Central Queensland Coal Project

Appendix 9b – Terrestrial Flora Reports

Environmental Impact Statement

Flora and Vegetation Assessment

Styx Coal

Yeats Consulting Engineers

OBERONIA
Botanical Services

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Executive Summary

The Styx Coal Project is a joint venture project between Waratah Coal and Queensland Nickel. The project is currently planning small-scale open-cut coal extraction from a number of ore deposits within the area covered by Exploration Permit (Coal) 1029. EPC1029 is located approximately 140 km north of Rockhampton, central Queensland. Six potential extraction areas are proposed totalling some 34.6 km² in area. Associated with the open-cut areas are coal processing facilities and rail infrastructure. A baseline terrestrial vegetation and botanical assessment was undertaken to assess the ecological attributes and values of the environment within the EPC1029 area. This assessment included desktop analysis and literature review of existing information as well as wet and dry season field surveys.

The wet and dry season field surveys were undertaken using methods that comply with the Department of Environment and Resource Management (DERM) guidelines for mapping Regional Ecosystems (RE) and vegetation communities, including CORVEG sampling, floristic surveys and random meander transects to verify the results of the desktop analysis.

Key Findings

The study area contains a mixture of vegetation biodiversity values including eucalypt open forest, brigalow woodlands, sedgelands, samphire forblands, and riparian communities as well as regrowth and cleared areas. A large proportion (approximately 74%) of the study area landscape has been historically cleared and converted to pasture. The condition of the remnant vegetation of the study area varies substantially according to historical land management practices including grazing.

Eighteen REs occur within the study area, comprising two REs classed as Endangered, four classed as Of Concern and the remainder classed as Least Concern under the provisions of the *Vegetation Management Act 1999* (VM Act). Brigalow communities REs 11.3.1 and 11.4.9 are classed as Endangered under the VM Act and are included in the description of the threatened ecological community Brigalow (*Acacia harpophylla* dominant and co-dominant) listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). These REs are distributed across the study area as discreet, non-continuous patches. Approximately 11.8 ha of RE 11.4.9 occur within the proposed extraction areas. Advanced regrowth of brigalow has been mapped as High Value Regrowth containing Endangered RE and also falls within the brigalow TEC definition. Approximately 28 ha of brigalow regrowth occur within the proposed extraction areas.

Patches of semi-evergreen vine thickets occur in the study area closely associated with alluvial soils of the active watercourses of Tooloombah Creek and the Styx River. These areas correspond to RE 11.3.11 and are presently not mapped in the certified RE mapping. RE 11.3.11 is classed as Endangered under the VM Act and is included in the description of the Semi-Evergreen Vine Thicket TEC under the EPBC Act.

One conservation significant flora species was recorded during the dry season field survey, this being the perennial sedge *Eleocharis blakeana* (listed as Near Threatened under the *Nature Conservation Act 1992* (NC Act)). While not recorded, the species *Solanum elachophyllum*, listed as Endangered under the NC Act, has the potential to occur in brigalow communities of the study area.

Offsets may be required under Commonwealth and/or State legislation where residual impacts to identified ecological values cannot be avoided or reasonably mitigated. Where development will impact on SEVT and/or brigalow TECs then a referral to the Federal government under the EPBC Act will be required. Any residual impacts associated with the project on State significant biodiversity values would trigger a biodiversity offset obligation under State legislative framework.

An offset strategy would need to be prepared as part of an Environmental Management Plan (EMP) for the site and demonstrate measures to avoid or mitigate the residual impacts associated with the

project on these State significant biodiversity values. The offset strategy should identify the biodiversity value and quantify the impacts. The strategy should also include the identification of potential offset areas consistent with the provision of the offset policy to compensate for loss of biodiversity values of the site.

1 Introduction

1.1 Project Overview

Oberonia Botanical Assessment was engaged by Yeats Consulting Engineers to conduct a baseline botanical and terrestrial vegetation assessment of the area covered by Exploration Permit (Coal) 1029 herein referred to as the "study area". The Styx Coal Project is a joint venture project between Waratah Coal and Queensland Nickel. The project is currently planning small-scale open-cut coal extraction from a number of ore deposits within the study area. Associated with the open-cut areas are coal processing facilities and rail infrastructure. This technical report provides a preliminary botanical assessment of the flora and vegetation communities located within the study area. The information contained within this technical report can be used to partly address the requirements of an Environmental Impact Statement (EIS) if one is required.

1.2 Study Area

The study area refers to the 342 km² area covered by Exploration Permit (Coal) (EPC) 1029 in the Styx Basin, central Queensland. EPC1029 falls between the population centres of Marlborough and Saint Lawrence and is approximately centred on the township of Ogmore, approximately 140 km north-west of Rockhampton (Figure 1). The land use within the study area is predominantly cattle grazing. The North Coast rail line and the Bruce Highway bisect the study area.

1.3 Objectives

The objectives of this study are to:

- Describe the flora values and vegetation communities from the area covered by EPC1029;
- 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;
- Identify populations of significant weed/pest species;
- Confirm the extent and attribution of the Department of Environment and Resource Management's (DERM) remnant vegetation and certified Regional Ecosystems (RE) mapping within the study area; and
- Confirm the extent of DERM's high value regrowth (HVR) mapped within the study area.

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 - Description of environmentally significant areas.

2 Methods

This section outlines the methods undertaken to describe the existing environmental values of the study area. A combination of desktop assessments and seasonal 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 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 Resource Management (DERM) certified Regional Ecosystem (RE) mapping (Version 6.0b, 2009). This mapping database is administered by the DERM 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;
- DERM'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.
- DERM's Environmentally Sensitive Areas mapping to determine whether any Environmentally Sensitive Areas as defined in the Environmental Protection Regulation 2008 are present within the EPC 1029 area;
- DERM'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 the DERM, consultants, academic facilities and community groups. Records were returned for a search area including a one kilometre buffer of the edge of the EPC 1029 area;
- Queensland Herbarium HERBRECS specimen database to identify any previously recorded flora species located within the study area, including NC Act listed species; and
- DERM's Fitzroy Natural Resource Region Back on Track report (DERM, 2010) identifies priority species in the Fitzroy NRM region, details the regional threatening processes impacting upon these species, and proposes a range of actions to address regional threats.

2.2 Field Survey

Seasonal field surveys were conducted to identify species and vegetation within the study area and to verify the certified RE and regrowth mapping. Field surveys also aimed to determine the likelihood of occurrence of threatened flora species or threatened ecological communities considered to have the potential to occur in the study area, as identified by desktop searches (Federal listings under EPBC Act, or State listings under NC Act or VM Act). Survey sites were selected to sample representative vegetation communities present in the study area. Verification 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 21st and 25th of March 2011 (wet season) and the 25th and 29th of September 2011 (dry season). The wet season survey coincided with the optimal period for vegetative vigour and inflorescence set, particularly for herbaceous and grass species. The dry season survey was optimal for access across the study area.

2.2.2 Site Selection

Flora surveys were undertaken in representative vegetation communities across the study area. Sites were selected on the basis of:

- Aerial photography interpretation of site characteristics;
- Presence of remnant vegetation;
- Verification of certified RE mapping extent and attribution;
- Verification of high-value regrowth mapping;
- Targeted threatened flora species and ecological communities and their habitats identified from database searches;
- Potential for close access by vehicle; and
- Location of the proposed coal extraction areas.

2.2.3 Field Survey Methods

Targeted floristic surveys were conducted using methods defined by the Queensland Herbarium (DERM) for mapping REs and vegetation communities (Neldner *et al*., 2005). Flora surveys were conducted in areas of remnant vegetation including mapped REs and within high-value regrowth and non-remnant vegetation. Flora sampling methods included:

- CORVEG sampling (Neldner *et al*., 2005);
- Site species lists; and
- Traverses.

CORVEG Sampling

A total of 31 wet season and 58 dry season survey sites were assessed across the study area. Sites were surveyed by a combination of secondary, tertiary or enhanced quaternary level CORVEG plots, as necessary to verify the extent and attribution of the certified RE and high-value regrowth mapping and to assist with determination of remnant status. Secondary sites (n = 6) provided comprehensive data on vegetation structure and composition. The less detailed tertiary sites (n = 34) and enhanced quaternary sites (n = 49) recorded key attributes of vegetation structure and composition to assist in verifying the certified RE and high-value regrowth mapping within the study area. Wet and dry season flora survey site locations are shown in Figures 2a-c.

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).

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.

Traverses

In addition to the CORVEG assessment sites, specific areas of vegetation in the study area were traversed on foot and the random meander technique (Cropper 1993) applied. The random meander technique is a widely accepted method to survey for threatened flora species that may not occur in surveyed plots. It involves traversing sections of the study area and recording vegetation type and vascular flora species along each traverse. The purpose of this type of assessment was to ensure adequate site coverage and to establish a comprehensive floral species list for the study area.

2.2.4 Field Survey Constraints

Wet Season Field Survey

As a consequence of a prolonged and extensive wet season many sites within the study area were inaccessible. Field survey sites were largely confined to areas near gazetted roads or all-weather tracks with a few sites accessed by foot.

Dry Season Field Survey

Landholder consent was not gained for access onto some properties within the study area during the dry season survey period. Final location of field survey sites was largely constrained by ease of access with a few sites accessed by foot.

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 and a plus sign ($^{+}$) indicates a non-indigenous native species. The description of REs follows that of the Regional Ecosystem Description Database (REDD, Version 6.0b (Department of Environment and Resource Management, 2011)).

2.4 Coordinate System and Map Datum

Positional data was collected with a handheld Garmin eTrex 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.

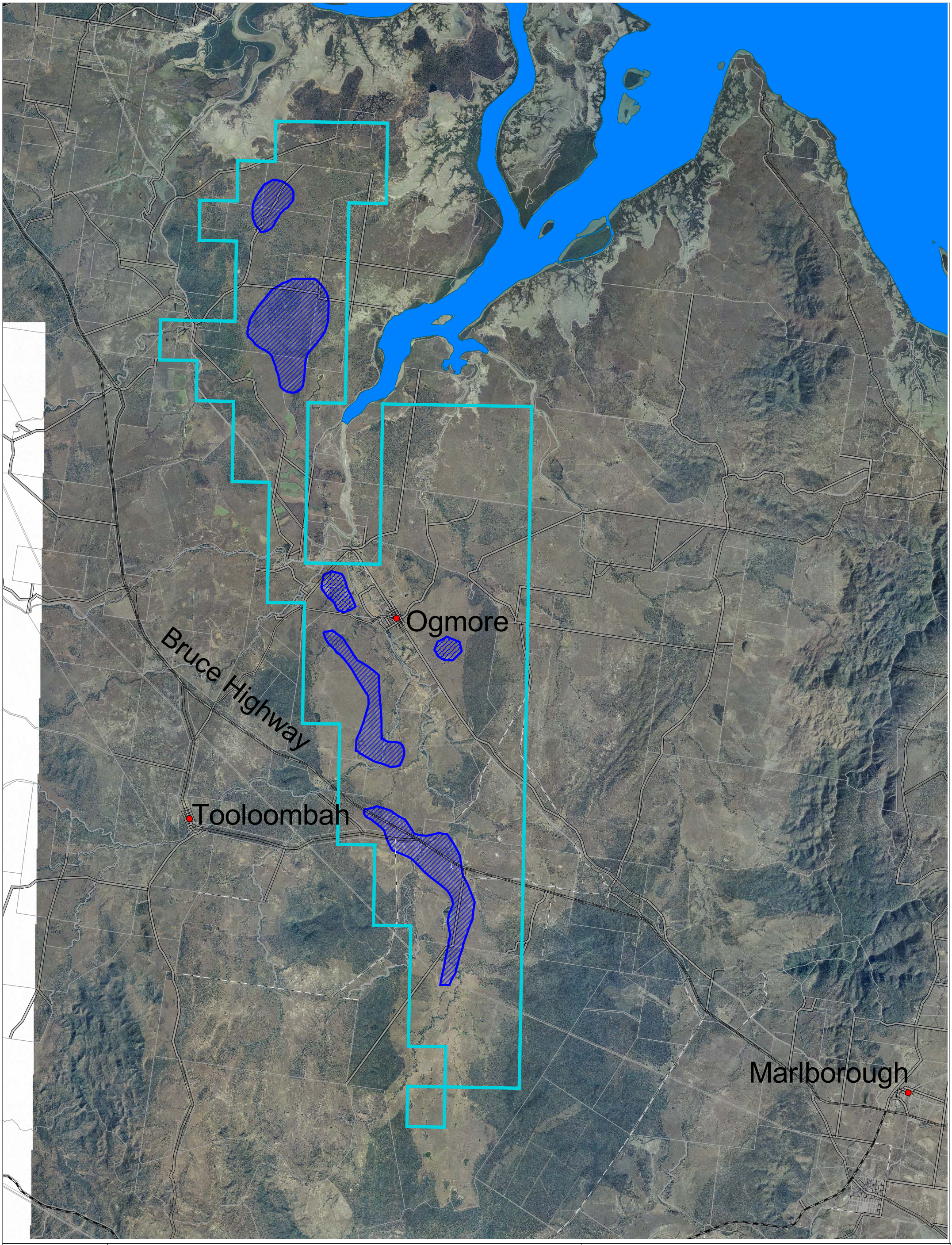

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Figure 1
Location of EPC1029

Styx Coal Project
Flora and Vegetation Survey

N
W E
S

2 0 2 4 6 8
Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

Legend

- Town
- EPC1029
- Extraction Areas

3 Existing Environmental Values

The study area falls between the population centres of Marlborough and Saint Lawrence and is centred on the township of Ogmore, approximately 140 km north-west of Rockhampton. The study area falls in both the Rockhampton and Isaac Regional Council local government areas and lies entirely in the Fitzroy Natural Resource Management region. Six potential extraction areas have been identified within the EPC extent totalling some 34.6 km² in area.

3.1 Climate

The climate of the region can be described as dry tropical. The study area generally falls between the 800 mm and 1000 mm rainfall isohyets. Climate records for the closest Bureau of Meteorology station to the study area (St Lawrence Post Office – 33065) indicates a mean annual rainfall of 1016.7 mm, 83% of which falls in the summer half year of October through to March.

3.2 Geology and Geomorphology

Geology mapping covering the EPC1029 area (Marlborough and St Lawrence 1:100,000 sheets) indicates that eleven distinct geologies occur across the study area (Table 1).

Table 1 Major geologies occurring in the study area.

Map Code	Age	Description	Area (ha)
Qa	Quaternary	Alluvium comprising clay, silt, sand and gravel, floodplain alluvium associated with active stream channels and terraces	7748.58
Qr,Qf>Kx	Quaternary	Clay, silt, sand, gravel and soil: colluvial and residual deposits	398.37
Qhe/m	Holocene	Mud, sandy mud, muddy sand and minor gravel on estuarine channels and banks, supratidal flats and coastal grasslands	1037.48
Qhe/s	Holocene	Sand, muddy sand, mud and minor gravel; estuarine channels and intertidal sand banks and flats	58.76
Qpa	Pleistocene	Clay, silt, sand and gravel, floodplain alluvium on high terraces	12223.18
TQr>Kx	Late Tertiary – Quaternary	Clay, silt, sand, gravel and soil; colluvial and residual deposits (generally on older land surfaces)	4860.9
Ta	Tertiary	White to buff, sandy claystone, poorly sorted, clayey labile sandstone, local unsorted granule to boulder gravel beds; deeply weathered with ferruginous zones; old alluvium and minor colluvial deposits; locally some interbedded basalt	300.21
Td	Tertiary	Duricrusted palaeosols at the top of deep weathering profiles, including ferricrete and silcrete;	100.14

Map Code	Age	Description	Area (ha)
		duricrusted old land surfaces	
Kx	Early Cretaceous	Quartzose sandstone, green lithic sandstone, mudstone, conglomerate, carbonaceous shale and coal (Styx Coal Measures)	2414.59
Pb	Late Permian	Predominantly massive, cleaved mudstone and siltstone (commonly with concretions), minor lithic sandstone (Back Creek Group)	4416.72
Pbm	Late Permian	Lithic sandstone, siltstone, mudstone, rare conglomerate (Boomer Formation)	633.28

The landform across the study area can be described as gently undulating. Elevation across the study area ranges from approximately 3 m to 120 m above sea level. Mount Bison and Mount Mamelon occur towards the southwest corner of the study area.

The study area falls entirely in the Styx River catchment. The major watercourses of Barrack Creek, Bridge Creek, Brumby Creek, Brussels Creek, Deep Creek, Granite Creek, Montrose Creek, Stockyard Creek, Stoodleigh Creek, Tooloombah Creek, and the Styx River 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.

3.3 Soils

Soils in the study area reflect its complex alluvial geomorphology. With the exception of small areas in the foothills of Mount Bison and Mount Mamelon, the soils are derived from deep regolith of sediments and alluvium overlying the base geology across the study area. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Australian Soil and Resources Information System (CSIRO Land and Water, 2009) has mapped the dominant sediments and alluvium as a complex combination of Sodosols, Vertosols and Kandosols. These soil types are generally considered to be imperfectly drained, often of high clay content, and are associated with floodplains, areas of alluvium near rivers/creeks and flat to very gently undulating topography. Major soil types occurring in the study area based on CSIRO soils mapping prepared at 1:2,000,000 scale are listed in Table 2.

Water may persist in the landscape for a significant period after rainfall owing to the flat to gently undulating topography. As a result of this ponding and the particular characteristics of certain soils (cracking clay soils) gilgai (or 'melon holes') may form. Gilgai is the name given to the small water bodies formed as a result of certain clay soil types swelling and shrinking creating depressions and mounds in these locations. The majority of the gilgai formations in the study area are on soils characterised as cracking clays (primarily Vertosols) and are highly elastic in nature with extensive shrinkage and expansive characteristics that vary with moisture content.

Table 2 Major soils occurring in the study area.

Soil Map Unit	Description and General Characteristics	Area (ha)
CC32	Gently undulating or level plains, often with slight to moderate gilgai microrelief: dominant soils are deep grey clays (Ug5.24 and Ug5.25) with lesser deep brown clays (Ug5.34). Closely associated are fairly	9678.3

Soil Map Unit	Description and General Characteristics	Area (ha)
	extensive areas of loamy duplex soils, chiefly (Dy2.33). Other soils occurring include friable brown clays (Uf6.34).	
Mw26	Strongly undulating lands with some high narrow ridges, low dissected mesas, and steep-scarped low cuestas: dominant soils are deep sandy red earths (Gn2.14) that are occasionally gravelly. On higher more dissected landscape sites are shallow stony loams (Um1.43), and lower flatter slopes mostly have deep sandy-surfaced duplex soils (Dy3.42) and (Dy5.42).	1996.6
NN2	Level alluvial marine plains adjacent to tidal flats; the unit may be inundated for short periods by flood waters and partly by very high tides: dominant soils are massive heavy clays (Ug5.4) with closely associated (Ug5.5), (Uf6.41), (Uf6.42), (Uf6.32), and (Uf6.33); thin-surfaced loamy duplex soils (Dd2.13) and (Dd2.33); and similar (Dd1) and (Dy2) soils. Small areas of self-mulching clays (Ug5.16) and (Ug5.24) occur in lower sites and in slight gilgai depressions. At their coastal margins the marine plains merge into salt pans with (Uf6.61) and other undescribed saline soils. These also occur adjacent to the many small tidal channels that dissect the marine plains. At the inland margins the unit grades to loamy duplex soils (Dy3.43).	1234.1
Sh1	Moderate to gently undulating lands with some small level gilgaied plains: dominant are sandy to loamy duplex soils with moderately deep A horizons overlying grey clay (Dy2.32). Closely associated are small level plains with grey and brown clays (Ug5.24), (Ug5.25), and (Ug5.34) that are moderately to strongly gilgaied. Also occurring are small levees adjacent to drainage lines with sandy earth soils (Gn2.14), (Gn2.42), and (Gn2.45).	1930.6
Ub86	Undulating lands with some isolated low hilly areas: dominant are loamy or occasionally sandy duplex soils of moderate to shallow depth; on higher landscape sites the soils are usually stony. The chief form is (Dy3.42) with (Dy3.41) and less often (Dy3.43), (Dy3.33), and (Dy3.32). Similar (Dy2) soils are associated and on the low hills are shallow stony loams (Um1.42) and (Um2.12).	63.9
Ub89	Moderate to strongly undulating lands with occasional low hilly areas: dominant are shallow loamy duplex soils (Dy3.42) and (Dy3.32) but with (Dy3.43), (Dy3.33), and similar (Dy2) soils also common. A prominent gravelly stone line is often present at the base of the A horizons. Higher ridges and low hilly areas have very shallow stony similar duplex soils and also some occurrences of (Dr2.12), (Db1.12), (Db1.22), (Um1.43), and (Um2.12).	5935.2
Va47	Level or very gently undulating alluvial plains rising slowly to undulating low foothills: dominant soils have fine sandy or loamy A horizons overlying strongly mottled clay (Dy3.43). Closely associated are (Dy3.42 and Dy3.41) and (Dy3.33 and Dy3.32). Similar (Dy2) soils may also occur. The surface of lower swampy areas has a prominent irregular trench gilgai microrelief. Slightly higher old stream levees traversing the plains have coarser-textured gradational soils	6153.5

Soil Map Unit	Description and General Characteristics	Area (ha)
	(Gn3.24), (Gn2.44), and (Gn2.71) or occasional brown duplex soils (Db1.22). On the undulating marginal foothills shallow often stony loamy duplex soils occur, chiefly (Dy3.42 and Dy3.41). Where the unit is adjacent to the coast the (Dy3) soils merge into salt pans (eroded (Dy3.43) soils), mangrove swamps, or less commonly marine plains (unit NN2).	
Vd3	Gently undulating slightly elevated plains with a slight gilgai microrelief: dominant soils have loamy A horizons. The chief form is (Dy3.33), rarely (Dy3.43). These duplex soils occur on level sites, most puffs, and all depressions; in the latter, A horizons are at the deep end of the range. Occasionally on some better-defined puffs grey clays (Ug5.24) occur.	8200.0

3.4 Desktop Assessment

3.4.1 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 11.3.25. The first number, 11, indicates the bioregion which the RE is located within, in this case the Brigalow Belt 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, 25, is the ecosystem number and relates to the dominant vegetation, in this case *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.

The Queensland Herbarium, which is part of the DERM, 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 DERM 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'.

Bioregion and Subregion

The study area occurs within the Brigalow Belt bioregion. The Brigalow Belt bioregion covers a total area of 135,500 km² and includes coastal areas, rugged ranges and alluvial plains. Dominant vegetation communities include open forests (dominated by *Acacia harpophylla*, *A. argyrodendron*, *A. cambagei*, *A. shirleyi*, *A. catenulata*, *Eucalyptus cambageana*, *E. camaldulensis*, *E. tereticornis*), woodlands (dominated by *Eucalyptus melanophloia*, *E. crebra*, *E. populnea*, *E. brownii*, *E. persistens*, *E. orgadophila*, *E. coolabah*, *E. camaldulensis*, *E. tereticornis*) and small patches of semi-evergreen vine thicket (Young *et al*., 1999).

The Brigalow Belt bioregion supports a range of flora and fauna including a number of threatened species. Regional biodiversity within the Brigalow Belt bioregion is under threat from historic and continued land clearing for grazing, dryland agriculture and mining. Broadscale clearing is particularly pronounced in lowland landscapes, and those formed on shales, while the more rugged topography associated with the sandstone and metamorphic ranges is relatively undisturbed (Young *et al*., 1999).

The majority of the study area occurs in the Marlborough Plains subregion (BRB14) of the Brigalow Belt bioregion. To a lesser extent and towards the southern part of the EPC1029 area, the study area falls in the Nebo-Connors Ranges (BRB12) and the Boomer Range (BRB17) subregions. The

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[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

[4] 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

Marlborough Plains subregion is a characteristically undulating to hilly subregion with a complex geology. The subregion is dominated by alluvial plains and colluvial slopes, usually supporting woodlands characterised by poplar gum (*Eucalyptus platyphylla*), ghost gum (*Corymbia dallachiana*), forest red gum (*Eucalyptus tereticornis*) and tea-tree (*Melaleuca* spp.) with low rises supporting narrow-leaved ironbark (*Eucalyptus crebra*). There are also extensive saline coastal littoral communities (Young *et al.,* 1999).

