triandra*	kangaroo grass	G	BB07a, BB07c, MS08, MS09, MS11b
Poaceae		*Thyridolepis xerophila*		G	BB06, BB26
Poaceae		*Triodia pungens*		G	BB07a, BB07c, BB26, MS01, MS04, MS05, MS06, MS07, MS08, MS09, MS11a, MS11b,
Poaceae		indet		G	MS02
Proteaceae		*Grevillea decora* subsp. *decora*		S	BB26
Proteaceae		*Grevillea pteridifolia*	golden grevillea	ST	MS04, MS07, MS08, MS11b
Proteaceae		*Hakea lorea*	bootlace oak	ST	MS01
Proteaceae		*Hakea* sp.		S	MS07
Proteaceae		*Persoonia falcata*	geebung	ST	BB26, MS04, MS05, MS06, MS07, MS08, MS10, MS11b
Rhamnaceae		*Alphitonia excelsa*	Red ash	ST	BB06, BB07a, BB07b, BB26, MS04, MS06, MS07, MS08, MS09, MS11a, MS11b
Rubiaceae		*Everistia vacciniifolia*	small-leafed canthium	S	BB06, MS02
Rubiaceae		*Oldenlandia mitrasacmoides*	Oldenlandia	F	MS06
Rubiaceae		*Pogonolobus reticulatus*	medicine bush	S	MS06

Family	Status	Taxon	Common Name	Life Form	Survey Sites
Rubiaceae		*Psydrax odorata* subsp. *australiana*	canthium	S	BB06, MS03
Rubiaceae		*Psydrax oleifolia*		S	BB07a, MS01, MS02, MS03, MS11b
Rutaceae		indet		S	BB06
Santalaceae		*Exocarpos cupressiformis*	native cherry	S	MS05, MS07
Santalaceae		*Santalum lanceolatum*	sandalwood	ST	MS11b
Sapindaceae		*Dodonaea viscosa* subsp. *angustissima*	sticky hop bush	S	MS05, MS07
Solanaceae		*Solanum* sp. “ellipticum”		S	BB06
Solanaceae		*Solanum* sp. “stelligerum”		S	BB06
Stackhousiaceae		*Stackhousia nuda*		F	BB07c, MS04, MS06, MS08, MS09, MS10, MS11b
Sterculiaceae		*Brachychiton populneus* subsp. *trilobata*	kurrajong	ST	BB07a, BB07b, BB07c, MS09, MS10, MS11b
Xanthorrhoeaceae		*Xanthorrhoea johnsonii*	Johnson’s grass tree	S	MS04, MS05, MS06
Xyridaceae		*Xyris* sp. *complanata?*			MS04

Notes:
* = exotic species

Life form: T = tree; ST = Short tree; S = Shrub; C = Chenopod shrub; G = Grass; F = Herb/Forb; V = Sedge; R = rush or lily; L = Vine; E = Fern; a = aquatic; e = epiphytic; p = parasitic.