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. Seven 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
1	Quaternary estuarine and marine deposits subject to periodic inundation by saline or brackish marine waters. Includes mangroves, saltpans, off-shore tidal flats and tidal beaches. Soils are predominantly Hydrosols (saline muds, clays and sands) or beach sand	Qhe/m, Qhe/s
3	Quaternary alluvial systems, including floodplains, alluvial plains, alluvial fans, terraces, levees, swamps, channels, closed depressions and fine textured palaeo-estuarine deposits. Also includes estuarine plains currently under fresh water influence, inland lakes and associated dune systems (lunettes). Excludes talus slopes, colluvial deposits and pediments. Includes a diverse range of soils, predominantly Vertosols and Sodosols, also with Hydrosols in higher rainfall areas.	Qa
4	Cainozoic clay deposits, usually forming level to gently undulating plains above current alluvial systems. Excludes clay plains and downs formed in-situ on bedrock. Mainly Vertosols with gilgai microrelief, but includes small areas of thin sandy or loamy surfaced Sodosols and Chromosols.	Qpa
5	Extensive, uniform near level or gently undulating Cainozoic 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 deep soils usually overlying duricrust. Excludes Quaternary alluvial deposits (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.	TQr>Kx, Ta, Td
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.	Ta, Td

Land zone	Description	Associated geology
	Soils are usually shallow Rudosols and Tenosols, with minor Sodosols and Chromosols on associated pediments, and shallow Kandosols on plateau margins and larger mesas.	
10	Medium to coarse-grained sedimentary rocks, with little or no deformation, forming plateaus, ledges and scarps. Includes siliceous 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.	Kx
11	Metamorphosed rocks, forming ranges, hills and lowlands. Primarily lower Permian and older sedimentary formations which are generally moderately to strongly deformed. Includes low- to high-grade and contact metamorphics such as phyllites, slates, gneisses of indeterminate origin and serpentinite, and interbedded volcanics. Soils are mainly shallow, gravelly Rudosols and Tenosols, with Sodosols and Chromosols on lower slopes and gently undulating areas. Soils are typically of low to moderate fertility.	Pb, Pbm

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 in the study area are described in Table 4 with a comparison of their remnant (as of 2006) and pre-clearing extent. Version 6.0b of the certified RE mapping has approximately 89.4 km^2 of remnant vegetation of 18 REs mapped across the study area. Figures 2a-c illustrate the extent of the remnant RE areas mapped within the study area (areas of RE mapped outside the study area are not shown on these figures but are indicated in the extract of the certified RE mapping appearing in Appendix A).

Of the 18 mapped remnant REs, two have been classed as Endangered, four have 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 DERM 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.

Approximately 694.7 ha of mapped remnant RE occur within the proposed extraction areas. This includes 66.8 ha of 11.1.2 (VM Act Class: Least Concern), 47 ha of 11.3.25 (VM Act Class: Least Concern), 569 ha of 11.4.2 (VM Act Class: Of Concern) and 11.8 ha of 11.4.9 (VM Act Class: Endangered).

w18
w28
w27
d39
d38
d37
d36
w26
w19
d52
d53
d55
d57
d56
d58
d54
d48
d49
d50

OBERONIA
Botanical Services

Figure 2a
RE (v6.0b) & HVR (v2.0)
Northern Section

Styx Coal Project
Flora and Vegetation Survey

N
W E
S

1000 0 1000 2000
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

Legend

Sites
- Dry - Secondary
- Dry - Tertiary
- Dry - Quaternary
- Wet - Secondary
- Wet - Tertiary
- Wet - Quaternary
- EPC1029
- Extraction Area
- Cadastre

HVR (v2.0)
- Containing Endangered REs
- Containing Of Concern REs
- Is a Least Concern RE

RE (v6.0b)
- Endangered (dom)
- Endangered (subdom)
- Of Concern (dom)
- Of Concern (subdom)
- Least Concern

d51 d48 d49 d50 w06 w07 w21 w08 d35 w05 w09 d34 d33 w20 w04 w31 w11 w13 w14 w12 OGMORE w29 w30 d21 d22 d23 w10 w03 d13 d14 d03 d12 d02 d15 d16 d20 d01 w15 d17 d09 d19 d10 d08 d06 d11 d05 d04 d40 d45 d41 w25 w01 w02 w17 w16 OOMBAH NORTH COAST RAI

OBERONIA Botanical Services

Figure 2b
RE (v6.0b) & HVR (v2.0)
Central Section

Styx Coal Project
Flora and Vegetation Survey

N W E S

1000 0 1000 2000
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

Legend

Sites
- Dry - Secondary
- Dry - Tertiary
- Dry - Quaternary
- Wet - Secondary
- Wet - Tertiary
- Wet - Quaternary
- EPC1029
- Extraction Area
- Cadastre

HVR (v2.0)
- Containing Endangered REs
- Containing Of Concern REs
- Is a Least Concern RE

RE (v6.0b)
- Endangered (dom)
- Endangered (subdom)
- Of Concern (dom)
- Of Concern (subdom)
- Least Concern

d21 d22 d23 d13 d14 d03 d12 d02 d01 w15 d15 d16 d20 d17 d09 d19 d10 d08 d06 d11 d05 d04 d40 d45 d41 w10 w03 w17 w01 w02 w25 w16 NORTH COAST RAILWAY BRUCE HIGHWAY d42 d32 d31 d29 d30 d27 d28 d26 d24 d25 w24 w23 w22

Figure 2c
RE (v6.0b) & HVR (v2.0)
Southern Section

Styx Coal Project
Flora and Vegetation Survey

OBERONIA Botanical Services

N W E S

1000 0 1000 2000
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

Legend

Sites
- Dry - Secondary
- Dry - Tertiary
- Dry - Quaternary
- Wet - Secondary
- Wet - Tertiary
- Wet - Quaternary
- EPC1029
- Extraction Area
- Cadastre

HVR (v2.0)
- Containing Endangered REs
- Containing Of Concern REs
- Is a Least Concern RE

RE (v6.0b)
- Endangered (dom)
- Endangered (subdom)
- Of Concern (dom)
- Of Concern (subdom)
- Least Concern

Table 4 Remnant REs mapped from EPC1029. Descriptions as per the Regional Ecosystem Description Database (Queensland Herbarium, 2011).

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
11.1.2/11.1.1	11.1.2	Samphire forbland or bare mud-flats on Quaternary estuarine deposits. Mainly saltpans and mudflats with clumps of saltbush including one or several of the following species; *Tecticornia* spp. (e.g. *Tecticornia indica* subsp. *julacea*, *Tecticornia indica* subsp. *leiostachya*), *Sesuvium portulacastrum*, *Sarcocornia quinqueflora* subsp. *quinqueflora*, *Suaeda australis*, *S. arbusculoides*, *Tecticornia australasica*, *Salsola kali*, algal crusts and the grass *Sporobolus virginicus*. Sedges are also common. Occurs on supratidal flats with deep saline clay soils and formed from Quaternary estuarine sediments. Occurs along the landward edge of the intertidal zone in a hypersaline environment that is only inundated by the highest spring tides. Soils are grey mottled clays with a crusting surface, and are highly saline. (BVG1M: 35b)	Least Concern	No Concern at Present	7.21	3.832
	11.1.1	*Sporobolus virginicus* grassland on Quaternary estuarine deposits. *Sporobolus* spp. usually dominates pure stands although a wide range of other species may be present as scattered individuals including *Fimbristylis ferruginea*, *Cyperus victoriensis*, *C. scariosus*, and sometimes *Eleocharis spiralis*, *Mnesithea rottboellioides*, *Marsilea mutica*, *Cynanchum carnosum*, *Ischaemum australe*, *Cyperus polystachyos*, *Ceratopteris thalictroides* and *Leptochloa fusca*. Occasional emergent stunted mangroves, usually *Avicennia marina* or *Ceriops tagal*, may occur as isolated individuals or along small channels. There may also be a minor presence of salt-tolerant forbs such as *Suaeda*	Least Concern	No Concern at Present		

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
		australis, *S. arbusculoides*, *Sarcocornia quinqueflora* subsp. *quinqueflora* or *Tecticornia australasica*. Occurs on supratidal flats which are often only inundated by highest spring tides. Often occurs on the landward side of intertidal flats; seaward margins irregularly inundated with tidal waters and dissected by small tidal channels. Formed from Quaternary estuarine sediments with deep grey or black and grey saline cracking clays with occasional mottling, minor gilgai occasionally present. (BVG1M: 35b)				
11.1.2		Samphire forbland on marine clay plains	Least Concern	No Concern at Present	1068.944	1068.905
11.1.2/11.1.4	11.1.2	Samphire forbland on marine clay plains	Least Concern	No Concern at Present	88.039	88.038
	11.1.4	Mangrove low forest on Quaternary estuarine deposits. Low open-shrubland to closed forest of mangrove species forming a variety of associations, depending on position in relation to salt water inundation. *Avicennia marina* is the most common dominant but also other trees such as *Aegiceras corniculatum*, *Rhizophora* spp. and *Ceriops tagal* dominate often in pure stands. There is often a shrub layer consisting of juvenile plants of the above species. Other species such as *Excoecaria agallocha*, *Bruguiera* spp., *Lumnitzera racemosa* and *Alchornea ilicifolia* may also occur. Occurs on intertidal flats which are often dissected by tidal streams. Soils are usually deep saline clays. (BVG1M: 35a)	Least Concern	No Concern at Present		
11.1.3		Sedgelands to grasslands on Quaternary estuarine deposits. Sedgeland dominated by a range of sedges and grasses which include *Eleocharis philippinensis*, *Cyperus alopecuroides*,	Of Concern	Of Concern	19.354	19.317

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
		C. scariosus and *C. iria* and the grasses *Sporobolus virginicus* and *Paspalum vaginatum*. Other typical species in shallower margins include *Fimbristylis ferruginea*, *Phyla nodiflora* and *Cyperus polystachyos* var. *polystachyos*. Occasional twiners such as *Cynanchum carnosum* may be present. Occurs in depressions on Quaternary estuarine deposits which are brackish to saline. These are may be seasonally inundated with fresh water, but dry out completely before the next season's rain. (BVG1M: 34c)				
11.3.1		Open-forest dominated by *Acacia harpophylla* and/or *Casuarina cristata* (particularly in southern parts), with or without scattered emergent *Eucalyptus* spp. such as *E. coolabah*, *E. largiflorens*, *E. populnea*, *E. orgadophila*, and *E. woollsiana*. A low tree layer dominated by *Geijera parviflora* and *Eremophila mitchellii* is usually present. The vegetation sometimes occurs as low open-forest or woodland. Tree height generally about 11-15m and the low tree (to tall shrub) understorey layer is between 2 and 8m high (where present). Ground cover is generally sparse. Associated with Cainozoic alluvial plains which may be occasionally flooded. Landforms range from level to very gently sloping plains, alluvial flats, drainage floors, back-swamps and abandoned channels. Associated soils are predominantly deep to very deep cracking clays, sometimes with gilgai or texture contrast soils with sandy surface (particularly where Eucalyptus populnea is present). (BVG1M: 25a)	Endangered	Endangered	405.463	2.688
11.3.4		*Eucalyptus tereticornis* woodland to open-forest. Other tree species that may be present and locally dominant include *E. camaldulensis*, *Corymbia*	Of Concern	Of Concern	1927.78	121.374

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
		tessellaris, *E. coolabah*, *C. clarksoniana*, *E. populnea* or *E. brownii*, *E. melanophloia*, *E. platyphylla* or *Angophora floribunda*. *E. crebra* and *Lophostemon suaveolens* may be locally dominant (subregion 14). A shrub layer is usually absent, and a tall grassy ground layer is often prominent, and may include any of *Bothriochloa bladhii* subsp. *bladhii*, *Aristida* spp., *Heteropogon contortus*, *Dichanthium* spp. and *Themeda triandra*. Heavily grazed areas tend to have shorter or annual grasses such as *Dactyloctenium radulans* or *Bothriochloa* spp. Occurs on Cainozoic alluvial plains and terraces. Occurs on variety of soils, including deep cracking clays, medium to fine textured soils, and deep texture-contrast soils. (BVG1M: 16c)				
11.3.11		Semi-evergreen vine thicket or semi-deciduous notophyll rainforest, frequently with emergent *Eucalyptus tereticornis* or *E. raveretiana*. Common species include *Diospyros humilis*, *D. geminata*, *Brachychiton australis*, *B. rupestris*, *Geijera salicifolia*, *Lysiphyllum* spp., *Mallotus philippensis* and *Streblus brunonianus*. Occasional shrubs such as *Carissa ovata* may be present. Forbs such as *Nyssanthes* spp. may also be present. Occurs on Cainozoic alluvial plains. (BVG1M: 7a)	Endangered	Endangered	116.693	0
11.3.25		*Eucalyptus camaldulensis* or *E. tereticornis* open-forest to woodland. Other tree species such as *Casuarina cunninghamiana*, *E. coolabah*, *Melaleuca bracteata*, *Melaleuca viminalis*, *Livistona* spp. (in north), *Melaleuca* spp. and *Angophora floribunda* are commonly present and may be locally dominant. An open to sparse, tall shrub layer is frequently present dominated by	Least Concern	Of Concern	824.074	776.29

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
		species including *Acacia salicina*, *A. stenophylla* or *Lysiphyllum carronii*. Low shrubs are present, but rarely form a conspicuous layer. The ground layer is open to sparse and dominated by perennial grasses, sedges or forbs such as *Imperata cylindrica*, *Bothriochloa bladhii*, *B. ewartiana*, *Chrysopogon fallax*, *Cyperus dactylotes*, *C. difformis*, *C. exaltatus*, *C. gracilis*, *C. iria*, *C. rigidellus*, *C. victoriensis*, *Dichanthium sericeum*, *Leptochloa digitata*, *Lomandra longifolia* or *Panicum* spp. Occurs on fringing levees and banks of major rivers and drainage lines of alluvial plains throughout the region. Soils are very deep, alluvial, grey and brown cracking clays with or without some texture contrast. These are usually moderately deep to deep, soft or firm, acid, neutral or alkaline brown sands, loams or black cracking or non-cracking clays, and may be sodic at depth. (BVG1M: 16a)				
11.3.29		*Eucalyptus crebra*, *E. exserta*, *Corymbia dallachiana*, *C. intermedia* woodland usually with a low tree understorey of *Melaleuca viridiflora* and *M. nervosa*. Occurs on broad plains and fans formed from Quaternary alluvium. Usually associated with bleached sodic duplex soils. (BVG1M: 18b)	Least Concern	No Concern at Present	115.983	33.272
11.4.2		*Eucalyptus populnea*/*E. brownii* or *E. melanophloia* +/- *Corymbia dallachiana* +/- *C. tessellaris* +/- *E. crebra* +/- *E. platyphylla* woodland. Occurs on Cainozoic clay plains, often on rises or patches of coarser textured material. Cracking clay and texture contrast soils. (BVG1M: 17a)	Of Concern	Of Concern	14576.43	3768.604

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
11.4.9		Open-forest, occasionally woodland, dominated by *Acacia harpophylla* usually with a low tree mid-storey of *Terminalia oblongata* and *Eremophila mitchellii* . *Casuarina cristata* sometimes replaces *Acacia harpophylla* in the overstorey and *Lysiphyllum cunninghamii* sometimes co-dominates. Other low tree or shrub species such as *Alectryon diversifolius*, *Carissa ovata*, *Pittosporum spinescens*, *Ehretia membranifolia*, *Geijera parviflora* and *Flindersia dissosperma* may occur in the mid-storey or low shrub layer. *Acacia harpophylla* trees have been recorded as 11- 17m high, the mid-storey layer 2- 8m high and the low shrub layer 1-2m high. Occurs on level to gently undulating Cainozoic plains, including weathered basalt. Associated soils are predominantly moderately deep to deep cracking clays that may be brown, red-brown or grey-brown, and with much surface gravel in some areas. (BVG1M: 25a)	Endangered	Endangered	8451.144	160.638
11.4.9/11.3.1	11.4.9	*Acacia harpophylla* shrubby open-forest to woodland with *Terminalia oblongata* on Cainozoic clay plains	Endangered	Endangered	179.451	23.989
	11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open-forest on alluvial plains	Endangered	Endangered		
11.5.8		Mosaic of *Melaleuca viridiflora* and/or *M. nervosa* woodland and *Eucalyptus crebra*, *Corymbia intermedia*, *E. latisinensis* and *Lophostemon suaveolens* woodland. Occurs on gently undulating plains and rises formed from unconsolidated course and medium textured Cainozoic sediments. Associated soils are yellow and brown duplex or yellow and red gradational.	Least Concern	No Concern at Present	56.601	56.601

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
		(BVG1M: 21a)				
11.5.8/11.7.2	11.5.8	*Melaleuca* spp., *Eucalyptus crebra*, *Corymbia intermedia* woodland on Cainozoic sandplains/remnant surfaces	Least Concern	No Concern at Present	1639.994	816.148
	11.7.2	Monospecific stands of *Acacia* spp. forest/woodland on Cainozoic lateritic duricrusts. *Acacia shirleyi* and or *Acacia catenulata* usually predominate the woodland to low woodland to low open-forest tree canopy (7-12m high). Other *Acacia* spp. that commonly occur and occasionally dominate the tree layer include *A. rhodoxylon*, *A. burrowii*, *A. sparsiflora*, *A. crassa* and *A. blakei*. Emergent eucalypt species such as *Eucalyptus thozetiana*, *E. crebra*, *E. decorticans* and *E. exserta* may be present. A low shrub layer is sometimes present and dominated by species such as *Acalypha eremorum*, *Croton phebalioides* and *Carissa ovata*. The ground layer is extremely sparse and dominated by grasses such as *Aristida caput-medusae*, *Paspalidium rarum*, and *Urochloa foliosa*. Forbs are usually rare although *Sida filiformis* may be conspicuous. Occurs on scarps and adjacent tops and slopes of dissected tablelands, mesas and buttes formed from chemically altered sediments and duricrusts. The soils are shallow to very shallow lithosols with surface stone and boulders. The vegetation is often growing in pockets of shallow lithosol soil between bare rock. (BVG1M: 24a)	Least Concern	No Concern at Present		
11.5.9		*Eucalyptus crebra* and/or *Eucalyptus melanophloia* woodland. Other tree species that may be present and locally dominant include *Corymbia citriodora* or *C. clarksoniana* sometimes in association with *C. intermedia*, *C. dallachiana*,	Least Concern	No Concern at Present	467.524	296.056

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
		C. lamprophylla, *E. tenuipes*, *E. exserta*, *E. cloeziana*, *E. acmenoides*. The mid layer ranges from absent to a sparse to dense shrubland typically dominated by *Acacia* spp. (such as *A. excelsa*, *A. leiocalyx*), *Petalostigma pubescens*, *Lysicarpus angustifolius*, *Alphitonia excelsa* and occasionally *Melaleuca nervosa* (on texture contrast soils). Occurs on plateaus and broad crests of hills and ranges which are formed by Cainozoic sandplains. Soils are generally deep red earths. (BVG1M: 18b)				
11.7.2		*Acacia* spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone	Least Concern	No Concern at Present	4.057	4.057
11.7.2/11.5.9	11.7.2	*Acacia* spp. woodland on Cainozoic lateritic duricrust. Scarp retreat zone	Least Concern	No Concern at Present	175.881	156.023
	11.5.9	*Eucalyptus crebra* and other *Eucalyptus* spp. and *Corymbia* spp. woodland on Cainozoic sandplains/remnant surfaces.	Least Concern	No Concern at Present		
11.10.7		*Eucalyptus crebra* and/or *E. melanophloia* +/- *E. populnea* shrubby woodland. *Eucalyptus melanophloia* and/or *E. crebra* predominate and form a distinct but open canopy. *E. populnea* is commonly present and may be locally dominant particularly on lower slopes. A low tree to tall shrub layer usually dominated by a range of species including *Eremophila mitchellii*, *Acacia decora*, *A. longispicata* spp. *longispicata* and *A. excelsa* is present. A low shrub layer with *Petalostigma pubescens* and other species is formed in places. The ground layer is variable in cover and composition, but composed mainly of grasses. Occurs on the lower slopes of scarp	Least Concern	No Concern at Present	104.023	77.272

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
		retreats, associated with dissected tablelands. Associated soils are generally moderately deep, acidic, sandy, yellow earths and sandy-surfaced texture contrast soils formed from medium to coarse-grained sediments. (BVG1M: 12a)				
11.10.7/11.10.1	11.10.7	*Eucalyptus crebra* woodland on coarse-grained sedimentary rocks	Least Concern	No Concern at Present	172.012	139.974
	11.10.1	*Corymbia citriodora* open-forest on coarse-grained sedimentary rocks	Least Concern	No Concern at Present		
11.11.1		*Eucalyptus crebra* woodland or tall woodland, often with *Acacia rhodoxylon*. Other species that may be present include *Corymbia citriodora*, *C. leichhardtii*, *E. melanophloia*, *C. erythrophloia*, *C. clarksoniana*, *E. fibrosa* subsp. *fibrosa* (subregion 18) and *E. moluccana* on lower slopes (subregions 14, 17, 18). *Macrozamia* spp. sometimes present in shrub layer. *Lophostemon grandiflorus* occurs in gullies within this regional ecosystem in the north of the bioregion. Occurs mainly on sub-coastal hills and ranges formed on moderately to strongly deformed and metamorphosed sediments and interbedded volcanics. (BVG1M: 13c)	Least Concern	No Concern at Present	1343.142	881.758
11.11.10/11.11.1	11.11.10	*Eucalyptus melanophloia* +/- *E. crebra* +/- *Corymbia dallachiana* +/- *C. erythrophloia* grassy or occasionally shrubby woodland or low woodland. Occurs on moderately to strongly deformed and metamorphosed sediments and Permian sediments. (BVG1M: 17b)	Of Concern	Of Concern	2.686	1.841
	11.11.1	*Eucalyptus crebra* +/- *Acacia rhodoxylon* woodland on old sedimentary rocks with varying	Least Concern	No Concern at Present		

Mapped RE	RE	Description	VM Act Class	Biodiversity Status	Pre-clear Extent (ha)	2006 Extent (ha)
		degrees of metamorphism and folding				
11.11.10/11.11.15	11.11.10	*Eucalyptus melanophloia* woodland on deformed and metamorphosed sediments and interbedded volcanics	Of Concern	Of Concern	277.068	150.391
	11.11.15	*Eucalyptus crebra* +/- *Corymbia erythrophloia* +/- *E. populnea* +/- *E. melanophloia* +/- *C. tessellaris* +/- *C. clarksoniana* woodland often with a shrubby layer. *Eucalyptus exserta* and *E. platyphylla* present in central coastal part of bioregion. Occurs on undulating rises and low hills, often with distinct strike pattern formed on moderately to strongly deformed and metamorphosed sediments and interbedded volcanics and Permian sediments. (BVG1M: 13c)	Least Concern	No Concern at Present		
11.11.15		*Eucalyptus crebra* woodland on deformed and metamorphosed sediments and interbedded volcanics.	Least Concern	No Concern at Present	2097.895	289.067
11.11.15/11.4.9	11.11.15	*Eucalyptus crebra* woodland on deformed and metamorphosed sediments and interbedded volcanics.	Least Concern	No Concern at Present	52.776	7.539
	11.4.9	*Acacia harpophylla* shrubby open-forest to woodland with *Terminalia oblongata* on Cainozoic clay plains	Endangered	Endangered		
Non-remnant						25230.55
Total						**34174.224**

3.4.2 Regulated Regrowth Vegetation

In October 2009, the Queensland Government introduced new 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 now 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 (DERM, 2009). Regrowth watercourse vegetation is all native woody vegetation that is located within 50 m of identified regrowth watercourses in priority reef catchment areas.

The DERM High Value Regrowth Vegetation mapping (Version 2) was obtained for the study area (Appendix B). Approximately 1385 ha of the study area are mapped as supporting high value regrowth (Figures 2a-c). This includes 383 ha of regrowth containing Endangered RE, 538 ha of regrowth containing Of Concern RE and 464 ha of regrowth containing Least Concern RE. Neither regrowth watercourses nor regrowth essential habitat are mapped as occurring in the study area.

Approximately 32.8 ha of mapped high vale regrowth vegetation occur within the proposed extraction areas. This includes 27.78 ha of regrowth containing Endangered RE, 5.04 ha of regrowth containing Of Concern RE and 0.002 ha of regrowth containing Least Concern RE.

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. DERM 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 DERM website).

3.4.3 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 EPBC Act.

Based on the EPBC Protected Matters Search Tool (Appendix C) three endangered TECs may occur within the study area, these being:

- Brigalow (*Acacia harpophylla* dominant and co-dominant);
- Natural grasslands of the Queensland Central Highlands and the northern Fitzroy; and
- Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions.

In Queensland, TECs are linked to certain REs which are identified in the listing advice of each TEC. Brigalow (*Acacia harpophylla* dominant and co-dominant) threatened ecological communities are mapped within and adjacent the study area as comprising REs 11.3.1 and 11.4.9. The total extent of these communities within the study area (as mapped in v6.0b of the certified RE mapping) is approximately 195 ha. Approximately 11.8 ha of RE 11.4.9 occur within the proposed extraction areas. According to v6.0b of the certified RE mapping no remnant natural grasslands or semi-evergreen vine thickets are mapped from the study area. However, field surveys identified areas of the semi-evergreen vine thicket from the study area as well as confirming the presence of the Brigalow TEC.

Brigalow (*Acacia harpophylla* dominant and codominant)

The Brigalow TEC comprises vegetation communities dominated or codominated by brigalow (*Acacia harpophylla*). Within Queensland, 16 REs are described as forming part of this TEC. All of these REs are located in either the Brigalow Belt, South East Queensland or Mulga Lands bioregions.

Under the EPBC Act, a referral is required where a project will require a clearing permit to clear brigalow under Queensland legislation, or where the brigalow regrowth is more than 15 years old. Of the REs listed as forming part of the TEC, only the REs 11.3.1 and 11.4.9 occur within the study area. Ground-truthing and vegetation community mapping has determined that approximately 160 ha of these REs as present within the study area. Remnant patches of brigalow within the study area are generally small (average size of the remaining remnants is 5.5 ha), isolated and scattered across the extent of the EPC area. Some remnant patches occur within other mapped vegetation communities.

Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions

The Semi-Evergreen Vine Thicket TEC comprises extremely dry forms of rainforest vegetation. Within Queensland, 10 REs are described as forming part of this TEC. All of these REs are located in the Brigalow Belt bioregion.

Under the EPBC Act, a referral is required where a project will require a clearing permit to clear semi-evergreen vine thickets TEC under Queensland legislation. Of the REs listed as forming part of the TEC, only RE 11.3.11 historically occurred within the study area with v6.0b of the RE mapping indicating that no extent of this RE remains. However, ground-truthing and vegetation community

mapping has determined that approximately 33 ha of this vegetation community is present within the study area. Remnant patches of semi-evergreen vine thicket within the study area are mostly small (average size of the remaining patches is 4 ha), isolated and associated with riparian areas of Tooloombah Creek and Styx River. Patches of semi-evergreen vine thicket in the study area are closely associated with other riparian vegetation communities.

3.4.4 Essential Habitat

To manage clearing and prevent loss of biodiversity, the DERM 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 on the study area.

3.4.5 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 DERM 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 two nationally threatened flora species listed under the EPBC Act (Table 5; Appendix C).

According to the EPBC Protected Matters database, two listed flora species are predicted to occur within the study area (Table 5; Appendix C), these being:

- *Cycas ophiolitica* (Endangered); and
- *Leucopogon cuspidatus* (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 DERM 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 DERM Wildlife Online database and the Queensland Herbarium's specimen database (HERBRECS).

A query of the DERM Wildlife Online database (Appendix D) returned 199 plant species that have been historically recorded within the study area. These included 167 native species and 32 exotic species. One threatened flora species has been recorded within the search area, this being:

- *Solanum elachophyllum* (Endangered).

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 (DERM) specimen database (HERBRECS) search returned 436 records of 310 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 310 records 44 species are non-native exotic species and two species are listed as threatened under the NC Act:

- *Paspalidium scabrifolium* (Near Threatened); and
- *Hakea trineura* (Vulnerable).

Fitzroy Natural Resource Management Region Back on Track

The Fitzroy Natural Resource Management (NRM) region Back on Track report (DERM, 2010) identifies 36 priority plant species for the region. As the Fitzroy 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 36 priority plant species listed in the report, only one species, *Hakea trineura*, has 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			
Hakea trineura	three-veined hakea	V	V	Y	Occurs on serpentinite-derived soil, often with broad-leaved ironbark (*Eucalyptus fibrosa*) and *Corymbia xanthope* woodland over hummock grassland on hills.	Unlikely. Serpentinite-derived soils not represented in study area.
Cycas ophiolitica	Marlborough blue	E	E		Occurs from Marlborough in the north, to the Fitzroy River near Rockhampton in the south, in woodland or open woodland dominated by eucalypts, often on serpentinite substrates. Plants occur along hilly outcrops and in lower regions near creek systems.	Unlikely. Habitat for this species not represented in study area.
Leucopogon cuspidatus	northern beard heath	V	LC		Occurs mainly in open forest, woodland and heath on rocky slopes, cliffs and rocky outcrops with granitic or serpentinite substrates.	Unlikely. Habitat for this species not represented in study area.
Paspalidium scabrifolium		NL	N	Y	Occurs in eucalypt woodlands on the lower and mid slopes of hills and ranges on volcanic derived soils. It is known to occur in brigalow areas (Sharp & Simon, 2002).	Unlikely. Habitat for this species not represented in study area.
Solanum elachophyllum		NL	E		Known only from limited collections in the Leichhardt pastoral district, occurring on cracking clay soils associated with brigalow (*Acacia harpophylla*), belah (*Casuarina*	Possible. Habitat for this species represented in study area. Closest

		cristata), *Macropteranthes* or *Eucalyptus cambageana*.	known population is 65 km west of the study area.

EPBC –*Environment Protection and Biodiversity Conservation Act 1999* (Cwlth); E –Endangered; 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).

3.4.6 Marine Plants

Marine plants are protected under the *Fisheries Act 1994*, administered by Queensland Primary Industries and Fisheries (Department of Employment, Economic Development and Innovation). Marine plants grow on or adjacent to tidal lands and include mangroves, seagrass, salt couch, algae, samphire (succulent) vegetation and adjacent plants such as melaleuca (paper barks) and casuarina (coastal she-oaks). Protection is attributed to all parts of marine plants (leaves, roots, branches etc.).

Marine plants occur within the study area in the following mapped REs:

- *Sporobolus virginicus* grassland on marine clay plains (RE 11.1.1);
- samphire forblands on marine clay plains (RE 11.1.2);
- sedgelands on marine clay plains (RE 11.1.3); and
- mangrove forest/woodland on marine clay plains (RE 11.1.4).

3.4.7 Weeds

A weed is defined as any plant that requires some form of action to reduce its harmful effects on the economy, the environment, human health and amenity (Natural Resource Management Ministerial Council, 2006). There are two types of invasion: introduction of exotic plants and movement by native species into new areas well outside their native range. Weeds have an adverse effect on an area's environmental values and ecological functioning for the following reasons:

- Competition with native species;
- Change in the structure of a plant community through addition or removal of strata;
- Repress recruitment of native species;
- Change the natural fire fuel characteristics, which can change the natural fire regime to the detriment of native species, often resulting in the loss of native species;
- Change the food sources and habitat values available to native fauna, reducing some and increasing others;
- May change geomorphological processes such as erosion; and
- May lead to changes in the hydrological cycle.

Weed species considered to be of greatest threat to natural and economic values on a national basis have been ranked as Weeds of National Significance (WONS) (Thorp and Lynch 1999). Weed significance at a national level was assessed using four major criteria:

- Invasiveness;
- Impacts;
- Potential for spread; and
- Socio-economic and environmental impacts.

At a State level, the *Land Protection (Pest and Stock Route Management) Act 2002* (LPA) identifies those weed species that represent a threat to primary industries, natural resources and the environment. Under the LPA, a weed species can be declared as a Class 1, 2 or 3 Pest based on its potential to become a serious pest and the degree of infestation in Queensland (Table 6).

Table 6 Categories of declared plants in Queensland.

Priority Class	Description
Class 1	A Class 1 pest is one that is not commonly present in Queensland, and if introduced would cause an adverse economic, environmental or social impact. Class 1 pests established in Queensland are subject to eradication from the state. Landowners must take reasonable steps to keep land free of Class 1 pests.
Class 2	A Class 2 pest is one that is established in Queensland and has, or could have, a substantial adverse economic, environmental or social impact. The management of these pests requires coordination and they are subject to local government-, community or landowner-led programs. Landowners must take reasonable steps to keep land free of Class 2 pests.
Class 3	A Class 3 pest is one that is established in Queensland and has or could have a substantial adverse economic, environmental or social impact. Its impact or potential impact is however considered to be less significant than that of a Class 2 pest.

The Wildlife Online and HERBRECS database searches indicates that ten declared pest plant species have been previously recorded within the search area, these being:

- *Acacia nilotica* (prickly acacia – Class 2 and WONS);
- *Bryophyllum delagoense* (mother-of-millions - Class 2);
- *Cryptostegia grandiflora* (rubber vine - Class 2 and WONS);
- *Hymenachne amplexicaulis* (hymenachne – Class 2 and WONS);
- *Jatropha gossypiifolia* (bellyache bush – Class 2);
- *Lantana camara* (lantana – Class 3 and WONS);
- *Opuntia stricta* (prickly pear - Class 3);
- *Opuntia tomentosa* (velvety tree pear - Class 3);
- *Parthenium hysterophorus* (parthenium weed – Class 2 and WONS); and
- *Sporobolus jacquemontii* (American rat's tail grass – Class 2).

3.5 Field Survey Results

3.5.1 Vegetation Communities

Vegetation communities were surveyed and mapped at 1:10,000 or greater across the study area and included eucalypt woodlands, brigalow woodland, semi-evergreen vine thicket, sedgeland vegetation, patches of regrowth, and cleared sites associated with pastoral land use. Detailed description of the vegetation communities present within the study area are detailed below with their distribution mapped in Figures 3a-c. The vegetation communities delineated on site are broadly consistent with the mapped REs. Wet or dry season survey sites are delineated respectively by a ‘w’ or ‘d’ preceding the site number. Plant taxa observed during the field investigation are listed in Appendix E.

THE ESPLANADE

OBERONIA Botanical Services

Figure 3a
Vegetation Community Map
Northern Section

Styx Coal Project
Flora and Vegetation Survey

N
W E
S

1000 0 1000 2000
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

Legend

Sites
- Dry - Secondary
- Dry - Tertiary
- Dry - Quaternary
- Wet - Secondary
- Wet - Tertiary
- Wet - Quaternary

Vegetation Community
- Sedgeland on estuarine plains
- Samphire forbland on marine clay plains
- Brigalow shrubby woodland
- Acacia shirleyi woodland
- Melaleuca leucadendra and/or Eucalyptus tereticornis fringing open forest
- Eucalyptus tereticornis/Corymbia tessellaris +/- E. crebra woodland on alluvial
- Semi-evergreen vine thicket on alluvial soils
- Mixed eucalypt woodland on clay plains
- Corymbia intermedia and/or Eucalyptus crebra, +/- E.platyphylla, +/- E.exserta, +/- Melaleuca viridi
- Eucalyptus crebra and/or E.melanophloia woodland with Acacia rhodoxylon
- Eucalyptus crebra +/- E.platyphylla +/- E.populnea grassy woodland
- Wetland
- Regrowth
- Cleared

OBERONIA Botanical Services

Figure 3b
Vegetation Community Map
Central Section

Styx Coal Project
Flora and Vegetation Survey

N
W E
S

1000 0 1000 2000
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

Legend

Sites
- Dry - Secondary
- Dry - Tertiary
- Dry - Quaternary
- Wet - Secondary
- Wet - Tertiary
- Wet - Quaternary

Vegetation Community
- Sedgeland on estuarine plains
- Samphire forbland on marine clay plains
- Brigalow shrubby woodland
- Acacia shirleyi woodland
- Melaleuca leucadendra and/or Eucalyptus tereticornis fringing open forest
- Eucalyptus tereticornis/Corymbia tessellaris +/- E. crebra woodland on alluvial
- Semi-evergreen vine thicket on alluvial soils
- Mixed eucalypt woodland on clay plains
- Corymbia intermedia and/or Eucalyptus crebra, +/- E.platyphylla, +/- E.exserta, +/- Melaleuca viridi
- Eucalyptus crebra and/or E.melanophloia woodland with Acacia rhodoxylon
- Eucalyptus crebra +/- E.platyphylla +/- E.populnea grassy woodland
- Wetland
- Regrowth
- Cleared

OBERONIA Botanical Services

Figure 3c
Vegetation Community Map
Southern Section

Styx Coal Project
Flora and Vegetation Survey

N
W E
S

1000 0 1000 2000
Metres

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia 1994
Grid: Map Grid of Australia, Zone 55

Legend

Sites
- Dry - Secondary
- Dry - Tertiary
- Dry - Quaternary
- Wet - Secondary
- Wet - Tertiary
- Wet - Quaternary

Vegetation Community
- Sedgeland on estuarine plains
- Samphire forbland on marine clay plains
- Brigalow shrubby woodland
- Acacia shirleyi woodland
- Melaleuca leucadendra and/or Eucalyptus tereticornis fringing open forest
- Eucalyptus tereticornis/Corymbia tessellaris +/- E. crebra woodland on alluvial
- Semi-evergreen vine thicket on alluvial soils
- Mixed eucalypt woodland on clay plains
- Corymbia intermedia and/or Eucalyptus crebra, +/- E.platyphylla, +/- E.exserta, +/- Melaleuca viridi
- Eucalyptus crebra and/or E.melanophloia woodland with Acacia rhodoxylon
- Eucalyptus crebra +/- E.platyphylla +/- E.populnea grassy woodland
- Wetland
- Regrowth
- Cleared

1. Sedgeland on estuarine plains

The sedgeland community (Figure 4) was recorded from the northern part of the study area on soils derived from estuarine deposits. The ecologically dominant layer is characterised by various grass, sedge and forb species. Typical species include *Panicum effusum* (hairy panic), *Chloris divaricata* (spreading windmill grass), *Portulaca bicolor* (pigweed), *Fimbristylis ferruginea* (common fingerrush), *Isolepis inundata* (swamp club rush), *Phyla nodiflora* (phyla), *Tetragonia tetragonioides* (New Zealand spinach), *Salsola kali* (soft roly poly), among other taxa and monospecific patches of *Sporobolus virginicus* (saltwater couch). The species composition, land form and soil type correspond with the description of RE 11.1.3 (VM Act Class: Of Concern). Corresponding sites: w18, w27, w28, d36.

2. Samphire forbland on estuarine plains

The samphire forbland community (Figure 4) was recorded from the northern part of the study area on soils derived from estuarine deposits. The ecologically dominant layer is characterised by various succulent samphire species including *Tecticornia indica* (glasswort), *T. pergranulata* (blackseed glasswort), *Suaeda australis* (Austral seablite), *Sesuvium portulacastrum* (sea purslane), *Salsola* kali (soft roly poly), among other taxa and minor patches of *Sporobolus virginicus* (saltwater couch). The species composition, land form and soil type correspond with the description of RE 11.1.2 (VM Act Class: Least Concern). Corresponding sites: d48.

Figure 4 Vegetation communities: Sedgeland on estuarine plain (left) and samphire forblands on estuarine plains (right)

3. *Melaleuca leucadendra* and/or *Eucalyptus tereticornis* fringing open forest

This vegetation community occurs along riparian areas throughout the study area. The canopy tended to be between 15 and 20 m and characterised by *Melaleuca leucadendra* and/or *Eucalyptus tereticornis* (Figure 5). Other taxa that may occur in the canopy include *Corymbia tessellaris* (carbeen) and *Lophostemon grandiflorus* (northern swamp mahogany). An understorey is often present and may be characterised by *Melaleuca viminalis* (weeping bottlebrush), *Casuarina cunninghamiana* (river sheoak), *Alphitonia excelsa* (red ash), *Planchonia careya* (cocky apple), *Melia azedarach* (white cedar) or *Acacia salicina* (sally wattle). A variable shrub layer may be present at some sites and consist of *Carissa ovata* (currant bush), *Breynia oblongifolia* (coffee bush), *Petalostigma pubescens* (quinine berry) or *Indigofera* spp. The exotic species **Lantana camara* (lantana) and **Stylosanthes scabra* (stylo) may invade this community at some sites. The ground layer tends to be open to sparse and consist *Lomandra longifolia* (spiny-head matrush), *Themeda triandra* (kangaroo grass), *Chrysopogon fallax* (golden-beard grass), *Epaltes australis* (spreading nut-heads) or *Dichanthium sericeum* (Queensland bluegrass). The ground layer is prone to invasion by exotic species such as **Megathyrsus maximus* (Guinea grass), **Stachytarpheta jamaicensis* (snake weed), or **Paspalum dilatatum* (paspalum). The species composition, land form and soil type correspond with the

description of RE 11.3.25 (VM Act Class: Least Concern). Corresponding sites: w6, w11, w16, w22, d02, d04, d14, d41, d44, d52.

4. *Eucalyptus tereticornis*/*Corymbia tessellaris* +/- *E. crebra* woodland on alluvial plains

This vegetation community is associated with alluvial plains and is characterised by *Eucalyptus tereticornis* (forest red gum) with *Corymbia tessellaris* (carbeen) to 22 m (Figure 5). *Eucalyptus crebra* (narrow-leaved ironbark) can sometimes be present. An understorey is often present and comprised of *Lophostemon suaveolens* (swamp mahogany), *Lysiphyllum hookeri* (pegunny) and *Alphitonia excelsa* (red ash). *Melaleuca bracteata* (black tea tree), *M. viminalis* (weeping bottlebrush) and/or *M. trichostachya* (tea tree) may be present in associated drainage lines or ponded areas. A sparse shrub layer may be present with taxa such as *Breynia oblongifolia* (coffee bush), *Carissa ovata* (currant bush) or *Alectryon diversifolius* (boonaree). The ground layer tends to be dense and dominated by grasses such as *Bothriochloa* spp., *Themeda triandra* (kangaroo grass) and *Heteropogon contortus* (black spear grass). The species composition, land form and soil type correspond with the description of RE 11.3.4 (VM Act Class: Of Concern). Corresponding sites: w13, w23, d05, d06, d09, d16, d17, d42, d43, d46.

Figure 5 Vegetation communities: *Melaleuca leucadendra* and/or *Eucalyptus tereticornis* fringing open forest (left) and *Eucalyptus tereticornis*/*Corymbia tessellaris* +/- *E. crebra* woodland on alluvial plains (right)

5. Semi-evergreen vine thicket on alluvial soils

This vegetation community (Figure 6) was recorded from alluvial terraces associated with the Styx River and Tooloombah Creek. The canopy tended to be between seven and 10 m tall and comprised of a variety of species including *Gossia bidwillii* (python tree), *Mallotus philippensis* (red kamala), *Strychnos psilosperma* (strychnine bush), *Sterculia quadrifida* (peanut tree), *Aphananthe philippensis* (rough leaved elm), *Melia azedarach* (white cedar), *Cupaniopsis anacardioides* (tuckeroo) among other taxa. Individuals of *Eucalyptus tereticornis* (forest red gum) and/or *Corymbia tessellaris* (carbeen) are occasionally emergent through the canopy. A shrub layer is present and consists of species including *Alyxia ruscifolia* (chain fruit), *Arytera divaricata* (coogera), *Diospyros geminata* (Queensland ebony), *Ficus opposita* (sandpaper fig), *Exocarpos latifolius* (broadleaved cherry), *Notelaea microcarpa* (velvet mock-orange) and *Carissa ovata* (currant bush). Vines are abundant and include *Jasminum didymum* subsp. *racemosum* (native jasmine), *Trophis scandens* (burny vine), *Clematis glycinoides* (forest clematis), *Pandorea pandorana* (wonga vine), *Legnephora moorei* (round-leaf vine) among other taxa. The species composition, land form and soil type correspond with the description of RE 11.3.11 (VM Act Class: Endangered). Corresponding sites: w12, w14, d13.

6. Brigalow (*Acacia harpophylla*) and/or belah (*Casuarina cristata*) shrubby woodland

This vegetation community is commonly associated with clay plains and areas of alluvium throughout the study area. The ecologically dominant layer tends to be dominated by *Acacia harpophylla*

(brigalow) and/or *Casuarina cristata* (belah) at some sites (Figure 6). Emergent *Eucalyptus moluccana* (gum-topped box) or *E. tereticornis* (forest red gum) may occasionally be present. A low tree or tall shrub layer may be present and characterised by *Alphitonia excelsa* (red ash), *Terminalia oblongata* (yellow-wood), *Maytenus cunninghamii* (yellow-berry bush), *Carissa ovata* (currant bush), *Alectryon diversifolius* (boonaree) and *Geijera parviflora* (wilga). The ground layer tended to be dominated by grasses with exotic grasses becoming more prevalent with increased grazing. Where this community occurs on alluvial soils, it corresponds with the description of RE 11.3.1 (VM Act Class: Endangered). Where it occurs on clay plains it corresponds with the description of RE 11.4.9 (VM Act Class: Endangered). Corresponding sites: w04, w09, w10, w20, w30, d04, d04s, d15, d18, d21, d47, d49. Regrowth sites: w21, w31.

Figure 6 Vegetation communities: Semi-evergreen vine thicket on alluvial soils (left) and brigalow (*Acacia harpophylla*) shrubby woodland (right)

7. Lancewood (*Acacia shirleyi*) shrubby woodland

This vegetation community is commonly associated with scarps and crests on the steeper sections of the south-west of the study area. The ecologically dominant layer tends to be dominated *by Acacia shirleyi* (lancewood) with occasional emergent bloodwoods (*Corymbia* spp.) or *Eucalyptus exserta* (Queensland peppermint) (Figure 7). A low tree to tall shrub layer may be present and characterised by *Petalostigma pubescens* (quinine bush), *Pogonolobus reticulatus* (medicine bush), and *Alstonia constricta* (bitterbark). The ground layer tends to be quite open to sparse and characterised by perennial grasses such as *Entolasia stricta* (wiry panic), *Eragrostis elongatus* and **Bothriochloa pertusa*. The species composition, land form and soil type correspond with the description of RE 11.10.3 (VM Act Class: Least Concern). Corresponding sites: d26, d27, d29.

8. Mixed eucalypt woodland on clay plains

This dry sclerophyll vegetation community is associated with clay plains in the study area. The canopy is characterised by co-dominance of a range of eucalypt species, including *Eucalyptus crebra* (narrow-leaved ironbark), *E. populnea* (poplar box), *E. moluccana* (gum-topped box), *E. exserta* (Queensland peppermint), *E. platyphylla* (poplar gum), *E. cambageana* (Dawson gum), *Corymbia intermedia* (pink bloodwood) and *C. tessellaris* (carbeen) (Figure 7). The understorey varies from open to sparse and is characterised by *Casuarina cristata* (belah), *Alphitonia excelsa* (red ash), *Petalostigma pubescens* (quinine), *Grevillea striata* (beefwood), *Acacia salicina* (sally wattle), and/or *Vachellia bidwillii* (corkwood wattle). Shrub layer is variable and may include *Eremophila mitchellii* (false sandalwood), *Melaleuca viridiflora* (broad-leaved tea-tree), *Atalaya hemiglauca* (whitewood), and/or *Geijera parviflora* (wilga). Ground layer tends to be dense and characterised by grasses such as *Themeda triandra* (kangaroo grass), *Heteropogon contortus* (black spear grass), *Eragrostis* spp., and *Bothriochloa* spp. The species composition, land form and soil type correspond with the

description of RE 11.4.2 (VM Act Class: Of Concern). Corresponding sites: w05, w07, w08, w15, w25, d01, d03, d07, d08, d11, d33, d38, d40, d45, d50, d51.

Figure 7 Vegetation communities: Lancewood (*Acacia shirleyi*) shrubby woodland (left) and mixed eucalypt woodland on clay plains (right)

9. *Corymbia intermedia* and/or *Eucalyptus crebra*, +/- *E. platyphylla*, +/- *E. exserta*, +/- *Melaleuca viridiflora* shrubby woodland

This vegetation community is associated with areas mapped as colluvial and residual deposits. The ecologically dominant layer is characterised by *Corymbia intermedia* (pink bloodwood) and/or *Eucalyptus crebra* (narrow-leaved ironbark) to 18 m tall (Figure 8). Other taxa which may be present in the canopy include *Corymbia tessellaris* (carbeen), *Eucalyptus platyphylla* (poplar gum), *Corymbia dallachyana* (Dallachy's gum), *Eucalyptus exserta* (Queensland peppermint) or *Eucalyptus cambageana* (Dawson gum). *Melaleuca viridiflora* (broad-leaved tea tree) may form distinct patches in the understorey in some situations. Other species which may occur in the understorey include *Acacia rhodoxylon* (rosewood), *Alphitonia excelsa* (red ash), *Petalostigma pubescens* (quinine), and *Acacia* spp. A low shrub layer is often present and includes species such as *Notelaea microcarpa*, *Sida hackettiana* or *S. cordifolia*. A grassy ground layer is present and is variable in cover depending on the shrub density. Species common in the ground layer include *Heteropogon contortus* (black speargrass), *Aristida* spp. (wiregrasses), *Bothriochloa* spp. and *Themeda triandra* (kangaroo grass). Where this community occurs on alluvial soils, it corresponds with the description of RE 11.3.29 (VM Act Class: Least Concern). Where it occurs on unconsolidated Cainozoic sediments it corresponds with the description of RE 11.5.8 (VM Act Class: Least Concern). Corresponding sites: w01, w02, w17, w19, d22, d23, d28, d32, d54, d55, d56, d57.

10. *Eucalyptus crebra* and/or *Eucalyptus melanophloia* woodland with *Acacia rhodoxylon*

This vegetation community is associated with areas of old sedimentary rock within the study area. The ecologically dominant layer is characterised by *Eucalyptus crebra* (narrow-leaved ironbark) and/or *E. melanophloia* (silver-leaved ironbark) over a well-developed understorey of *Acacia rhodoxylon* (rosewood) (Figure 8). A shrub layer is often present and may include *Hibiscus divaricatus*, *Erythroxylon* sp., *Maytenus cunninghamii* (yellow-berry bush), and *Carissa ovata* (currant bush). The ground layer is typically dense and characterised by various grass species. The species composition, land form and soil type correspond with the description of RE 11.11.1 (VM Act Class: Least Concern). Corresponding sites: w29, w24 (regrowth), d20, d25, d30, d53.

Figure 8 *Corymbia intermedia* and/or *Eucalyptus crebra*, +/- *E. platyphylla*, +/- *E. exserta*, +/- *Melaleuca viridiflora* shrubby woodland (left) and *Eucalyptus crebra* and/or *Eucalyptus melanophloia* woodland with *Acacia rhodoxylon* (right)

11. *Eucalyptus crebra*, +/- *E. platyphylla*, +/- *E. populnea* grassy woodland

The canopy of this vegetation community is characterised by *Eucalyptus crebra* (narrow–leaved ironbark) (Figure 9). The canopy can also include *Eucalyptus populnea* (poplar box), *Eucalyptus platyphylla* (poplar gum) and *Corymbia dallachiana* (Dallachy's gum). An open to spare understorey may be present and may include *Alphitonia excelsa* (red ash) and *Grevillea striata* (beefwood) among other species. A shrub layer is often present and includes *Maytenus cunninghamii* (yellow-berry bush), *Petalostigma pubescens* (quinine), *Breynia oblongifolia* (coffee bush), *Alectryon diversifolius* (boonaree) and *Hibiscus divaricatus*. Ground layer tends to be dense and characterised by various grass species including *Heteropogon contortus* (black speargrass), *Bothriochloa* spp., *Themeda triandra* (kangaroo grass) and *Panicum* spp. The species composition, land form and soil type correspond with the description of RE 11.11.15 (VM Act Class: Least Concern). Corresponding sites: w03, w26, d19, d24, d34, d35.

12. Wetland

A small wetland area occurs north of Mount Bison Road at the western extremity of the EPC area. This wetland is a large closed depression approximately 200 m across (Figure 9). Margins of the wetland are broad and open with extensive area of shallow water (<30 cm deep) with deeper water (>30 cm deep) towards centre of the depression. *Melaleuca viridiflora* trees (up to 8 m in height) occur in standing water with a variety of sedges at centre of the wetland. Sparse cover of hydrophytes (including *Ottelia ovalifolia*) present near centre of wetland as well. Dry margins of wetland with sparse to dense cover of low sedges and forbs (generally <20 cm in height). Surrounded by mixed eucalypt woodland with *Eucalyptus platyphylla, Corymbia tessellaris* and *E. erythrophloia* co-dominant and a dense to mid-dense ground layer of grasses and forbs (mostly <50 cm).

Figure 9 *Eucalyptus crebra*, +/- *E. platyphylla*, +/- *E. populnea* grassy woodland (left) and wetland vegetation (right)

13. Regrowth

Areas of regrowth in the study area included areas mapped as high value regrowth (HVR) and other regrowth areas that do not meet the criteria of HVR. Areas of regrowth not mapped as HVR may occur in areas mapped as either non-remnant vegetation under the RE mapping or in Category X areas under the PMAV mapping. Those patches of regrowth vegetation not mapped as HVR are exempt from clearing restrictions from Queensland's VM Act and can be cleared without a development permit provided they do not trigger the Commonwealth's EPBC Act. Mapping of regrowth of the different REs has not been undertaken. Areas of regrowth were lumped into the single mapping unit. As such, the species composition and structural complexity will vary depending on the regrowing RE as determined by the pre-clearing RE layer and the time since last clearing.

14. Cleared areas

A large proportion (approximately 74%) of the study area landscape has been heavily altered by grazing activities. Alteration has occurred through direct historical clearing associated with the pastoral industry. These areas typically support a mix of exotic and native perennial grass species and may have patches of regrowth.

3.5.2 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 summarised in Table 7. 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. Approximately 227 km² of the study area are already covered with existing PMAVs. 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.

3.5.3 Flora

A total of 298 plant species (Appendix E) were recorded from all sites surveyed across the study area during both wet and dry season surveys. These include 245 native and 53 exotic or weed species. The wet season survey recorded 237 plant species from all sites surveyed of which 193 are native

species. The dry season survey recorded 190 species of which 156 are native species including one conservation significant species, *Eleocharis blakeana* which is listed as Near Threatened under the NC Act. No EPBC listed threatened species were recorded from any of the sites assessed during either the wet or dry surveys. The black orchid (*Cymbidium canaliculatum*) was identified as an epiphyte on older trees within the study area. This species is offered protection under the NC Act due to its commercial value.

3.5.4 Weeds

Of the 298 plant species recorded from all sites surveys during the field inspections (Appendix E), 53 (18%) are exotic or weed species. Ten LPA declared plant species were recorded during the site visits, four of which are listed as Weeds of National Significance (WONS), these being:

- *Aristolochia elegans* (Dutchman's pipe - Class 3);
- *Bryophyllum delagoense* (mother-of-millions - Class 2);
- *Cryptostegia grandiflora* (rubbervine - Class 2 and WONS);
- *Harrisia martini* (harrisia cactus - Class 2);
- *Hymenachne amplexicaulis* (hymenachne - Class 2 and WONS);
- *Jatropha gossypiifolia* (bellyache bush – Class 2);
- *Lantana camara* (lantana - Class 3 and WONS);
- *Opuntia stricta* (prickly pear - Class 2);
- *Parthenium hysterophorus* (parthenium - Class 2 and WONS); and
- *Sporobolus fertilis* (giant Parramatta grass - Class 2).

Table 7 Summary of inconsistencies between site survey results and certified RE mapping

Site	Easting	Northing	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Suggested RE	Comments
w01	770671	7486049	11.5.8a/11.7.2	Qr,Qf>Kx	5	*Corymbia intermedia* and/or *Eucalyptus crebra*, +/- *E. platyphylla*, +/- *E. exserta*, +/- *Melaleuca viridiflora* shrubby woodland	11.5.8	This site occurs in a mapped heterogeneous polygon. Site survey results match the description of 11.5.8.
w02	770977	7486025	11.4.2	Qr,Qf>Kx	5	*Corymbia intermedia* and/or *Eucalyptus crebra*, +/- *E. platyphylla*, +/- *E. exserta*, +/- *Melaleuca viridiflora* shrubby woodland	11.5.8	Most likely an error related to scale. Site 2 occurs in an area mapped as 11.4.2 which is close to a polygon mapped as 11.5.8a/11.7.2. The geology mapping, soils and species composition match RE 11.5.8 better.
w04	773421	7496236	11.4.9/11.3.1	Qpa	4	Brigalow (*Acacia harpophylla*) shrubby woodland	11.4.9	This site occurs upslope of a drainage line. RE 11.3.1 is associated with alluvium soils with this drainage line. RE 11.4.9 occurs on the clay plains away from alluvial areas.
w05	775006	7497589	11.4.9	Qpa	4	Mixed eucalypt woodland on clay plains	11.4.2	Most likely an error related to the scale of the RE mapping. This site occurs close to the boundary of a polygon of 11.4.2. Lines represented on the certified RE maps are ±100 m of their true position and as such this site could fall in the true extent of RE 11.4.2.
w09	774807	7497424	11.4.9/11.3.1	Qpa	4	Brigalow (*Acacia harpophylla*) shrubby woodland	11.4.9	This site occurs in a mapped heterogeneous polygon. Site survey results match the description of 11.4.9.

Site	Easting	Northing	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Suggested RE	Comments
w10	776532	7491161	11.11.1	Qpa	4	Brigalow (*Acacia harpophylla*) shrubby woodland	11.4.9	Most likely an error related to scale. This site occurs in a polygon mapped as land zone 11. The underlying geology for this site is Qpa which equates to land zone 4. Site also supports brigalow shrubby woodland and fits with the description of 11.4.9.
w12	772278	7495892	non-remnant	Qa	3	Semi-evergreen vine thicket on alluvial soils	11.3.11	This site occurs in a remnant patch of semi-evergreen vine thicket occurring on alluvial soil. The patch would be too small to be mapped on the RE map. The pre-clearing RE for this site is 11.3.1. However, the vegetation community structure and species composition matches the description of 11.3.11.
w13	772080	7495753	non-remnant	Qa	3	*Eucalyptus tereticornis*/*Corymbia tessellaris* +/- *E. crebra* woodland on alluvial plains	11.3.4	This remnant patch would be too small to be mapped on the certified RE map. The pre-clearing RE for this site is 11.3.1. However, the vegetation community structure and species composition matches the description of 11.3.4.
w14	771548	7495970	11.4.9	Qa	3	Semi-evergreen vine thicket on alluvial soils	11.3.11	This site occurs on an area of mapped alluvial soil (land zone 3). The vegetation community structure and species composition matches the description of 11.3.11.
w17	769323	7485894	11.5.8a/11.7.2	Qr,Qf>Kx	5	*Corymbia intermedia* and/or *Eucalyptus crebra*, +/- *E. platyphylla*, +/- *E. exserta*, +/-	11.5.8	This site occurs in a mapped heterogeneous polygon. Site survey results match the

Site	Easting	Northing	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Suggested RE	Comments
						Melaleuca viridiflora shrubby woodland		description of 11.5.8.
w18	768563	7516369	11.1.2a/11.1.2b	Qhe/m	1	Sedgeland on estuarine plains	11.1.3	Most likely an attribution error. The species composition, including the predominance of sedges and grasses, at this site matches better with the description of RE 11.1.3.
w20	770048	7496715	11.4.9	Qpa	3	Brigalow (*Acacia harpophylla*) shrubby woodland	11.3.1	Most likely an error related to scale of geology mapping. This site occurs along an active drainage line incised into the surrounding clay plain. Soils would be alluvium associated with the drainage channel and as such would meet the definition of RE 11.3.1.
w22	776836	7479706	11.4.9	Qa	3	*Melaleuca leucadendra* and/or *Eucalyptus tereticornis* fringing open forest	11.3.25	This site is associated with an active drainage line. The underlying geology mapping has the site mapped as Qa (alluvium). Landform, geology, vegetation community structure and species composition fit with the definition of RE 11.3.25.
w23	776659	7479977	11.4.2	Qa	3	*Eucalyptus tereticornis*/*Corymbia tessellaris* +/- *E. crebra* woodland on alluvial plains	11.3.4	This site occurs on an alluvial plain associated with an active drainage line. The underlying geology is mapped as Qa (alluvium). Landform, geology, vegetation community structure and species composition fit best with the definition of RE 11.3.4.

Site	Easting	Northing	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Suggested RE	Comments
w27	767165	7514301	11.1.2a/11.1.2b	TQr>Kx	1	Sedgeland on estuarine plains	11.1.3	Most likely an attribution error. The species composition, including the predominance of sedges and grasses, at this site matches better with the description of RE 11.1.3.
w28	767518	7514924	11.1.2a/11.1.2b	TQr>Kx	1	Sedgeland on estuarine plains	11.1.3	Most likely an attribution error. The species composition, including the predominance of sedges and grasses, at this site matches better with the description of RE 11.1.3.
w29	776504	7494295	11.4.9	Pb	11	*Eucalyptus crebra* and/or *Eucalyptus melanophloia* woodland with *Acacia rhodoxylon*	11.11.1	Most likely an error related to scale. This site occurs in an area which corresponds to land zone 11. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.11.1.
w30	776466	7494218	11.4.9	Pb	11	Cleared	non-remnant	Most likely an error related to scale. This site occurs in close proximity to an area mapped as Qpa and due to scale, it is quite possible that this site is Qpa rather than Pb. The structure present on the site would not meet the definition of remnant vegetation as per the VM Act.
w31	771423	7496043	11.4.9	Qpa	4	Brigalow (*Acacia harpophylla*) shrubby woodland	non-remnant (regrowth)	This site occurs in a polygon mapped as remnant 11.4.9. The site survey indicates that the vegetation on site does not fulfil the definition of remnant vegetation under the VM Act.

Site	Easting	Northing	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Suggested RE	Comments
d03	771276	7488510	11.4.9	Qpa	4	Mixed eucalypt woodland on clay plains	11.4.2	Area mapped as 11.4.9 much larger than the on-ground distribution. Predominant canopy characterised by *Eucalyptus populnea*. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.4.2.
d06	775825	7487308	11.4.2	Qa	3	*Eucalyptus tereticornis*/*Corymbia tessellaris* +/- *E. crebra* woodland on alluvial plains	11.3.4	Land zone attribution error. Geology mapping indicates that this site occurs on Quaternary alluvium and as such would correspond to land zone 3. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.3.4.
d11	775000	7487485	11.4.9	Qpa	4	Mixed eucalypt woodland on clay plains	11.4.2	Polygon mapped as 11.4.9 but very little brigalow present. Predominant canopy characterised by eucalypt species. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.4.2.
d13	772154	7489134	11.3.25	Qa	3	Semi-evergreen vine thicket on alluvial soils	11.3.11	This site occurs on an area of mapped alluvial soil (land zone 3). The vegetation community structure and species composition matches the description of 11.3.11.
d15	774906	7488635	11.3.4	Qa	3	Brigalow (*Acacia harpophylla*) shrubby woodland	11.4.9	A small area of brigalow dominated community on a slight rise above alluvial plain. Soils heavy pale clay with gilgai. Most likely a small area of Qpa (land zone 4). The

Site	Easting	Northing	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Suggested RE	Comments
								vegetation community structure and species composition matches the description of 11.4.9.
d17	775589	7487960	11.3.25	Qa	3	*Eucalyptus tereticornis*/*Corymbia tessellaris* +/- *E. crebra* woodland on alluvial plains	11.3.4	The landform, geology, vegetation community structure and species composition fits best with the definition of 11.3.4.
d18	775744	7487931	11.3.4	Qpa	4	Brigalow (*Acacia harpophylla*) shrubby woodland	11.4.9	Land zone attribution error. Geology mapping indicates that this site occurs on boundary between Qa (Quaternary alluvium) and Qpa (Cainozoic clay plains). Site occurs above alluvial area on clay plain and as such would correspond to land zone 4. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.4.9.
d19	7769003	7487753	11.3.4	Qpa	4	*Eucalyptus crebra*, +/- *E. platyphylla*, +/- *E. populnea* grassy woodland	11.4.2	Land zone attribution error. Geology mapping indicates that this site occurs on Qpa (Cainozoic clay plain) and as such would correspond to land zone 4. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.4.2.
d26	772640	7482236	11.10.7	Kx	10	*Acacia shirleyi* woodland	11.10.3	The landform, geology, vegetation community structure and species composition fits best with the definition of 11.10.3.

Site	Easting	Northing	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Suggested RE	Comments
d27	772403	7482485	11.10.7/11.10.1	Kx	10	*Acacia shirleyi* woodland	11.10.3	The landform, geology, vegetation community structure and species composition fits best with the definition of 11.10.3.
d33	776551	749551	11.4.9	Qpa	4	Mixed eucalypt woodland on clay plains	11.4.2	Land zone attribution error. Geology mapping indicates that this site occurs on boundary between Qpa (Cainozoic clay plains) and Pb (late Permian sedimentary rocks). Site occurs on clay plain and as such would correspond to land zone 4. Predominant canopy characterised by *Eucalyptus crebra*. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.4.2.
d37	770684	7511790	11.4.2	Qhe/m	1	Cleared	non-remnant	Slightly raised site but still on land zone 1. Very weedy site. The site survey indicates that the vegetation on site does not fulfil the definition of remnant vegetation under the VM Act.
d41	776047	7486430	11.4.2	Qa	3	*Melaleuca leucadendra* and/or *Eucalyptus tereticornis* fringing open forest	11.3.25	The landform, geology, vegetation community structure and species composition fits best with the definition of 11.3.25.
d42	776093	7486315	11.4.9	Qa	3	*Eucalyptus tereticornis*/*Corymbia tessellaris* +/- *E. crebra*	11.3.4	No brigalow present on site. The landform, geology, vegetation community structure and species composition fits best with the

Site	Easting	Northing	V6.0b RE mapping	Geology mapping	Land Zone	Vegetation Community	Suggested RE	Comments
						woodland on alluvial plains		definition of 11.3.25.
d43	776140	7486293	11.4.9	Qa	3	*Eucalyptus tereticornis*/*Corymbia tessellaris* +/- *E. crebra* woodland on alluvial plains	11.3.4	No brigalow present on site. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.3.25.
d44	776205	7486338	11.4.9	Qa	3	*Melaleuca leucadendra* and/or *Eucalyptus tereticornis* fringing open forest	11.3.25	No brigalow present on site. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.3.25.
d45	776355	7486238	11.4.9	Qpa	4	Mixed eucalypt woodland on clay plains	11.4.2	No brigalow present on site. The landform, geology, vegetation community structure and species composition fits best with the definition of 11.4.2.

4 Environmentally Significant Areas

4.1 Ecological processes

Ecological processes are those intrinsic landscape scale processes that contribute to the maintenance of biodiversity values in the region. These include the relationships of vegetation to water quality and soil stability, maintenance of biological assemblages and specific ecological communities of local, regional, national and international importance and ecological values including foraging and roosting habitats, food chains and wildlife corridors.

In consideration of the above, the status of landscape elements of the study area must be considered within local as well as regional and national contexts. Of the 342 km² covered by the study area, remnant vegetation only covers some 89.4 km² or approximately a quarter of the land area. A large proportion of the landscape has historically been cleared for conversion to pasture particularly those areas defined by clay plains. Large patches of remnant native vegetation are largely confined to hill slopes or saline flats away from the clay plains. These remnant patches represent at-least locally significant habitat areas within a largely cleared matrix.

4.2 Significant vegetation

4.2.1 Threatened Ecological Communities

At both State and national scale, significant areas of vegetation within the study area include brigalow vegetation, both as remnant and advanced regrowth, and patches of semi-evergreen vine thickets on alluvial soils. The brigalow vegetation type is closely associated with the extensive clay plains of the region and as such has been subjected to intensive clearing and conversion to pastures. For example, only 2% of the pre-clearing extent of RE 11.4.9 (brigalow open forest on clay plains) remains in the study area. This RE type is offered protection at both the State (under the VM Act) and National (under the EPBC Act) level. Significant areas of advanced regrowth of this RE are mapped as high value regrowth containing an endangered RE.

Patches of semi-evergreen vine thickets occur in the study area closely associated with alluvial soils of the active watercourses of Tooloombah Creek and the Styx River (see Figure 3b). These areas correspond to RE 11.3.11 and are presently not mapped in the certified RE mapping. RE 11.3.11 is classed as Endangered under the VM Act and is included in the description of the Semi-Evergreen Vine Thicket TEC under the EPBC Act.

4.2.2 Regional Ecosystems of State Significance

Of the REs present within the study area, three are listed as Endangered and four are listed as Of Concern under the VM Act. These REs are:

- Endangered: 11.3.1, 11.3.11, and 11.4.9; and
- On Concern: 11.1.3, 11.3.4, 11.4.2, and 11.11.10.

Very little remnant vegetation in the study area remains in an undisturbed state, with grazing affecting a large proportion of the area. Connectivity between remnant patches has been greatly reduced by the past extensive clearing activities and conversion to pastures. Remnant riparian vegetation along the major watercourses of the study area provides the most significant connectivity across the study area landscape. These remnant riparian areas remain as important habitat refuges within the generally cleared matrix.

4.3 Environmentally Sensitive Areas

The study area does not contain any Category A Environmentally Sensitive Areas as defined in Section 25 of the Environmental Protection Regulation 2008. However, the study area contains Category B Environmentally Sensitive Areas, as defined in Section 26 of the Environmental Protection Regulation 2008, including mapped REs with a Biodiversity Status of Endangered and marine plants. Towards the northern boundary of the study area includes wetlands mapped within the Directory of Important Wetlands.

4.4 Conservation Significant Flora Species

Conservation significant flora species are defined as those listed under either the EPBC Act and/or the NC Act. Literature reviews and database searches identified five conservation significant flora species that potentially occur within a 10 km buffer of the study area. None of these species were recorded from the survey sites. However the perennial sedge*, Eleocharis blakeana*, listed as Near Threatened under the NC Act was recorded during dry season surveys. *Eleocharis blakeana* is also listed as a high priority species in the Fitzroy NRM region Back on Track report (DERM, 2010).

Eleocharis blakeana tends to occur on plains and low undulating country on poorly drained, clayey soils. It commonly grows in ephemeral wet habitats in gilgai country in brigalow and belah woodlands, and in small depressions along drainage lines in open forest and woodland communities (Halford 1996). Within the study area, this species was recorded from site d03s (E: 771218, N: 7488518) on Mamelon Station, approximately 400 m south-east of Tooloombah Creek. It occurred in poplar box (*Eucalyptus populnea*) woodland on gilgai clay plains. This record extends the northern most limit of the geographical range for this species and a specimen has been lodged with the Queensland Herbarium.

4.5 Offset strategy

In October 2011 the DERM released the Queensland Biodiversity Offset Policy (QBOP), a specific-issue offsets policy under the Queensland Government Environmental Offset Policy (QGEOP). The purpose of the QBOP is to increase the long-term protection and viability of the state's biodiversity, by limiting residual impacts from development on areas possessing State significant biodiversity values. These biodiversity values are defined in Appendix 1 of the QBOP and include Endangered or Of Concern REs, essential habitat, high value regrowth containing an Endangered or Of Concern RE or regrowth essential habitat, watercourses (creek, stream, river or watercourse which appears on the vegetation management remnant watercourse map).

Biodiversity offsets will be required when a project has demonstrated to the regulator that all practical and reasonable efforts have been taken to avoid and minimise impacts on State significant biodiversity values but a residual impact remains that will impact on one or more of these values. Offsets will only be acceptable when all reasonable attempts have been made to avoid and reduce impacts on the relevant biodiversity values and, as such, cannot be presented as a primary mitigation approach.

The Styx Coal Project falls within the definition of a level 1 mining activity as listed under chapter 5a of the *Environmental Protection Act 1994* and as such any residual impacts associated with the project on State significant biodiversity values would trigger a biodiversity offset obligation under QBOP. Level 1 mining activities are 'not assessable development' (as detailed in the Queensland Sustainable Planning Regulation 2009), and as such are exempt from offset obligations triggered by the VM Act. Preliminary layout of the extraction area would impact on the following State significant biodiversity values: Of Concern REs, watercourse vegetation and High Value regrowth containing Of Concern REs. An offset strategy would need to be prepared as part of an Environmental Management Plan (EMP) and demonstrate measures to avoid and mitigate the residual impacts associated with the

project on these State significant biodiversity values. The offset strategy should identify the biodiversity value and area being impacted. The strategy should also include the identification of potential offset areas consistent with the provision of QBOP to compensate for loss of biodiversity values of the site.

Additionally, any impacts associated with the project on Matters of National Environmental Significance (MNES) listed under the EPBC Act are required to be identified with offset options discussed with reference to the eight principals set out in the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) Draft Policy Statement Use of Environmental Offsets under the *Environment Protection and Biodiversity Conservation Act 1999*. The delivery of a biodiversity offset strategy may, in some instances, be able to be combined with offsets under Commonwealth legislation.

5 Conclusion

The study area refers to the area covered by Exploration Permit (Coal) (EPC) 1029 in the Styx Basin, central Queensland. EPC1029 falls between the population centres of Marlborough and Saint Lawrence and is approximately centred on the township of Ogmore, approximately 140 km north-west of Rockhampton. EPC1029 falls entirely in the Brigalow Belt Bioregion. The study area covers some 342 km² and contains a mixture of vegetation biodiversity values including eucalypt open forest, brigalow woodlands, sedgelands, samphire forblands, and riparian communities as well as regrowth and cleared areas. A large proportion (approximately 74%) of the study area landscape has been historically cleared and converted to pasture. 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 18 REs within the study area (Table 4) comprising two REs classed as Endangered, four classed as Of Concern and the remainder classed as Least Concern. Vegetation communities of the study area were mapped at 1:10,000 or greater and identified 12 discreet remnant vegetation types and two non-remnant types. The vegetation community mapping over the study area can be used to produce an amended RE map indicating areas where there is a conflict with the certified RE layer.

Two TECs protected under the EPBC Act are found in the study area, these being:

1. Brigalow (*Acacia harpophylla* dominant and co-dominant) – comprising both remnant and regrowth vegetation; and

2. Semi-evergreen vine thickets (SEVT) of the Brigalow Belt (North and South) and Nandewar Bioregions – occurring as discreet patches along Tooloombah Creek and Styx River.

Five threatened flora species were identified through desktop searches within a 1 km buffer of the study area. One conservation significant flora species were recorded in the study area, this being the perennial sedge *Eleocharis blakeana* (NC Act: Near Threatened). Habitat assessments and likelihood of occurrence analysis based on species requirements suggested that a further one threatened species, *Solanum elachophyllum*, may have the potential to occur in the study area.

Offsets may be required under Commonwealth and/or State legislation where residual impacts to identified ecological values cannot be avoided or reasonably mitigated. Where development will impact on SEVT and/or brigalow TECs then a referral to the Federal government under the EPBC Act will be required. Any residual impacts associated with the project on State significant biodiversity values would trigger a biodiversity offset obligation under State legislation.

An offset strategy would need to be prepared as part of an Environmental Management Plan (EMP) for the site and demonstrate measures to avoid or mitigate the residual impacts associated with the project on these State significant biodiversity values. The offset strategy should identify the biodiversity value and quantify the impacts. The strategy should also include the identification of potential offset areas consistent with the provision of the offset policy to compensate for loss of biodiversity values of the site.

6 References

Bostock, P.D. and Holland, A.E. (eds) (2010). *Census of the Queensland Flora 2010*. Queensland Herbarium, Department of Environment and Resource Management, Toowong, Queensland.

Cropper, S.C. (1993). *Management of Endangered Plants*. CSIRO, Canberra.

Department of Environment and Resource Management (2010). *Fitzroy Natural Resource Management Region Back on Track Actions for Biodiversity*, Department of Environment and Resource Management, Brisbane.

Department of Environment and Resource Management (2011). Regional Ecosystem Description Database (REDD). Version 6.0b Updated January 2011, (January 2011) Department of Environment and Resource Management, Brisbane.

Halford, D. (1996). *Eleocharis blakeana*, in Species Management Manual. Department of Natural Resources, Brisbane.

Natural Resource Management Ministerial Council (2006). *Australian Weed Strategy – A National Strategy for Weed Management in Australia.* Australian Government Department of the Environment and Water Resources, Canberra ACT.

Neldner, V.J., Wilson, B. A., Thompson, E.J. and Dillewaard, H.A. (2005). *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Version 3.1. Updated September 2005. Queensland Herbarium, Environmental Protection Agency, Brisbane.

Sharp, D. & Simon, B.K. (2002). *AusGrass: Grasses of Australia*. CD-ROM, Version 1.0, Australian Biological Resources Study, Canberra, and Environmental Protection Agency, Queensland.

Thorp, J.R. and Lynch, R. (2000). The determination of weeds of national significance. National Weeds Strategy Executive Committee.

Walker, J. and Hopkins, M.S. (1990). Vegetation. In R.C. McDonald, R.F. Isbell, J.G. Speight, J. Walker and M.S. Hopkins (eds), *Australian Soil and Land Survey Field Handbook*, 2nd edition, pp. 58–86. Inkata Press, Melbourne.

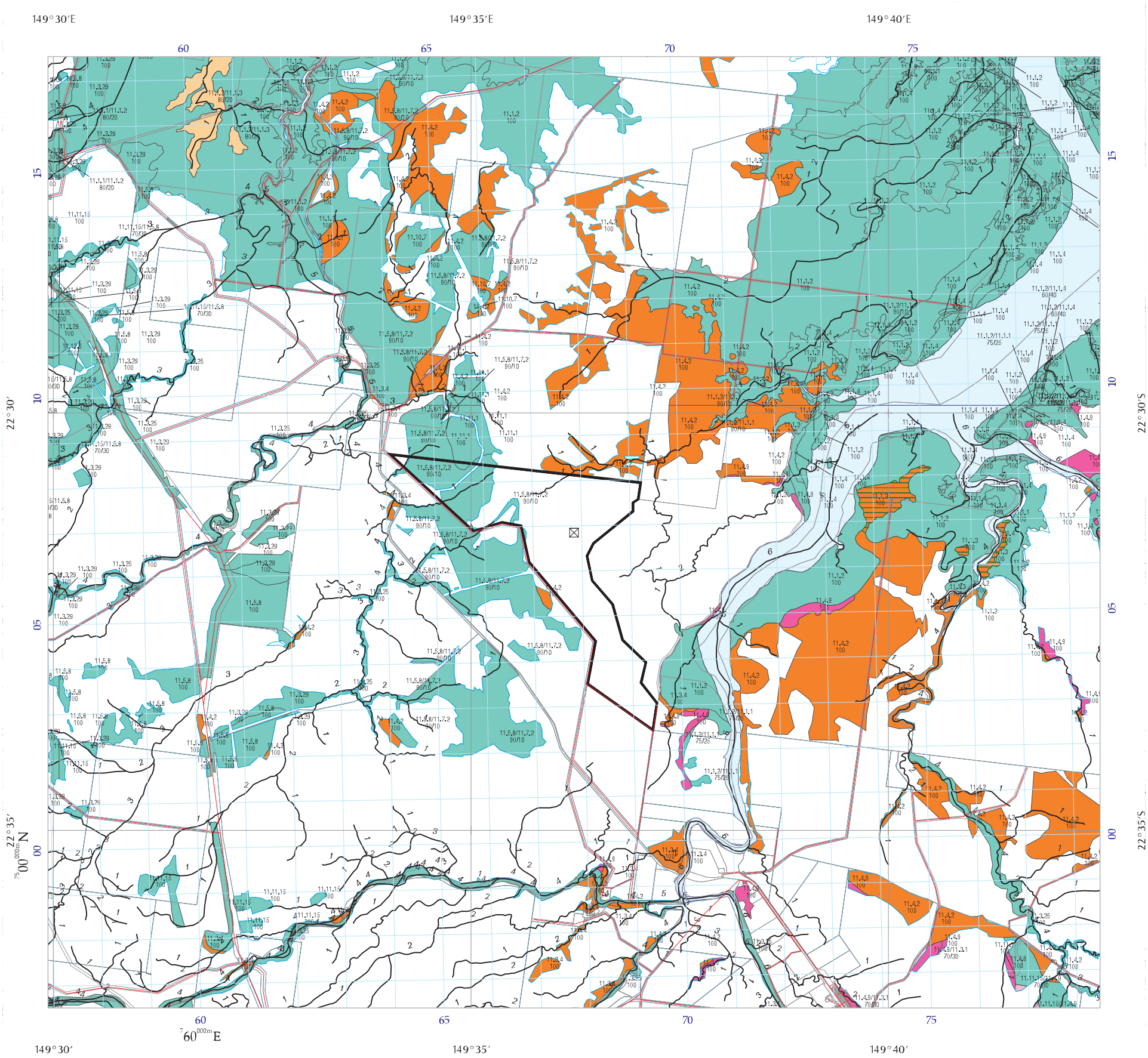
Young, P.A.R., Wilson, B.A., McCosker, J.C., Fensham, R.J., Morgan, G. and Taylor, P.M. (1999). Brigalow Belt. In P.S. Sattler and R.D. Williams (eds) *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendix A

Extract of Certified Regional Ecosystem Mapping

Version 6.0b

(Source: DERM, 2011)



Vegetation Management Act Regional Ecosystem and Remnant Map-Version 6

Remnant vegetation containing endangered regional ecosystems
- Dominant
- Sub-dominant

Remnant vegetation containing of concern regional ecosystems
- Dominant
- Sub-dominant

- 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 © MapInfo Australia Pty Ltd 2009
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

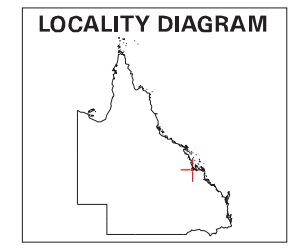
Based on 2006 Landsat TM imagery

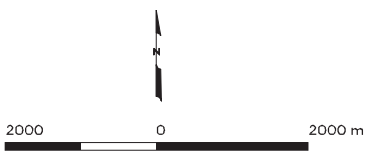
Requested By: ANDREW@OBERONIA.COM.AU
Date: 14 Apr 11 Time: 22.12.50

Centered on point position:
Latitude: -22.5238 Longitude: 149.6039 (decimal degrees)
Bioregion: Brigalow Belt

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), Department of Environment and Resource Management (DERM)).

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

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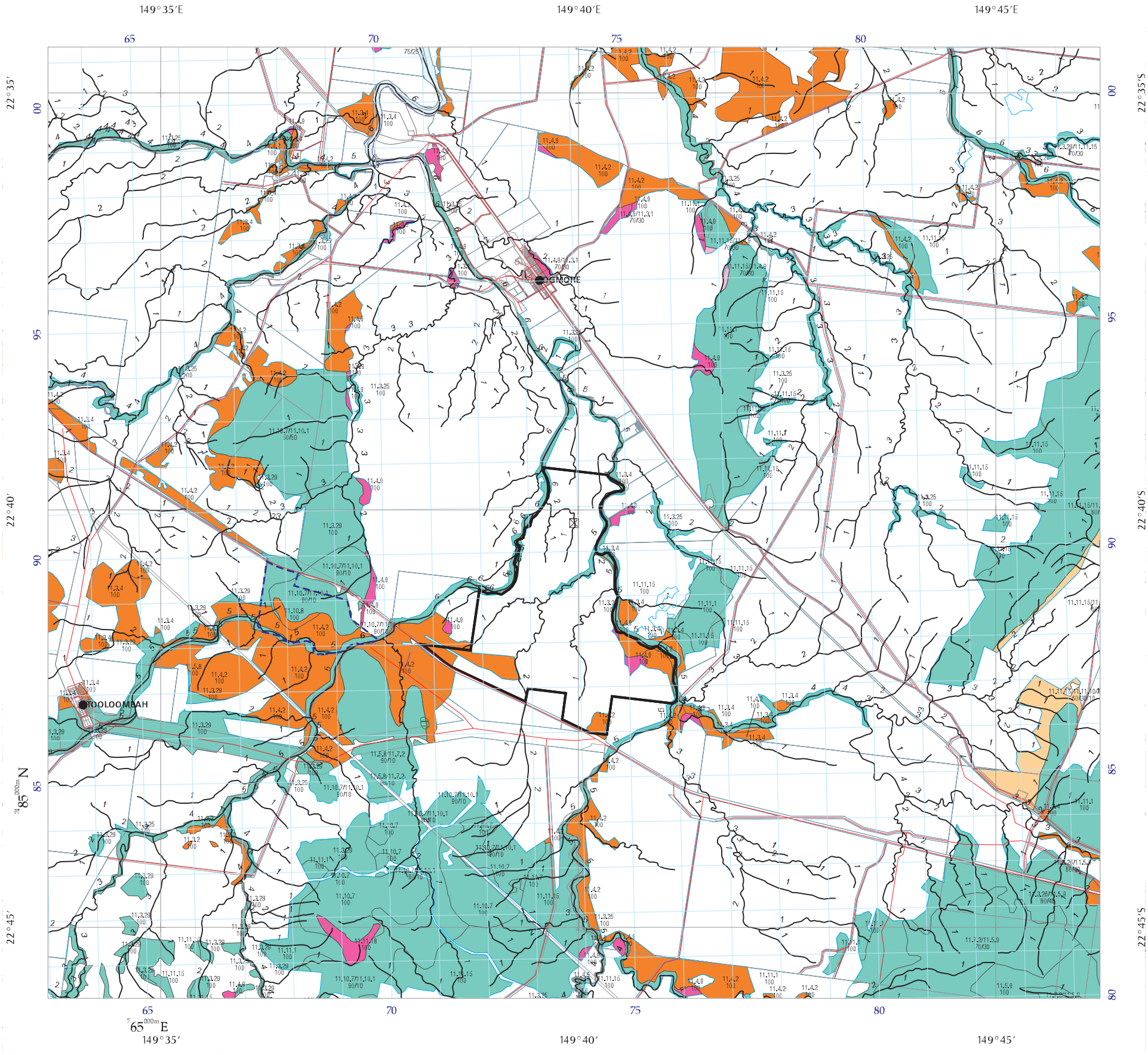
All datasets are updated as they become available to provide the most current information as of the date shown on this map.

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 Environment and Resource Management.

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



Vegetation Management Act Regional Ecosystem and Remnant Map-Version 6

Remnant vegetation containing endangered regional ecosystems
- Dominant
- Sub-dominant

Remnant vegetation containing of concern regional ecosystems
- Dominant
- Sub-dominant

- 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 © MapInfo Australia Pty Ltd 2009
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

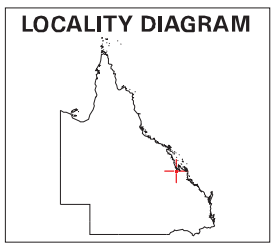
Based on 2006 Landsat TM imagery

Requested By: ANDREW@OBERONIA.COM.AU
Date: 14 Apr 11 Time: 22.12.40

Centered on point position:
Latitude: -22.6692 Longitude: 149.6658 (decimal degrees)
Bioregion: Brigalow Belt

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.

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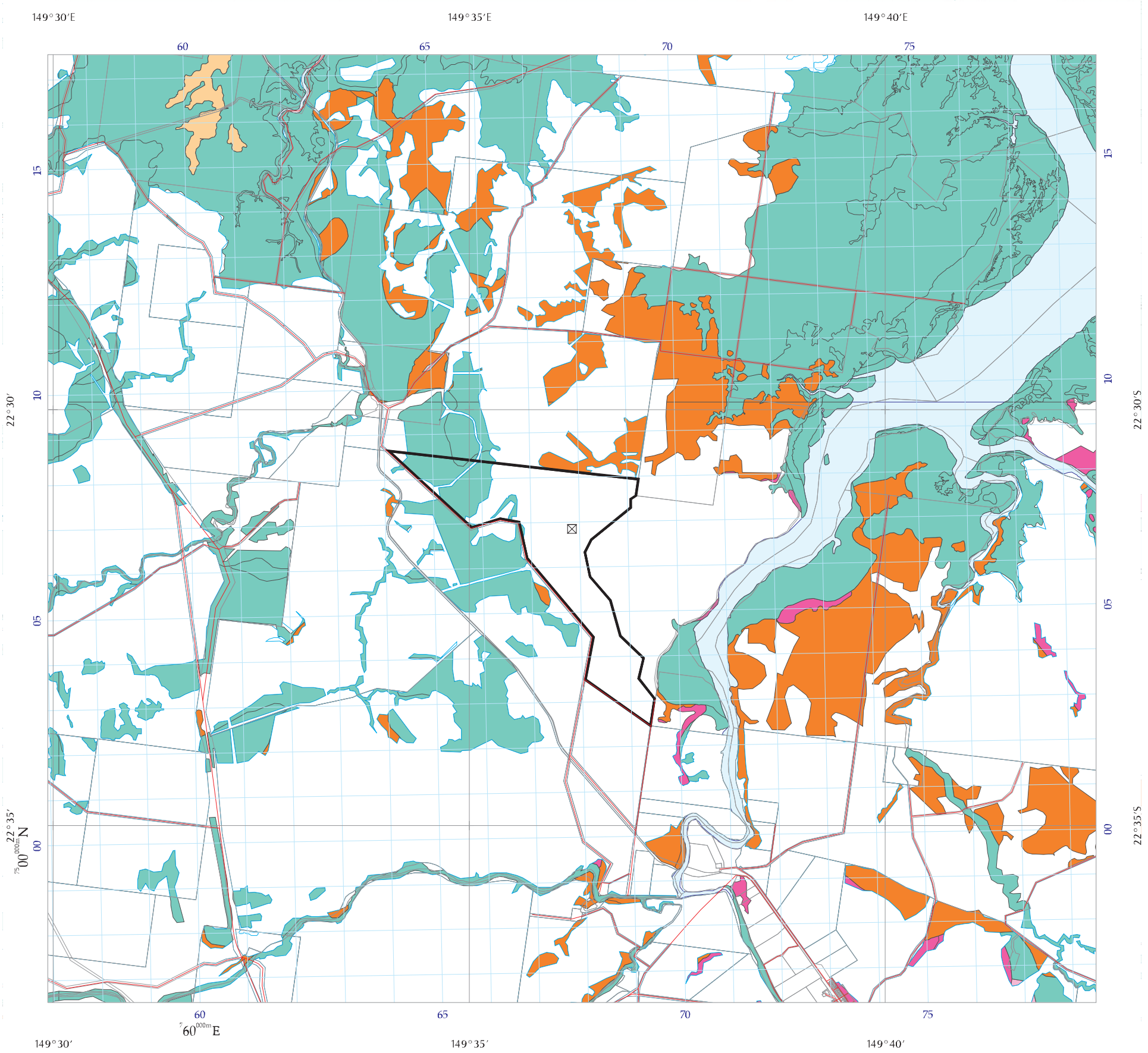


Vegetation Management Act Essential Habitat Map Version 3.0

Remnant vegetation containing endangered regional ecosystems
- Dominant
- Sub-dominant

Remnant vegetation containing of concern regional ecosystems
- Dominant
- Sub-dominant

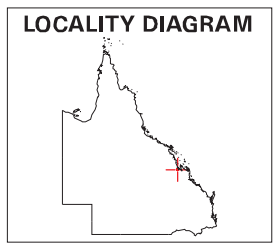
- Remnant vegetation that is a least concern regional ecosystem
- Remnant vegetation under Section 20AH of the VMA
- Non-remnant
- Plantation Forest
- Dam or Reservoir
- Remnant Vegetation
- PMAV Category X area
- Vegetation Management Act Essential Habitat
- Vegetation Management Act Essential Habitat Species Records
- Subject Lot
- Roads © MapInfo Australia Pty Ltd 2009
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

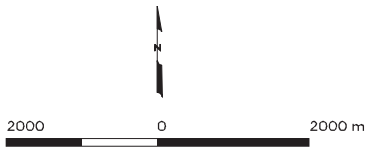
Requested By: ANDREW@OBERONIA.COM.AU
Date: 14 Apr 11 Time: 22.12.54

Centered on point position:
Latitude: -22.5238 Longitude: 149.6039 (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, Department of Environment and Resource Management).

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

Vegetation Management Act Essential Habitat Map Version 3.0

Remnant vegetation containing endangered regional ecosystems
- Dominant
- Sub-dominant

Remnant vegetation containing of concern regional ecosystems
- Dominant
- Sub-dominant

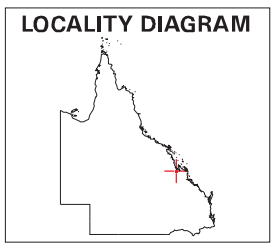
- Remnant vegetation that is a least concern regional ecosystem
- Remnant vegetation under Section 20AH of the VMA
- Non-remnant
- Plantation Forest
- Dam or Reservoir
- Remnant Vegetation
- PMAV Category X area
- Vegetation Management Act Essential Habitat
- Vegetation Management Act Essential Habitat Species Records
- Subject Lot
- Roads © MapInfo Australia Pty Ltd 2009
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

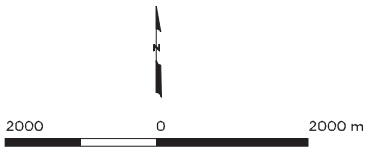
Requested By: ANDREW@OBERONIA.COM.AU
Date: 14 Apr 11 Time: 22.12.44

Centered on point position:
Latitude: -22.6692 Longitude: 149.6658 (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, Department of Environment and Resource Management).

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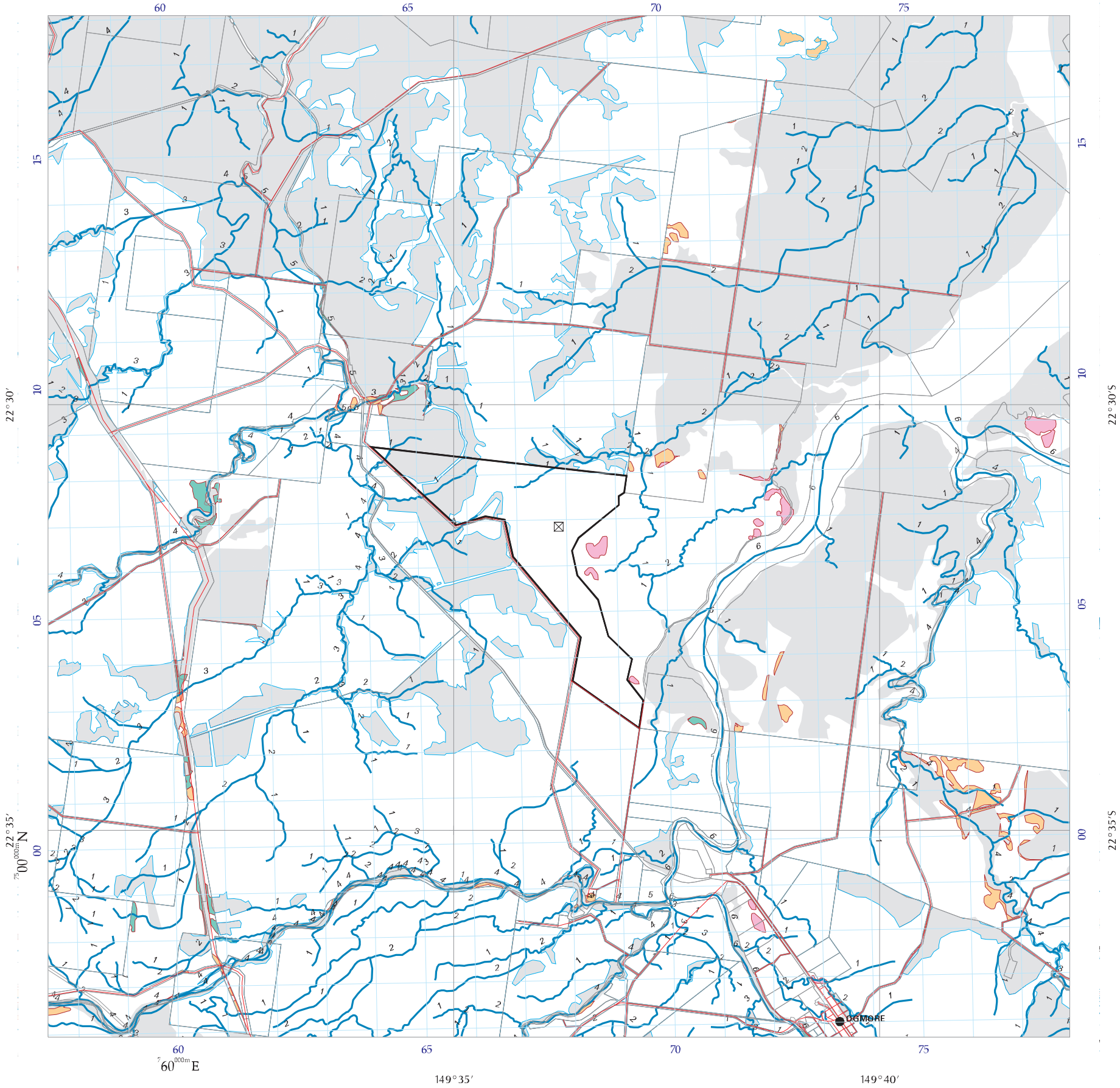
Digital regional ecosystem data is available in shapefile format, for Lot on Plans from www.derm.qld.gov.au/REDATA or from DERM for larger areas.

Appendix B

High Value Regrowth Vegetation Mapping

Version 2.0

(Source: DERM, 2011)



REGROWTH VEGETATION MAP - Version 2.0

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
© MapInfo Australia Pty Ltd 2009

Cadastral line
Property boundaries shown are provided as a locational aid only.

Towns

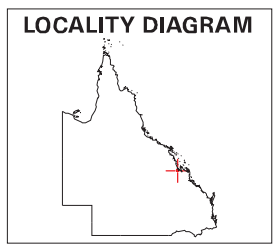
Coordinate entered

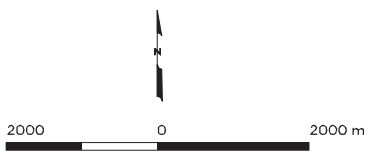
Requested By: ANDREW@OBERONIA.COM.AU
Date: 14 Mar 11 Time: 09.30.38

Centered on point position:
Latitude: -22.5238 Longitude: 149.6039 (decimal degrees)

Queensland Government

LOCALITY DIAGRAM





Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

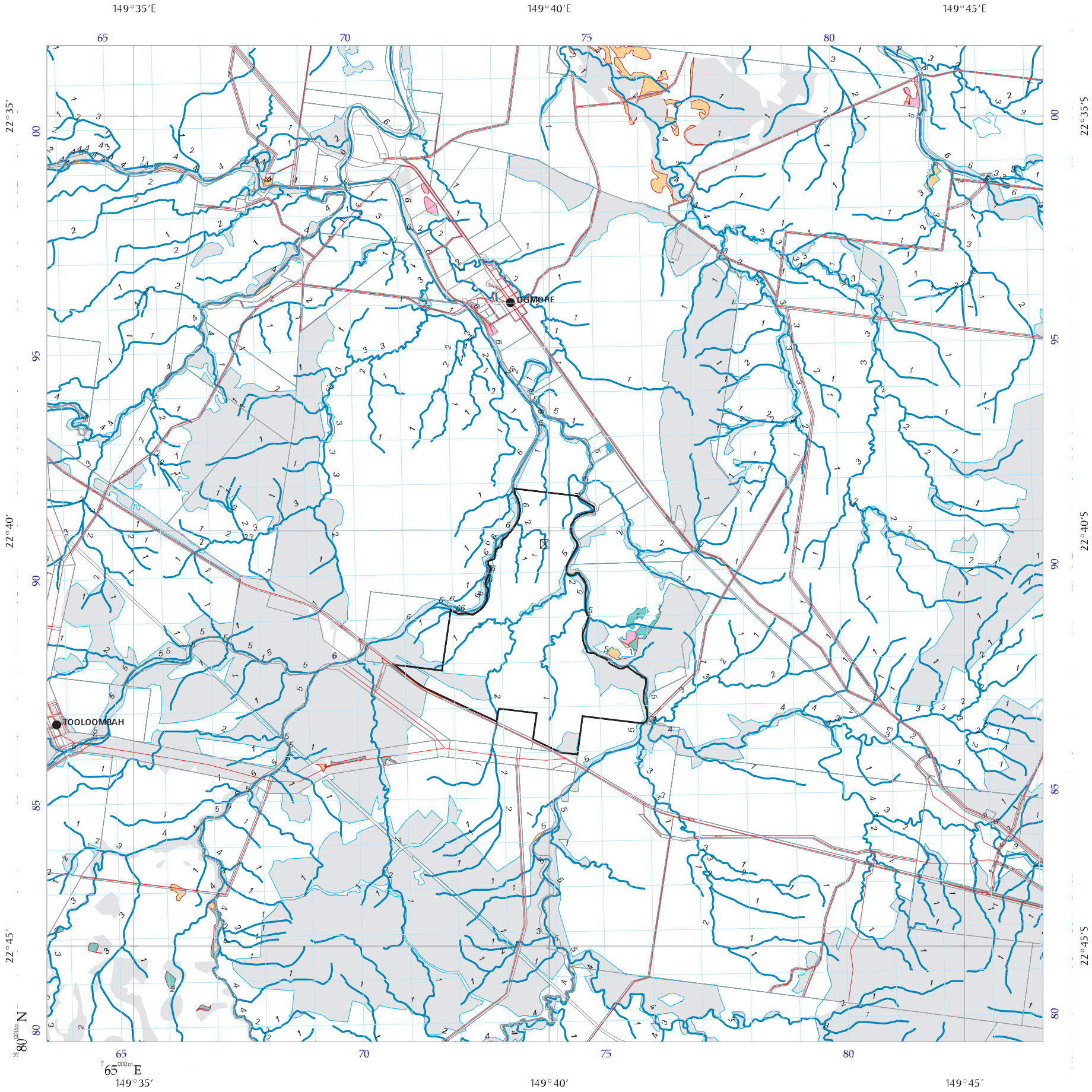
Labels for Vegetation Management Act Essential Regrowth Habitat are centred on the subject lot.
Labels correlate to the label field in the attached essential regrowth habitat database.

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 Environment and Resource Management.

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.



REGROWTH VEGETATION MAP - Version 2.0

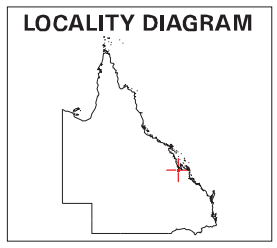
- 1087 Vegetation Management Act Essential Regrowth Habitat with example label number
- Great Barrier Reef Wetland Protection Area
- High value regrowth vegetation containing Endangered regional ecosystems
- High value regrowth vegetation containing Of Concern regional ecosystems
- High value regrowth 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
- © MapInfo Australia Pty Ltd 2009
- Cadastral line
- Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

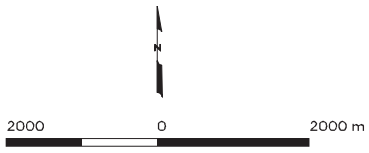
Requested By: ANDREW@OBERONIA.COM.AU
Date: 14 Mar 11 Time: 09.30.50

Centered on point position:
Latitude: -22.6692 Longitude: 149.6658 (decimal degrees)

Queensland Government

LOCALITY DIAGRAM





Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

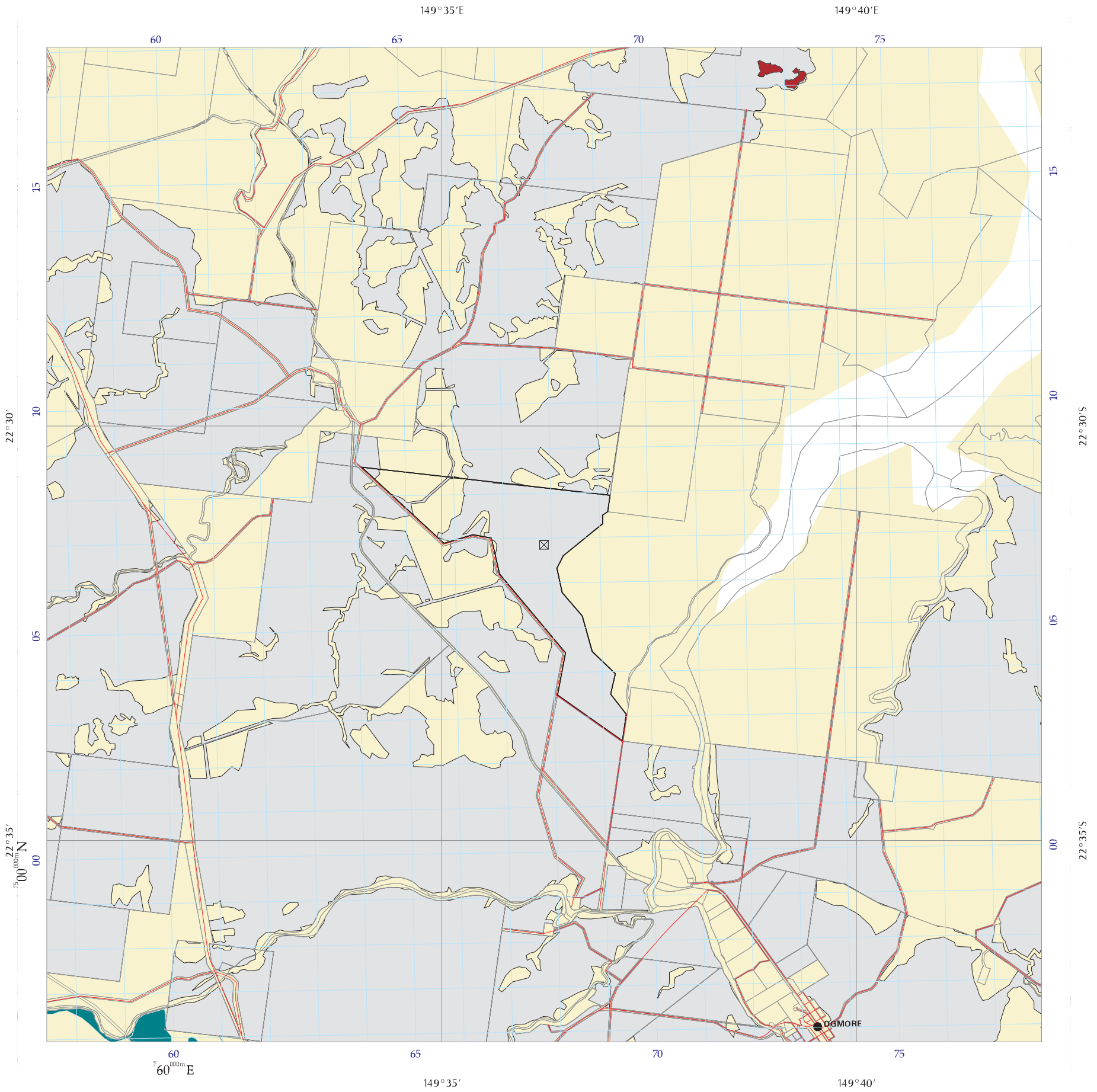
Labels for Vegetation Management Act Essential Regrowth Habitat are centred on the subject lot.
Labels correlate to the label field in the attached essential regrowth habitat database.

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 Environment and Resource Management.

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.



Property Maps of Assessable Vegetation (PMAVs)

Requested By: ANDREW@OBERONIA.COM.AU
Date: 14 Mar 11 Time: 09.30.40

Centered on point position:
Latitude: -22.5238 Longitude: 149.6039 (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.

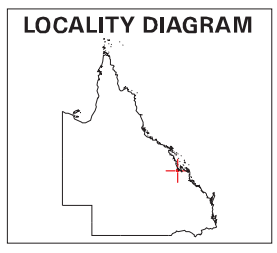
For further information go to the website:
http://www.derm.qld.gov.au/vegetation/index.html
or contact Vegetation Management, Department of Environment and Resource Management.

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
  © MapInfo Australia Pty Ltd 2009
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

Queensland Government

LOCALITY DIAGRAM



2000 0 2000 m

Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

Property Maps of Assessable Vegetation (PMAVs)

Requested By: ANDREW@OBERONIA.COM.AU
Date: 14 Mar 11 Time: 09.30.52

Centered on point position:
Latitude: -22.6692 Longitude: 149.6658 (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.

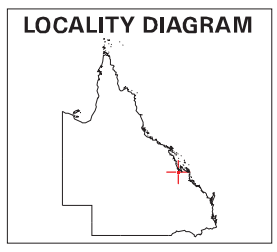
For further information go to the website:
http://www.derm.qld.gov.au/vegetation/index.html
or contact Vegetation Management, Department of Environment and Resource Management.

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
  © MapInfo Australia Pty Ltd 2009
- Cadastral line
  Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered

Queensland Government

LOCALITY DIAGRAM



2000 0 2000 m

Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

Appendix C

EPBC Protected Matters Search Tool Results

(Source: DSEWPC, 2011)

EPBC Act Protected Matters Report: Coordinates

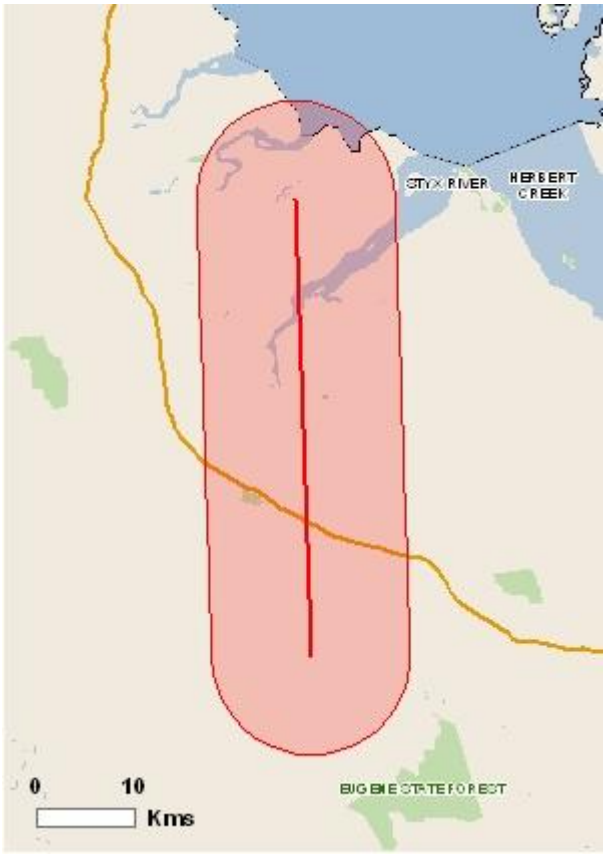
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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.

You may wish to print this report for reference before moving to other pages or websites.

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: 01/03/11 22:35:27



Coordinates
Buffer: 10Km

Summary

Matters of National Environmental 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:	1
National Heritage Places:	1
Wetlands of International Significance (Ramsar Wetlands):	None
Great Barrier Reef Marine Park:	Relevant
Commonwealth Marine Areas:	None
Threatened Ecological Communitites:	3
Threatened Species:	28
Migratory Species:	35

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

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

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.au/epbc/permits/index.html.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	76

Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves:	None

Report Summary for Extra Information

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

Place on the RNE:	2
State and Territory Reserves:	4
Regional Forest Agreements:	None
Invasive Species:	13
Nationally Important Wetlands:	1

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	Status
Great Barrier Reef QLD	Declared property

National Heritage Places [Resource Information]

Name	Status
Natural	
Great Barrier Reef QLD	Listed place

Great Barrier Reef Marine Park [Resource Information]

Zone Type	Zone Name	IUCN
Marine National Park	MNP-21-1146	II
General Use	GU-19-6010	VI

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
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	Endangered	Community may occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area

Threatened Species [Resource Information]

Name	Status	Type of Presence
BIRDS		

Epthianura crocea macgregori Yellow Chat (Dawson) [67090]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	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
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Vulnerable	Species or species habitat may occur within area
MAMMALS		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
Dasyurus hallucatus Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Nyctophilus timoriensis (South-eastern form) Greater Long-eared Bat, South-eastern Long-eared Bat [66888]	Vulnerable	Species or species habitat may occur within area
Pteropus conspicillatus Spectacled Flying-fox [185]	Vulnerable	Species or species habitat may occur within area
Xeromys myoides Water Mouse, False Water Rat [66]	Vulnerable	Species or species habitat likely to occur within area
OTHER		
Cycas ophiolitica [55797]	Endangered	Species or species habitat likely to occur within area
PLANTS		
Leucopogon cuspidatus [9739]	Vulnerable	Species or species habitat likely to occur within area
REPTILES		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area

Chelonia mydas		
Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Denisonia maculata		
Ornamental Snake [1193]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Egernia rugosa		
Yakka Skink [1420]	Vulnerable	Species or species habitat likely to occur within area
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Furina dunmalli		
Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Lepidochelys olivacea		
Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Rheodytes leukops		
Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle [1761]	Vulnerable	Species or species habitat may occur within area
SHARKS		
Pristis zijsron		
Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Species or species habitat may occur within area
Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Migratory Species [Resource Information]

Name	Status	Type of Presence
Migratory Marine Birds		
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat may 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
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Sterna albifrons		
Little Tern [813]		Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area

Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat likely to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat likely to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat likely to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Migratory Terrestrial Species		
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat may occur within area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat may occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat likely to 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
Calidris tenuirostris	
Great Knot [862]	Species or species habitat likely to occur within area
Gallinago hardwickii	
Latham's Snipe, Japanese Snipe [863]	Species or species habitat may occur within area
Nettapus coromandelianus albipennis	
Australian Cotton Pygmy-goose [25979]	Species or species habitat may occur within area
Numenius madagascariensis	
Eastern Curlew [847]	Species or species habitat likely to occur within area
Numenius phaeopus	
Whimbrel [849]	Species or species habitat likely to occur within area
Rostratula benghalensis s. lat.	
Painted Snipe [889]	Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anseranas semipalmata		
Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat may 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
Calidris tenuirostris		
Great Knot [862]		Species or species habitat likely to 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
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat may occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area

Merops ornatus Rainbow Bee-eater [670]	Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]	Species or species habitat may occur within area
Monarcha trivirgatus Spectacled Monarch [610]	Breeding likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]	Species or species habitat likely to occur within area
Nettapus coromandelianus albipennis Australian Cotton Pygmy-goose [25979]	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew [847]	Species or species habitat likely to occur within area
Numenius phaeopus Whimbrel [849]	Species or species habitat likely to occur within area
Rostratula benghalensis s. lat. Painted Snipe [889]	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]	Species or species habitat may occur within area
Fish	
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]	Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]	Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied Pipefish [66194]	Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]	Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]	Species or species habitat may occur within area
Corythoichthys haematopterus Reef-top Pipefish [66201]	Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]	Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]	Species or species habitat may occur within area
Corythoichthys paxtoni Paxton's Pipefish [66204]	Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]	Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific	Species or species habitat may occur within area

Blue-stripe Pipefish [66211]	
Festucalex cinctus	
Girdled Pipefish [66214]	Species or species habitat may occur within area
Filicampus tigris	
Tiger Pipefish [66217]	Species or species habitat may occur within area
Halicampus dunckeri	
Red-hair Pipefish, Duncker's Pipefish [66220]	Species or species habitat may occur within area
Halicampus grayi	
Mud Pipefish, Gray's Pipefish [66221]	Species or species habitat may occur within area
Halicampus nitidus	
Glittering Pipefish [66224]	Species or species habitat may occur within area
Halicampus spinirostris	
Spiny-snout Pipefish [66225]	Species or species habitat may occur within area
Hippichthys cyanospilos	
Blue-speckled Pipefish, Blue-spotted Pipefish [66228]	Species or species habitat may occur within area
Hippichthys heptagonus	
Madura Pipefish, Reticulated Freshwater Pipefish [66229]	Species or species habitat may occur within area
Hippichthys penicillus	
Beady Pipefish, Steep-nosed Pipefish [66231]	Species or species habitat may occur within area
Hippocampus bargibanti	
Pygmy Seahorse [66721]	Species or species habitat may occur within area
Hippocampus kuda	
Spotted Seahorse, Yellow Seahorse [66237]	Species or species habitat may occur within area
Hippocampus planifrons	
Flat-face Seahorse [66238]	Species or species habitat may occur within area
Hippocampus zebra	
Zebra Seahorse [66241]	Species or species habitat may occur within area
Lissocampus runa	
Javelin Pipefish [66251]	Species or species habitat may occur within area
Micrognathus andersonii	
Anderson's Pipefish, Shortnose Pipefish [66253]	Species or species habitat may occur within area
Micrognathus brevirostris	
thorntail Pipefish, Thorn-tailed Pipefish [66254]	Species or species habitat may occur within area
Nannocampus pictus	
Painted Pipefish, Reef Pipefish [66263]	Species or species habitat may occur within area
Solegnathus hardwickii	
Pallid Pipehorse, Hardwick's Pipehorse [66272]	Species or species habitat may occur within area
Solenostomus cyanopterus	
Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]	Species or species habitat may occur within area
Solenostomus paegnius	
Rough-snout Ghost Pipefish	Species or species habitat may occur within area

[68425]

Solenostomus paradoxus

Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184] — Species or species habitat may occur within area

Syngnathoides biaculeatus

Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279] — Species or species habitat may occur within area

Trachyrhamphus bicoarctatus

Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280] — Species or species habitat may occur within area

Mammals

Dugong dugon

Dugong [28] — Species or species habitat likely to occur within area

Reptiles

Acalyptophis peronii

Horned Seasnake [1114] — Species or species habitat may occur within area

Aipysurus duboisii

Dubois' Seasnake [1116] — Species or species habitat may occur within area

Aipysurus eydouxii

Spine-tailed Seasnake [1117] — Species or species habitat may occur within area

Aipysurus laevis

Olive Seasnake [1120] — Species or species habitat may occur within area

Astrotia stokesii

Stokes' Seasnake [1122] — Species or species habitat may occur within area

Caretta caretta

Loggerhead Turtle [1763] — Endangered — Species or species habitat likely to occur within area

Chelonia mydas

Green Turtle [1765] — Vulnerable — Species or species habitat likely to occur within area

Crocodylus porosus

Salt-water Crocodile, Estuarine Crocodile [1774] — Species or species habitat likely to occur within area

Dermochelys coriacea

Leatherback Turtle, Leathery Turtle, Luth [1768] — Endangered — Species or species habitat likely to occur within area

Disteira kingii

Spectacled Seasnake [1123] — Species or species habitat may occur within area

Disteira major

Olive-headed Seasnake [1124] — Species or species habitat may occur within area

Emydocephalus annulatus

Turtle-headed Seasnake [1125] — Species or species habitat may occur within area

Eretmochelys imbricata

Hawksbill Turtle [1766] — Vulnerable — Species or species habitat likely to occur within area

Hydrophis elegans

Elegant Seasnake [1104] — Species or species habitat may occur within area

Hydrophis mcdowelli

null [25926] — Species or species habitat may occur within area

Hydrophis ornatus a seasnake [1111]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Laticauda colubrina a sea krait [1092]		Species or species habitat may occur within area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and Other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat may occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

Places on the RNE [Resource Information]

Note that not all Indigenous sites may be listed.

Name	Status
Natural	
Great Barrier Reef Region QLD	Registered
Historic	
Newport Meatworks Site (former) QLD	Indicative Place

State and Territory Reserves [Resource Information]

Great Barrier Reef Coast, QLD
Newport, QLD
Tooloombah Creek, QLD
Broad Sound, 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, 2001.

Name	Status	Type of Presence
Mammals		
Capra hircus Goat [2]		Species or species habitat may occur within area
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
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat may occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered		Species or species habitat likely to occur within area

Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]	
Parkinsonia aculeata	
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]	Species or species habitat may occur within area
Parthenium hysterophorus	
Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]	Species or species habitat likely to occur within area
Prosopis spp.	
Mesquite, Algaroba [68407]	Species or species habitat may occur within area
Salvinia molesta	
Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]	Species or species habitat may occur within area

Nationally Important Wetlands **[Resource Information]**

Broad Sound, QLD

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 resolutions.

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 information sources.

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.

Coordinates

149.65287 -22.41495,149.66709 -22.83139

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

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

Appendix D

Wildlife Online Search Results

(Source: DERM, 2011)

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 22.3703 to 22.8864
Longitude: 149.7151 to 149.6029
Email: andrew@oberonia.com.au
Date submitted: Tuesday 01 Mar 2011 21:48:11
Date extracted: Tuesday 01 Mar 2011 22:01:04

The number of records retrieved = 245

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	*Rhinella marina*	cane toad	Y			1
animals	birds	Acanthizidae	*Gerygone fusca*	western gerygone		C		1
animals	birds	Acanthizidae	*Gerygone palpebrosa*	fairy gerygone		C		1
animals	birds	Acanthizidae	*Acanthiza reguloides*	buff-rumped thornbill		C		1
animals	birds	Acanthizidae	*Chthonicola sagittata*	speckled warbler		C		1
animals	birds	Acanthizidae	*Sericornis frontalis*	white-browed scrubwren		C		1
animals	birds	Accipitridae	*Aquila audax*	wedge-tailed eagle		C		3
animals	birds	Accipitridae	*Milvus migrans*	black kite		C		1
animals	birds	Anatidae	*Anas gracilis*	grey teal		C		1
animals	birds	Anatidae	*Tadorna radjah*	radjah shelduck		NT		1
animals	birds	Anatidae	*Anas superciliosa*	Pacific black duck		C		1
animals	birds	Ardeidae	*Ardea pacifica*	white-necked heron		C		1
animals	birds	Artamidae	*Strepera graculina*	pied currawong		C		1
animals	birds	Cacatuidae	*Calyptorhynchus banksii*	red-tailed black-cockatoo		C		1
animals	birds	Campephagidae	*Lalage leucomela*	varied triller		C		1
animals	birds	Corcoracidae	*Struthidea cinerea*	apostlebird		C		1
animals	birds	Corvidae	*Corvus sp.*					1
animals	birds	Estrildidae	*Neochmia ruficauda*	star finch		C		1
animals	birds	Estrildidae	*Taeniopygia bichenovii*	double-barred finch		C		1
animals	birds	Halcyonidae	*Dacelo novaeguineae*	laughing kookaburra		C		1
animals	birds	Halcyonidae	*Todiramphus sanctus*	sacred kingfisher		C		1
animals	birds	Maluridae	*Malurus lamberti*	variegated fairy-wren		C		1
animals	birds	Megapodiidae	*Alectura lathami*	Australian brush-turkey		C		2
animals	birds	Meliphagidae	*Meliphaga lewinii*	Lewin's honeyeater		C		1
animals	birds	Meliphagidae	*Lichmera indistincta*	brown honeyeater		C		1
animals	birds	Meliphagidae	*Acanthagenys rufogularis*	spiny-cheeked honeyeater		C		1
animals	birds	Meliphagidae	*Melithreptus albogularis*	white-throated honeyeater		C		2
animals	birds	Meliphagidae	*Manorina flavigula*	yellow-throated miner		C		2
animals	birds	Monarchidae	*Myiagra rubecula*	leaden flycatcher		C		1
animals	birds	Nectariniidae	*Dicaeum hirundinaceum*	mistletoebird		C		1
animals	birds	Otididae	*Ardeotis australis*	Australian bustard		C		1
animals	birds	Pachycephalidae	*Colluricincla harmonica*	grey shrike-thrush		C		1
animals	birds	Pachycephalidae	*Pachycephala rufiventris*	rufous whistler		C		2
animals	birds	Petroicidae	*Petroica rosea*	rose robin		C		1
animals	birds	Petroicidae	*Microeca fascinans*	jacky winter		C		1
animals	birds	Petroicidae	*Eopsaltria australis*	eastern yellow robin		C		1
animals	birds	Psittacidae	*Trichoglossus haematodus moluccanus*	rainbow lorikeet		C		1
animals	birds	Rhipiduridae	*Rhipidura albiscapa*	grey fantail		C		2
animals	birds	Threskiornithidae	*Platalea regia*	royal spoonbill		C		1
animals	birds	Timaliidae	*Zosterops lateralis*	silvereye		C		1
animals	insects	Lycaenidae	*Jalmenus eubulus*	pale imperial hairstreak		V		1
animals	mammals	Macropodidae	*Macropus dorsalis*	black-striped wallaby		C		1
animals	mammals	Peramelidae	*Isoodon macrourus*	northern brown bandicoot		C		1
animals	mammals	Tachyglossidae	*Tachyglossus aculeatus*	short-beaked echidna		C		1
animals	reptiles	Boidae	*Morelia spilota*	carpet python		C		1
fungi	sac fungi	Usneaceae	*Usnea scabrida subsp. elegans*			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Acanthaceae	*Ruellia tuberosa*		Y			2
plants	higher dicots	Acanthaceae	*Rostellularia adscendens*			C		2
plants	higher dicots	Aizoaceae	*Trianthema portulacastrum*	black pigweed	Y			1
plants	higher dicots	Amaranthaceae	*Achyranthes aspera*			C		2
plants	higher dicots	Amaranthaceae	*Deeringia amaranthoides*	redberry		C		2/2
plants	higher dicots	Amaranthaceae	*Alternanthera nana*	hairy joyweed		C		2
plants	higher dicots	Apocynaceae	*Parsonsia*			C		1
plants	higher dicots	Apocynaceae	*Wrightia saligna*			C		1
plants	higher dicots	Apocynaceae	*Cascabela thevetia*	yellow oleander	Y			2/2
plants	higher dicots	Apocynaceae	*Secamone elliptica*			C		1/1
plants	higher dicots	Apocynaceae	*Parsonsia lanceolata*	northern silkpod		C		2
plants	higher dicots	Apocynaceae	*Cryptostegia grandiflora*	rubber vine	Y			3/1
plants	higher dicots	Apocynaceae	*Parsonsia eucalyptophylla*	gargaloo		C		1
plants	higher dicots	Apocynaceae	*Asclepias curassavica*	red-head cottonbush	Y			1
plants	higher dicots	Apocynaceae	*Alstonia constricta*	bitterbark		C		1
plants	higher dicots	Apocynaceae	*Cynanchum bowmanii*	bowman's milkvine		C		1/1
plants	higher dicots	Apocynaceae	*Carissa ovata*	currantbush		C		2
plants	higher dicots	Asclepiadaceae	*Sarcostemma*			C		1
plants	higher dicots	Asteraceae	*Asteraceae*			C		1
plants	higher dicots	Asteraceae	*Parthenium hysterophorus*	parthenium weed	Y			1
plants	higher dicots	Asteraceae	*Verbesina encelioides*	crownbeard	Y			1
plants	higher dicots	Asteraceae	*Xanthium occidentale*		Y			1
plants	higher dicots	Asteraceae	*Ageratum conyzoides*	billygoat weed	Y			1
plants	higher dicots	Asteraceae	*Eriochlamys*			C		1
plants	higher dicots	Asteraceae	*Eclipta prostrata*	white eclipta		C		1/1
plants	higher dicots	Boraginaceae	*Ehretia*			C		1
plants	higher dicots	Boraginaceae	*Heliotropium indicum*		Y			1/1
plants	higher dicots	Boraginaceae	*Ehretia membranifolia*	weeping koda		C		3
plants	higher dicots	Cactaceae	*Opuntia stricta*		Y			1
plants	higher dicots	Cactaceae	*Opuntia tomentosa*	velvety tree pear	Y			1
plants	higher dicots	Caesalpiniaceae	*Senna barclayana*			C		1
plants	higher dicots	Caesalpiniaceae	*Lysiphyllum hookeri*	Queensland ebony		C		1
plants	higher dicots	Caesalpiniaceae	*Senna coronilloides*			C		1
plants	higher dicots	Capparaceae	*Capparis lasiantha*	nipan		C		3
plants	higher dicots	Capparaceae	*Apophyllum anomalum*	broom bush		C		1
plants	higher dicots	Casuarinaceae	*Casuarina cristata*	belah		C		1
plants	higher dicots	Casuarinaceae	*Allocasuarina luehmannii*	bull oak		C		1/1
plants	higher dicots	Casuarinaceae	*Allocasuarina torulosa*			C		1/1
plants	higher dicots	Celastraceae	*Denhamia oleaster*			C		2/1
plants	higher dicots	Celastraceae	*Maytenus cunninghamii*	yellow berry bush		C		1
plants	higher dicots	Celastraceae	*Elaeodendron australe var. integrifolium*			C		1
plants	higher dicots	Chenopodiaceae	*Salsola kali*			C		1
plants	higher dicots	Chenopodiaceae	*Einadia hastata*			C		1
plants	higher dicots	Chenopodiaceae	*Maireana microphylla*			C		1
plants	higher dicots	Chenopodiaceae	*Enchylaena tomentosa*			C		3
plants	higher dicots	Combretaceae	*Terminalia oblongata*			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Combretaceae	*Terminalia porphyrocarpa*			C		1/1
plants	higher dicots	Convolvulaceae	*Bonamia media*			C		1/1
plants	higher dicots	Convolvulaceae	*Evolvulus alsinoides*			C		1
plants	higher dicots	Convolvulaceae	*Ipomoea carnea subsp. fistulosa*		Y			1/1
plants	higher dicots	Cucurbitaceae	*Diplocyclos palmatus*			C		1
plants	higher dicots	Ebenaceae	*Diospyros humilis*	small-leaved ebony		C		1
plants	higher dicots	Erythroxylaceae	*Erythroxylum australe*	cocaine tree		C		1
plants	higher dicots	Euphorbiaceae	*Euphorbiaceae*			C		1
plants	higher dicots	Euphorbiaceae	*Acalypha capillipes*	small-leaved acalypha		C		1
plants	higher dicots	Euphorbiaceae	*Excoecaria dallachyana*	scrub poison tree		C		1
plants	higher dicots	Euphorbiaceae	*Croton phebalioides*	narrow-leaved croton		C		1
plants	higher dicots	Fabaceae	*Indigofera*			C		1
plants	higher dicots	Fabaceae	*Stylosanthes*			C		1
plants	higher dicots	Fabaceae	*Hovea longipes*	brush hovea		C		1
plants	higher dicots	Fabaceae	*Macroptilium lathyroides*		Y			1/1
plants	higher dicots	Fabaceae	*Austrosteenisia blackii var. blackii*			C		1/1
plants	higher dicots	Fabaceae	*Crotalaria incana subsp. incana*		Y			1/1
plants	higher dicots	Fabaceae	*Desmodium campylocaulon*			C		1
plants	higher dicots	Goodeniaceae	*Velleia pubescens*			C		1/1
plants	higher dicots	Goodeniaceae	*Brunonia australis*	blue pincushion		C		1
plants	higher dicots	Gyrostemonaceae	*Codonocarpus attenuatus*			C		1
plants	higher dicots	Lamiaceae	*Lamiaceae*			C		1
plants	higher dicots	Lamiaceae	*Spartothamnella juncea*	native broom		C		1
plants	higher dicots	Lamiaceae	*Clerodendrum floribundum*			C		1
plants	higher dicots	Lamiaceae	*Pityrodia salviifolia*	pityrodia		C		1/1
plants	higher dicots	Lamiaceae	*Salvia reflexa*		Y			1
plants	higher dicots	Lamiaceae	*Glossocarya hemiderma*			C		1
plants	higher dicots	Lamiaceae	*Vitex melicopea*			C		1/1
plants	higher dicots	Lentibulariaceae	*Utricularia aurea*	golden bladderwort		C		1/1
plants	higher dicots	Loganiaceae	*Strychnos psilosperma*	strychnine tree		C		1
plants	higher dicots	Loranthaceae	*Amyema quandang*			C		1
plants	higher dicots	Lythraceae	*Rotala mexicana*			C		1/1
plants	higher dicots	Malvaceae	*Sida*			C		2
plants	higher dicots	Malvaceae	*Abutilon*			C		1
plants	higher dicots	Malvaceae	*Sida corrugata*			C		3/1
plants	higher dicots	Malvaceae	*Abutilon oxycarpum*			C		1
plants	higher dicots	Malvaceae	*Sida hackettiana*			C		2
plants	higher dicots	Malvaceae	*Sida cordifolia*		Y			1
plants	higher dicots	Malvaceae	*Hibiscus*			C		1
plants	higher dicots	Malvaceae	*Hibiscus divaricatus*			C		1/1
plants	higher dicots	Malvaceae	*Sida sp. (Greenvale R.J.Fensham 1150)*			C		1/1
plants	higher dicots	Malvaceae	*Hibiscus phyllochlaenus*			C		1/1
plants	higher dicots	Menyanthaceae	*Nymphoides indica*	water snowflake		C		1/1
plants	higher dicots	Mimosaceae	*Albizia lebbeck*	Indian siris		C		1/1
plants	higher dicots	Mimosaceae	*Acacia fasciculifera*	scaly bark		C		1
plants	higher dicots	Mimosaceae	*Archidendropsis thozetiana*			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Mimosaceae	*Acacia crassa subsp. longicoma*			C		3/3
plants	higher dicots	Mimosaceae	*Acacia crassa subsp. crassa*			C		1/1
plants	higher dicots	Mimosaceae	*Acacia harpophylla*	brigalow		C		3
plants	higher dicots	Moraceae	*Ficus opposita*			C		1
plants	higher dicots	Myoporaceae	*Myoporum montanum*	boobialla		C		1/1
plants	higher dicots	Myoporaceae	*Eremophila deserti*			C		2/1
plants	higher dicots	Myoporaceae	*Myoporum acuminatum*	coastal boobialla		C		1
plants	higher dicots	Myoporaceae	*Eremophila mitchellii*			C		1
plants	higher dicots	Myrtaceae	*Eucalyptus platyphylla*	poplar gum		C		1
plants	higher dicots	Myrtaceae	*Melaleuca viminalis*			C		1/1
plants	higher dicots	Myrtaceae	*Eucalyptus cambageana*	Dawson gum		C		1
plants	higher dicots	Myrtaceae	*Corymbia tessellaris*	Moreton Bay ash		C		1
plants	higher dicots	Myrtaceae	*Eucalyptus populnea*	poplar box		C		1
plants	higher dicots	Myrtaceae	*Eucalyptus crebra*	narrow-leaved red ironbark		C		3/1
plants	higher dicots	Oleaceae	*Notelaea microcarpa*			C		1
plants	higher dicots	Oleaceae	*Jasminum didymum subsp. racemosum*			C		1
plants	higher dicots	Onagraceae	*Ludwigia octovalvis*	willow primrose		C		1/1
plants	higher dicots	Passifloraceae	*Passiflora foetida*		Y			1/1
plants	higher dicots	Passifloraceae	*Passiflora aurantia*			C		1
plants	higher dicots	Phyllanthaceae	*Flueggea leucopyrus*			C		1
plants	higher dicots	Phyllanthaceae	*Breynia oblongifolia*			C		2
plants	higher dicots	Pittosporaceae	*Pittosporum spinescens*			C		1
plants	higher dicots	Polygonaceae	*Antigonon leptopus*		Y			1/1
plants	higher dicots	Portulacaceae	*Portulaca oleracea*	pigweed	Y			1
plants	higher dicots	Portulacaceae	*Portulaca*			C		1
plants	higher dicots	Proteaceae	*Grevillea parallela*			C		1
plants	higher dicots	Rhamnaceae	*Alphitonia excelsa*	soap tree		C		1/1
plants	higher dicots	Rhamnaceae	*Alphitonia pomaderroides*			C		1
plants	higher dicots	Rubiaceae	*Spermacoce*			C		1
plants	higher dicots	Rubiaceae	*Psydrax odorata*			C		1
plants	higher dicots	Rubiaceae	*Psydrax attenuata*			C		1
plants	higher dicots	Rubiaceae	*Pavetta australiensis var. australiensis*			C		1/1
plants	higher dicots	Rubiaceae	*Everistia vacciniifolia*			C		1
plants	higher dicots	Rubiaceae	*Triflorensia ixoroides*			C		1
plants	higher dicots	Rutaceae	*Citrus glauca*			C		1
plants	higher dicots	Rutaceae	*Flindersia australis*	crow's ash		C		1
plants	higher dicots	Rutaceae	*Geijera parviflora*	wilga		C		1
plants	higher dicots	Rutaceae	*Geijera salicifolia*	brush wilga		C		1/1
plants	higher dicots	Santalaceae	*Exocarpos latifolius*			C		1
plants	higher dicots	Santalaceae	*Santalum lanceolatum*			C		2
plants	higher dicots	Sapindaceae	*Alectryon connatus*	grey birds-eye		C		1
plants	higher dicots	Sapindaceae	*Alectryon diversifolius*	scrub boonaree		C		3
plants	higher dicots	Sapindaceae	*Atalaya hemiglauca*			C		1
plants	higher dicots	Sapotaceae	*Planchonella cotinifolia*			C		1
plants	higher dicots	Scrophulariaceae	*Scoparia dulcis*	Scoparia	Y			2/1
plants	higher dicots	Simaroubaceae	*Samadera sp. (Dam Creek T.S.Ryan 1006)*			C		2/2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Solanaceae	*Solanum*			C		1
plants	higher dicots	Solanaceae	*Solanum stelligerum*	devil's needles		C		1
plants	higher dicots	Solanaceae	*Solanum elachophyllum*			E		1
plants	higher dicots	Solanaceae	*Solanum ellipticum*	potato bush		C		1/1
plants	higher dicots	Solanaceae	*Solanum esuriale*	quena		C		1
plants	higher dicots	Sparrmanniaceae	*Grewia latifolia*	dysentery plant		C		1
plants	higher dicots	Sparrmanniaceae	*Triumfetta rhomboidea*	chinese burr	Y			1/1
plants	higher dicots	Sterculiaceae	*Sterculia quadrifida*	peanut tree		C		1/1
plants	higher dicots	Sterculiaceae	*Brachychiton australis*	broad-leaved bottle tree		C		1
plants	higher dicots	Sterculiaceae	*Brachychiton rupestris*			C		1
plants	higher dicots	Stylidiaceae	*Stylidium eriorhizum*			C		1/1
plants	higher dicots	Ulmaceae	*Trema tomentosa var. aspera*			C		2/2
plants	higher dicots	Verbenaceae	*Stachytarpheta jamaicensis*	Jamaica snakeweed	Y			1
plants	higher dicots	Vitaceae	*Cayratia*			C		1
plants	higher dicots	Vitaceae	*Clematicissus opaca*			C		1
plants	lower dicots	Aristolochiaceae	*Aristolochia pubera var. pubera*			C		1/1
plants	lower dicots	Papaveraceae	*Argemone ochroleuca subsp. ochroleuca*	Mexican poppy	Y			1
plants	monocots	Cyperaceae	*Cyperus*			C		2
plants	monocots	Cyperaceae	*Cyperus fulvus*			C		1
plants	monocots	Cyperaceae	*Cyperus gracilis*			C		1
plants	monocots	Cyperaceae	*Cyperus javanicus*			C		1/1
plants	monocots	Cyperaceae	*Fimbristylis dichotoma*	common fringe-rush		C		3/1
plants	monocots	Hydrocharitaceae	*Ottelia*			C		1/1
plants	monocots	Orchidaceae	*Cymbidium canaliculatum*			C		1
plants	monocots	Poaceae	*Panicum laevinode*	pepper grass		C		2/1
plants	monocots	Poaceae	*Sorghum halepense*	Johnson grass	Y			1/1
plants	monocots	Poaceae	*Sporobolus caroli*	fairy grass		C		1
plants	monocots	Poaceae	*Aristida lazaridis*			C		2/1
plants	monocots	Poaceae	*Chloris ventricosa*	tall chloris		C		1
plants	monocots	Poaceae	*Echinochloa colona*	awnless barnyard grass	Y			1
plants	monocots	Poaceae	*Eragrostis brownii*	Brown's lovegrass		C		1
plants	monocots	Poaceae	*Eragrostis sororia*			C		1
plants	monocots	Poaceae	*Pennisetum ciliare*		Y			2
plants	monocots	Poaceae	*Aristida gracilipes*			C		2/1
plants	monocots	Poaceae	*Leptochloa digitata*			C		1
plants	monocots	Poaceae	*Paspalidium distans*	shotgrass		C		3/1
plants	monocots	Poaceae	*Paspalidium gracile*	slender panic		C		1
plants	monocots	Poaceae	*Bothriochloa bladhii*			C		1
plants	monocots	Poaceae	*Bothriochloa pertusa*		Y			1
plants	monocots	Poaceae	*Cymbopogon refractus*	barbed-wire grass		C		2
plants	monocots	Poaceae	*Digitaria parviflora*			C		1/1
plants	monocots	Poaceae	*Leptochloa decipiens*			C		1
plants	monocots	Poaceae	*Panicum decompositum*			C		1
plants	monocots	Poaceae	*Sporobolus scabridus*			C		2
plants	monocots	Poaceae	*Heteropogon contortus*	black speargrass		C		1
plants	monocots	Poaceae	*Enteropogon acicularis*	curly windmill grass		C		2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	*Sorghum x almum*		Y			1
plants	monocots	Poaceae	*Chloris inflata*	purpletop chloris	Y			1/1
plants	monocots	Poaceae	*Eulalia aurea*	silky browntop		C		1
plants	monocots	Poaceae	*Leptochloa*			C		1
plants	monocots	Poaceae	*Aristida*			C		1
plants	monocots	Poaceae	*Panicum*			C		1
plants	monocots	Poaceae	*Ancistrachne uncinulata*	hooky grass		C		1
plants	monocots	Poaceae	*Calyptochloa gracillima*			C		1
plants	monocots	Poaceae	*Dactyloctenium radulans*	button grass		C		1
plants	monocots	Poaceae	*Eragrostis megalosperma*			C		1
plants	monocots	Poaceae	*Paspalidium caespitosum*	brigalow grass		C		3
plants	monocots	Poaceae	*Echinochloa polystachya cv. Amity*		Y			1/1
plants	monocots	Poaceae	*Megathyrsus maximus var. pubiglumis*		Y			1
plants	monocots	Poaceae	*Leptochloa decipiens subsp. asthenes*			C		1/1
plants	monocots	Poaceae	*Bothriochloa decipiens var. decipiens*			C		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 E

Flora species recorded from EPC 1029

Wet season survey: 21 - 25 March 2011

Dry season survey: 25 – 29 September 2011

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Acanthaceae		*Brunoniella acaulis*	brunoniella	F	w19	
Acanthaceae		*Pseuderanthemum variabile*	pastel flower	F	w20	
Acanthaceae		*Rostellularia adscendens*	pink tongues	F	w19	
Adiantaceae		*Cheilanthes sieberi*	mulga fern	E	w16	
Aizoaceae		*Sesuvium portulacastrum*	sea purslane	F		d48
Aizoaceae		*Tetragonia tetragonioides*	New Zealand spinach	F	w18	
Amaranthaceae		*Achyranthes aspera*	chaff flower	F	w10, w29, w30	
Amaranthaceae		*Alternanthera nana*	hairy joyweed	F	w01, w02, w15, w18	d52
Amaranthaceae	*	*Gomphrena celosioides*	gomphrena weed	F	w02, w03, w04, w19,w24	d45
Amaryllidaceae		*Crinum flaccidum*	Darling lily	F		d16, d21, d42
Annonaceae		*Fitzalania heteropetala*	orange annona	ST	w14	
Annonaceae		*Melodorum leichhardtii*	zig-zag vine	L		d13, d14
Apocynaceae		*Alstonia constricta*	bitterbark	ST	w12	d05, d07, d26, d27
Apocynaceae		*Alyxia ruscifolia*	chainfruit	S	w12, w20	
Apocynaceae		*Carissa ovata*	currant bush	S	w03, w10, w12, w20, w22, w23, w29, w30, w31	d02, d07, d08, d11, d12, d14, d15, d18, d20, d25, d33, d34, d40, d45, d49
Apocynaceae	*	*Cryptostegia grandiflora*	rubbervine	L	w04, w07, w13, w25, w31	d11, d12, d21, d43
Apocynaceae		*Cynanchum bowmanii*		L	w29	

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Apocynaceae		*Parsonsia eucalyptophylla*	gargaloo	L	w03, w04, w05, w09, w10, w20, w30	d21
Apocynaceae		*Parsonsia straminea*	monkey rope	L		d18, d21, d33
Araliaceae		*Polyscias elegans*	celerywood	ST		d13
Aristolochiaceae	*	*Aristolochia elegans*	dutchman's pipe	L	w04, w12, w14	
Asteraceae	*	*Ageratum conyzoides*	billygoat weed	F	w01, w03, w04, w10, w14, w22, w23, w4	d04, d40
Asteraceae	*	*Bidens bipinnata*	beggar's ticks	F	w03, w05, w06, w10, w24, w30	d09, d40
Asteraceae		*Cyanthillium cinereum*	vernonia	F	w01, w03, w10, w15, w24, w29, w30	
Asteraceae		*Eclipta prostrata*	white eclipta	F	w02	d03
Asteraceae	*	*Emilia sonchifolia*	emilia	F	w03	d06, d22
Asteraceae		*Epaltes australis*	spreading nut-heads	F	w03, w16, w17, w24	d19, d32, d37, d44, d55
Asteraceae	*	*Parthenium hysterophorus*	parthenium	S	w11	d13
Asteraceae		*Pterocaulon redolens*	ragweed	F	w01, w03, w08, w16, w19, w23, w24, w25, w27, w29, w30	d09, d16, d18, d19, d20, d22, d24, d25, d26, d28, d40, d42, d55
Asteraceae	*	*Xanthium occidentale*	Noogoora burr	S	w04, w06, w11, w12, w13, w23	d04, d14, d43
Bignoniaceae		*Pandorea pandorana*	wonga vine	L	w14, w22	
Boraginaceae	*	*Heliotropium amplexicaule*	blue heliotrope	F	w13	

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Boraginaceae		*Trichodesma zeylanicum*	camel bush	F		d06
Byttneriaceae		*Keraudrenia lanceolata*		S		d28
Cactaceae	*	*Harrisia martinii*	harrisa cactus	S	w04	
Cactaceae	*	*Opuntia stricta*	prickly pear	S	w03, w10, w29	d11, d25, d36, d49
Caesalpiniaceae		*Lysiphyllum hookeri*	white bauhinia	ST	w04, w13, w16, w31	d04, d11, d13, d18
Caesalpiniaceae		*Senna barclayana*	smooth senna	S	w22, w23, w29, w31	d25
Caesalpiniaceae	*	*Tamarindus indica*	tamarind	ST	w04	
Campanulaceae		*Lobelia quadrangularis*	forest violet	F		d32, d55
Campanulaceae		*Pratia concolor*	poison pratia	F		d04, d21
Campanulaceae		*Wahlenbergia gracilis*	bluebell	F		d09
Capparaceae		*Apophyllum anomalum*	warrior bush	S	w30, w31	
Capparaceae		*Capparis arborea*	brush caper berry	S	w14, w29	
Capparaceae		*Capparis canescens*	wild orange	S	w25	d08, d18, d20, d24, d45
Capparaceae		*Capparis lasiantha*	nepine	S	w03, w04, w05, w16, w20, w30	d02, d12, d14, d15, d33, d35
Casuarinaceae		*Casuarina cristata*	belah	T	w05, w20, w30	d02, d03, d12, d18, d21, d3, d35
Casuarinaceae		*Casuarina cunninghamiana* subsp. *cunninghamiana*	river oak	T	w16	d04, d17, d41, d44, d58
Celastraceae		*Denhamia oleaster*	stiff denhamia	S	w20, w23	
Celastraceae		*Denhamia pittosporoides* subsp. *pittosporoides*	boxwood	S	w23	
Celastraceae		*Maytenus cunninghamii*	yellow-berry bush	S	w03, w05, w08, w25, w29, w30	d02, d07, d19, d25, d40, d49

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Chenopodiaceae		*Enchylaena tomentosa*	ruby saltbush	C	w04, w07, w30	
Chenopodiaceae		*Maireana microphylla*	small-leaf bluebush	C	w16, w25, w30	d15
Chenopodiaceae		*Salsola kali*	soft roly poly	C	w16, w18	d36, d37
Chenopodiaceae		*Sclerolaena muricata*	black roly poly	C	w18	
Chenopodiaceae		*Suaeda australis*	Austral seablite	C		d48
Chenopodiaceae		*Tecticornia indica*	glasswort	C		d48
Chenopodiaceae		*Tecticornia pergranulata* subsp. *queenslandica*	blackseed glasswort	C		d48
Combretaceae		*Terminalia oblongata*	yellow-wood	T	w20	d21, d25, d33
Combretaceae		*Terminalia porphyrocarpa*	bandicoot plum	T	w22	
Commelinaceae		*Murdannia graminea*	grass lily	F	w03, w24	
Convolvulaceae		*Dichondra repens*	kidney weed	F		d04, d46, d55
Convolvulaceae		*Evolvulus alsinoides*	tropical speedwell	F	w01, w03, w05, w10, w19, w24, w29, w30	
Convolvulaceae	*	*Ipomoea cairica*	mile-a-minute	L	w12	
Convolvulaceae		*Polymeria calycina*		L	w03, w04, w05, w06, w22, w23	d04
Crassulaceae	*	*Bryophyllum daigremontianum* x *Bryophyllum delagoense*	hybrid mother-of-millions	F		d18
Crassulaceae	*	*Bryophyllum delagoense*	mother-of-millions	F	w04	d40, d45, d49
Cyperaceae		*Baumea articulata*	jointed rush	V		d36
Cyperaceae		*Baumea juncea*	bare twigrush	V		d53
Cyperaceae		*Bulbostylis barbata*	watergrass	V	w17	
Cyperaceae		*Cyperus concinnus*	trim flatsedge	V	w04, w10, w19, w29, w30	d10, d11, d14, d15, d17, d21, d25, d32, d35, d50, d55

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Cyperaceae		*Cyperus cuspidatus*	coastal plain flatsedge	V	w17	
Cyperaceae		*Cyperus gracilis*	slender flat-sedge	V		d36, d45, d48
Cyperaceae		*Cyperus perangustus*		V	w29	d21
Cyperaceae		*Cyperus javanicus*		V	w02, w03, w09, w13, w30	
Cyperaceae	N	*Eleocharis blakeana*		V		d03
Cyperaceae		*Fimbristylis*	a fingerrush	V	w03, w21, w25	
Cyperaceae		*Fimbristylis acicularis*		V	w17	
Cyperaceae		*Fimbristylis ferruginea*	common fingerrush	V	w18, w27	
Cyperaceae		*Fimbristylis littoralis*		V	w03, w17	
Cyperaceae		*Fimbristylis nutans*	nodding fingerrush	V		d10, d21
Cyperaceae		*Fimbristylis polytrichoides*	rusty sedge	V	w18	
Cyperaceae		*Fuirena ciliaris*		V		d32
Cyperaceae		*Gahnia aspera*	saw-sedge	V	w29	d10, d20, d25, d27, d53
Cyperaceae		*Isolepis inundata*	swamp club-sedge	V	w18	
Cyperaceae		*Lepidosperma laterale* var. *laterale*	sword sedge	V	w10	
Cyperaceae		*Schoenoplectus mucronatus*		V		d10, d21
Ebenaceae		*Diospyros geminata*	Queensland ebony	ST	w23	d13, d14, d18, d21
Erythroxylaceae		*Erythroxylum* sp. (Splityard Creek L.Pedley 5360)		S	w05, w29, w30	
Euphorbiaceae		*Acalypha eremorum*	native acalypha	S	w04, w30, w31	d02, d11
Euphorbiaceae		*Alchornea ilicifolia*	native holly	S	w20	d14
Euphorbiaceae		*Chamaesyce drummondii*	caustic weed	F	w02, w25	
Euphorbiaceae		*Croton acronychioides*	thick-leaved cascarilla	S		d13
Euphorbiaceae		*Croton insularis*	silver croton	S	w05, w20, w31	d02
Euphorbiaceae		*Croton phebalioides*	narrow-leaved croton	S	w20	

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Euphorbiaceae	*	*Jatropha gossypiifolia*	bellyache bush	S		d43
Euphorbiaceae		*Mallotus philippensis*	red kamala	ST	w12, w14, w20, w23	d13, d14
Fabaceae		*Cajanus reticulatus*	nalta jute	L	w23	
Fabaceae		*Crotalaria mitchellii*	yellow rattlepod	S		d06, d09, d16, d42
Fabaceae	*	*Crotalaria pallida*	streaked rattlepod	S	w09, w14,	
Fabaceae		*Erythrina vespertilio*	bat-wing coral tree	ST		d05
Fabaceae		*Glycine tomentella*	woolly glycine	L	w08, w25	d24
Fabaceae		*Indigofera linnaei*	Birdsville indigo	S	w06, w16	
Fabaceae		*Indigofera pratensis*	forest indigo	S	w03	
Fabaceae	*	*Macroptilium atropurpureum*	siratro	L	w06, w12, w14, w22, w23	
Fabaceae		*Rhynchosia minima* var. *minima*	rhyncho	L	w19	
Fabaceae	*	*Stylosanthes scabra*	stylo	S	w01, w02, w05, w06, w07, w08, w09, w16, w17, w18, w19, w22, w23, w24, w25, w26, w27	d04, d23, d24, d28, d32, d33, d34, d35, d40, d43, d45, d50, d55, d56, d57
Goodeniaceae		*Velleia pubescens*		F	w17	
Juncaceae		*Juncus polyanthemus*		R		d04, d14, d17, d21, d44, d52, d55
Lamiaceae		*Ajuga australis*	Austral bugle	F		d06
Lamiaceae		*Anisomeles malabarica*	chodhava	F	w03, w08, w10	
Lamiaceae		*Basilicum polystachyon*	musk basil	F		d04s
Lamiaceae		*Clerodendrum tomentosum*	lolly bush	S	w12	

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Lamiaceae	*	*Hyptis suaveolens*		F	w03	
Lamiaceae		*Vitex melicopea*	scrub vitex	T	w14	
Laxmanniaceae		*Eustrephus latifolius*	wombat berry	L	w03, w16	d04, d42, d43
Laxmanniaceae		*Lomandra longifolia*	spiny-headed mat-rush	R	w06, w16, w23	d04, d41, d43, d44
Lecythidaceae		*Planchonia careya*	cocky apple	ST	w02, w08, w16	d06, d09, d16, d28, d31, d42, d43, d44, d46, d54, d56
Loganiaceae		*Strychnos psilosperma*	threadwood	S	w10, w14	d13
Loranthaceae		*Amyema quandang*	grey mistletoe	epS	w01, w04, w09	
Malvaceae		*Abutilon auritum*	Asian Indian mallow	S	w22, w23	d13, d49
Malvaceae		*Hibiscus divaricatus*	native hibiscus	S	w03, w04, w10, w20, w23, w29, w30	d01, d03, d04, d05, d06, d07, d09, d11, d16, d26, d33, d34, d43, d46
Malvaceae		*Hibiscus heterophyllus*	native rosella	S	w10, w30, w31	
Malvaceae		*Hibiscus vitifolius*	tropical rose mallow	S	w10	
Malvaceae	*	*Malvastrum americanum*	spiked mallow	S	w23, w30	
Malvaceae	*	*Sida cordifolia*	flannel weed	S	w03, w10, w19, w23, w30	

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Malvaceae		*Sida hackettiana*	spiked sida	S	w01, w02, w03, w08, w10, w16, w20, w21, w23, w24, w29	d04, d06, d08, d09, d11, d16, d18, d24, d25, d26, d32, d34, d36, d37, d9, d40, d42, d43, d45, d46, d55
Malvaceae	*	*Sida retusa*	Paddy's lucerne	S		d21, d22, d25, d43, d46
Malvaceae		*Sida* sp. (Greenvale R.J.Fensham 1150)		S	w19, w29	
Malvaceae	*	*Sida spinosa*	prickly sida	S	w04, w05	d07, d57, d58
Malvaceae	*	*Urena lobata*	urena burr	S		d06, d11, d43, d52
Marsileaceae		*Marsilea hirsuta*	nardoo	E	w25	d03, d21, d43
Meliaceae		*Melia azedarach*	white cedar	ST	w11, w12, w14, w22	d13
Meliaceae		*Turraea pubescens*	native witch-hazel	ST		d13
Menispermaceae		*Legnephora moorei*	round-leaf vine	L	w12	
Menispermaceae		*Stephania japonica* var. *discolor*	snake vine	L	w16	
Menyanthaceae		*Nymphoides indica*	water snowflake	aF		d10
Mimosaceae		*Acacia harpophylla*	brigalow	ST	w04, w09, w10, w20, w21, w30, w31	d02, d03, d11, d12, d13, d14, d15, d18, d21, d33, d47, d49
Mimosaceae		*Acacia holosericea*	silky wattle	S	w05	
Mimosaceae		*Acacia leptocarpa*	wattle	ST	w01	d01, d09, d32, d34, d35, d46

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Mimosaceae		*Acacia rhodoxylon*	rosewood	ST	w05, w10, w17, w24, w29	d20, d23, d24, d25, d34, d52, d53
Mimosaceae		*Acacia salicina*	sally wattle	ST	w06, w07, w13, w14, w20	d19, d21, d50
Mimosaceae		*Acacia shirleyi*	lancewood	ST	w17	d26, d27
Mimosaceae	*	*Leucaena leucocephala*	leucaena	ST		d44
Mimosaceae	*	*Mimosa pudica*	sensitive plant	F	w18	d24
Mimosaceae		*Vachellia bidwillii*	corkwood wattle	ST	w07, w16	d40
Mimosaceae	*	*Vachellia farnesiana*	mimosa bush	ST		d03
Moraceae		*Ficus coronata*	creek sandpaper fig	ST	w19	d14, d21
Moraceae		*Ficus opposita*	sandpaper fig	ST	w11, w12, w13, w14, w16, w23	d04, d11, d16, d41, d43, d44
Moraceae		*Trophis scandens* subsp. *scandens*	burny vine	L	w12, w14, w20	d02, d13, d18
Myoporaceae		*Eremophila debilis*	winter apple	F	w16, w19, w25	d19, d35
Myoporaceae		*Eremophila deserti*	turkeybush	S		d49, d50
Myoporaceae		*Eremophila mitchellii*	false sandalwood	S	w03, w05, w15	d18, d19, d24, d35
Myoporaceae		*Myoporum montanum*	boobialla	S	w15	d03
Myrsinaceae		*Myrsine variabilis*	muttonwood	ST		d13
Myrtaceae		*Corymbia dallachiana*	Dallachy's gum	T	w02, w26	d23
Myrtaceae		*Corymbia erythrophloia*	red bloodwood	T		d08, d24
Myrtaceae		*Corymbia intermedia*	pink bloodwood	T	w01, w02, w07, w16, w17, w19	d04, d05, d06, d07, d09, d16, d23, d27, d28, d31, d32, d42, d43, d54, d55, d57

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Myrtaceae		*Corymbia tessellaris*	carabeen	T	w01, w06, w13, w14, w15, w16, w23	d02, d04, d05, d06, d08, d09, d13, d14, d16, d17, d32, d38, d41, d42, d43, d46, d50
Myrtaceae		*Eucalyptus cambageana*	Dawson River blackbutt	T	w07, w15, w19	
Myrtaceae		*Eucalyptus crebra*	narrow-leaf ironbark	T	w03, w05, w07, w08, w10, w15, w16, w17, w19, w22, w23, w25, w26, w29	d01, d03, d07, d08, d11, d14, d16 d19, d20, d22, d23, d24, d25, d31, d33, d34, d35, d39, d40, d45, d50, d51, d53, d54, d55, d56
Myrtaceae		*Eucalyptus exserta*	Queensland peppermint	T	w03, w05, w17, w29	d27, d28, d31, d53, d55, d56, d57
Myrtaceae		*Eucalyptus melanophloia*	silver-leaved ironbark	T	w24	d20
Myrtaceae		*Eucalyptus moluccana*	gum-topped box	T	w05, w09, w25	
Myrtaceae		*Eucalyptus platyphylla*	poplar gum	T	w01, w02, w03, w05, w07, w08, w15, w26	d01, d05, d06, d08, d09, d11, d16, d23, d35, d42, d43, d46, d54, d57, d58

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Myrtaceae		*Eucalyptus populnea*	poplar box	T	w03, w07, w15, w25	d03, d11, d15, d24, d34, d35, d38, d40, d47, d50, d51
Myrtaceae		*Eucalyptus tereticornis*	forest red gum	T	w03, w06, w11, w13, w14, w16, w20, w22, w23	d01, d02, d04, d05, d06, d10, d11, d13, d14, d17, d41, d42, d43
Myrtaceae		*Gossia bidwillii*	python tree	ST	w14	d13, d14
Myrtaceae		*Lophostemon grandiflorus*	northern swamp mahogany	T	w13, w16, w22, w23	d04, d06, d10, d14, d41, d44
Myrtaceae		*Lophostemon suaveolens*	swamp mahogany	T		d16, d27, d42, d43, d46, d53, d56
Myrtaceae		*Melaleuca bracteata*	black tea tree	ST	w13, w14	
Myrtaceae		*Melaleuca leucadendra*	white tea tree	T	w06, w16, w23	d04, d41, d44, d52
Myrtaceae		*Melaleuca trichostachya*	tea tree	ST	w04, w23	d04, d17
Myrtaceae		*Melaleuca viminalis*	weeping bottlebrush	ST	w02, w16, w23	d01, d04
Myrtaceae		*Melaleuca viridiflora* var. *viridiflora*	broad-leaved paperbark	ST	w02, w05, w08, w17, w19	d23, d32, d54, d55, d56, d57, d58
Nyctaginaceae		*Boerhavia pubescens*		F	w10	
Nymphaeaceae		*Nymphaea gigantea*	giant waterlily	aF		
Oleaceae		*Jasminum didymum*	native jasmine	L	w10, w14, w20, w30	d14
Oleaceae		*Jasminum simplicifolium*	stiff jasmine	L	w04, w22	
Oleaceae		*Notelaea microcarpa* var. *microcarpa*	small-fruited mock olive	S	w01, w10, w14	d13, d14

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Onagraceae		*Ludwigia octovalvis*	willow primrose	S	w03, w30	d55
Orchidaceae		*Cymbidium canaliculatum*	black orchid	eS	w05, w20	d45
Oxalidaceae	*	*Oxalis corniculata*	yellow wood sorrel	F	w10, w29	d06, d09
Passifloraceae	*	*Passiflora foetida*	stinking passionflower	L	w01, w03, w05, w09, w10, w24, w31	d12, d21
Passifloraceae	*	*Passiflora suberosa*	corky passionfruit	L	w04, w12	
Petiveriaceae	*	*Rivina humilis*	coral berry	F	w21	
Philydraceae		*Philydrum lanuginosum*	frogmouth	aF		d55
Phormiaceae		*Dianella rara*		F		d26, d27, d28, d31, d34, d57
Phyllanthaceae		*Breynia oblongifolia*	coffee bush	S	w03, w04, w05, w09, w13, w16, w19, w22, w23, w29	d04, d09, d11, d12, d14, d18, d21, d25, d43, d52, d53
Phyllanthaceae		*Phyllanthus maderaspatensis*		S	w03, w25	
Phyllanthaceae		*Phyllanthus microcladus*	small-leaved phyllanthus	S	w14	
Phyllanthaceae		*Phyllanthus virgatus*		F	w01, w03, w16, w18	
Picrodendraceae		*Petalostigma pubescens*	quinine bush	ST	w01, w03, w04, w05, w06, w07, w08, w23, w31	d01, d08, d09, d13, d20, d25, d26, d27, d28, d31, d52, d53, d54, d56
Pittosporaceae		*Auranticarpa rhombifolia*	hollywood	ST	w23	
Pittosporaceae		*Bursaria incana*	prickly pine	ST		d13, d34,
Pittosporaceae		*Bursaria spinosa*	blackthorn	ST	w16, w20, w31	d12, d14, d20,

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
						d21
Pittosporaceae		*Pittosporum spinescens*	wallaby apple	S		d02
Plumbaginaceae		*Limonium solanderi*	native sea lavender	F		d36, d48
Plumbaginaceae		*Plumbago zeylanica*	wild plumbago	S		d04s
Poaceae		*Alloteropsis semialata*	cockatoo grass	G	w19, w24, w25, w26, w29	d46
Poaceae		*Aristida benthamii*	a wiregrass	G	w01	d06, d07, d08, d09, d24, d35, d38
Poaceae		*Aristida calycina*	dark wiregrass	G		d26, d28
Poaceae		*Arundinella nepalensis*	reedgrass	G	w30	
Poaceae		*Avena?*	oats	G		d22
Poaceae		*Bothriochloa decipiens*	pitted bluegrass	G		d06, d07, d09, d11, d15, d18, d19, d20, d25, d26, d33, d34, d35, d9, d40, d45, d46, d50, d53
Poaceae	*	*Bothriochloa pertusa*	Indian bluegrass	G	w01, w02, w03, w05, w07, w09, w13, w19, w24, w25, w26	
Poaceae		*Calyptochloa gracillima*		G		d25, d26
Poaceae	*	*Cenchrus ciliaris*	buffel grass	G	w04, w14	d05, d07, d12, d16

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Poaceae		*Chloris divaricata* var. *divaricata*	tall windmill grass	G	w03, w14	d03, d06, d13, d14, d18, d21, d22, d23, d24, d33, d34, d36, d37, d40, d49, d50
Poaceae	*	*Chloris gayana*	Rhodes grass	G	w05, w09	d35, d38, d45
Poaceae	*	*Chloris inflata*	purpletop Rhodes grass	G	w21	d02, d36, d37, d50
Poaceae		*Chloris ventricosa*	tall chloris	G	w18, w20, w25	
Poaceae	*	*Chloris virgata*	feathertop Rhodes grass	G	w04	
Poaceae		*Chrysopogon fallax*	golden beard grass	G	w16	
Poaceae		*Cymbopogon refractus*	barbed wire grass	G	w03, w10, w24, w25, w29	
Poaceae	*	*Cynodon dactylon* var. *dactylon*	green couch	G	w18, w25	d33, d36
Poaceae		*Dichanthium sericeum*	Queensland bluegrass	G	w04, w06, w15, w19	d11, d24, d37, d42, d43
Poaceae		*Digitaria parviflora*	small-flowered finger grass	G	w01, w03, w08, w17, w25, w29	
Poaceae		*Digitaria* sp.AJF1103038		G	w18	
Poaceae	*	*Echinochloa colona*	awnless barnyard grass	G	w02, w09	
Poaceae		*Enteropogon acicularis*	curly windmill-grass	G	w03, w07	
Poaceae		*Entolasia stricta*	wiry panic	G	w17	d18, d26, d27, d28, d31, d53

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Poaceae		*Eragrostis brownii*	Brown's lovegrass	G	w01, w03, w05, w06, w16, w17, w5, w29	d09, d11, d16, d20, d23, d24, d25, d26, d27, d28, d31, d32, d34, d40, d45, d46, d49
Poaceae		*Eragrostis elongatus*	clustered lovegrass	G	w06, w19	d27
Poaceae		*Eriachne stipacea*		G	w17	
Poaceae		*Heteropogon contortus*	black speargrass	G	w01, w02, w03, w05, w08, w09, w13, w15, w19, w24, w26, w30	d06, d08, d16, d20, d24, d34, d42, d43, d45
Poaceae		*Heteropogon triticeus*	tall speargrass	G		d16, d24, d25, d34, d35, d39, d40, d42
Poaceae	*	*Hymenachne amplexicaulis*	hymenachne	G	w02	
Poaceae	*	*Hyparrhenia rufa*	thatch grass	G	w15	
Poaceae		*Imperata cylindrica*	blady grass	G	w05	d04, d05, d06, d41, d46
Poaceae		*Leptochloa decipiens*	slender cane grass	G	w30	
Poaceae		*Leptochloa fusca*	brown beetle grass	G	w18	
Poaceae	*	*Megathyrsus maximus*	Guinea grass	G	w02, w03, w04, w05, w06, w08, w09, w10, w11, w12, w13, w14, w16, w20, w22, w23, w31	d02, d13, d21

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Poaceae	*	*Melinis minutiflora*	molasses grass	G	w01	
Poaceae	*	*Melinis repens*	red natal	G	w03, w06, w07, w10, w15	d23, d32, d33, d34, d50
Poaceae		*Mnesithea rottboellioides*	northern canegrass	G		d41
Poaceae		*Oplismenus aemulus*	wavy beard grass	G	w10	
Poaceae		*Panicum decompositum*	native millet	G	w01	
Poaceae		*Panicum effusum*	hairy panic	G	w18, w19, w29, w30	d09, d20, d24, d25, d36, d48
Poaceae		*Panicum queenslandicum*	yadbila grass	G	w02, w15, w25, w26, w27	
Poaceae		*Paspalidium caespitosum*	brigalow grass	G		d03, d15, d18, d21, d23, d47, d49
Poaceae		*Paspalidium distans*		G	w03, w10, w25, w29, w30	
Poaceae	*	*Paspalum dilatatum*	paspalum	G	w01, w03, w04, w07, w09, w10, w13, w16, w19, w20, w21, w22, w23, w25, w27, w30, w31	d43
Poaceae		*Perotis rara*	comet grass	G	w01	
Poaceae	*	*Sorghum halepense*	Johnson grass	G	w11	
Poaceae		*Sporobolus caroli*	yakka grass	G	w25, w30	
Poaceae	*	*Sporobolus fertilis*	giant Parramatta grass	G	w02, w06, w19, w27	
Poaceae		*Sporobolus virginicus*	saltwater couch	G	w18, w27	d36, d48

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Poaceae		*Themeda triandra*	kangaroo grass	G	w03, w05, w06, w08, w09, w10, w15, w16, w17, w19, w24, w25	d08, d09, d11, d18, d19, d20, d22, d23, d28, d31, d32, d38, d50, d56, d58
Poaceae		*Tripogon loliiformis*	five-minute grass	G		d15
Polygonaceae		*Persicaria attenuata*	white smartweed	F	w04	d10, d17
Pontederiaceae		*Monochoria cyanea*	monochoria	aF	w02	
Portulacaceae		*Portulaca bicolor*		F	w07, w18, w25	
Portulacaceae	*	*Portulaca pilosa* subsp. *pilosa*	akulikuli	F	w18, w30	d48
Potamogetonaceae		*Potamogeton javanicus*	floating-leafed pondweed	aF		d21
Proteaceae		*Grevillea striata*	beefwood	ST	w03, w07, w08, w15, w25, w29	d03, d07, d08, d11, d19, d22, d24, d28, d34, d40
Putranjivaceae		*Drypetes deplanchei*	yellow tulipwood	ST		d11, d14, d18, d21
Ranunculaceae		*Clematis glycinoides*	headache vine	L	w14	
Rhamnaceae		*Alphitonia excelsa*	red ash	ST	w01, w03, w05, w06, w08, w10, w15, w17, w20, w22, w23, w24, w29	d02, d04, d07, d08, d09, d11, d14, d20, d23, d24, d25, d27, d28, d31, d32, d33, d35, d43, d52, d53, d55, d57
Rubiaceae		*Cyclophyllum coprosmoides*	coast canthium	ST	w05	
Rubiaceae		*Pavetta australiensis*	pavetta	S		d13

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Rubiaceae		*Pogonolobus reticulatus*	medicine bush	S	w03, w20, w25	d05, d16, d20, d26, d27, d28, d46, d53
Rubiaceae		*Psydrax attenuata*		S	w04, w17	d14
Rubiaceae		*Psydrax odorata*	shiny-leaved canthium	S	w01, w29	d14, d23, d24, d27, d31, d34, d50
Rutaceae		*Citrus glauca*	desert lime	S	w20	
Rutaceae		*Flindersia australis*	crows ash	ST	w05, w10	d07, d13, d34
Rutaceae		*Geijera parviflora*	wilga	S	w04, w07, w10, w20, w30, w31	d02, d12, d18, d49
Rutaceae		*Geijera salicifolia*	scrub wilga	ST	w20	d02, d13, d14, d18
Santalaceae		*Exocarpos latifolius*	scrub cherry	S	w10, w14, w20	
Santalaceae		*Santalum lanceolatum*	sandalwood	ST		d02, d18, d40
Sapindaceae		*Alectryon connatus*	alectryon	S	w20	d13, d14
Sapindaceae		*Alectryon diversifolius*	scrub boonaree	S	w03, w04, w05, w09, w10, w20, w23, w30, w31	d02, d03, d07, d12, d14, d15, d18, d21, d25, d35, d49
Sapindaceae		*Arytera divaricata*	rose tamarind	S	w14	
Sapindaceae		*Atalaya hemiglauca*	whitewood	ST	w05, w07, w20	d07, d14, d16, d35, d42, d47, d50
Sapindaceae		*Cupaniopsis*		ST	w20	
Sapindaceae		*Cupaniopsis anacardioides*	tuckeroo	ST	w12, w14, w20, w23	d02, d21
Sapindaceae		*Dodonaea lanceolata* subsp. *subsessilifolia*	hopbush	S	w29	

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Sapindaceae		*Elattostachys xylocarpa*	white tamarind	ST	w14, w20	d13
Sapindaceae		*Harpullia pendula*	tulipwood	ST	w12	
Sapotaceae		*Planchonella cotinifolia*	small-leaved plum	ST	w12	d02
Sapotaceae		*Planchonella pubescens*	small-leaved coondoo	ST	w12, w14	d13
Scrophulariaceae	*	*Scoparia dulcis*	scoparia	F		d04s
Solanaceae		*Physalis angulata*	wild gooseberry	S	w13, w21	
Solanaceae		*Solanum parvifolium*	nightshade	S	w20	d18, d21, d53
Solanaceae	*	*Solanum seaforthianum*	Brazilian nightshade	L	w04, w12, w20, w29	d13
Sparrmanniaceae		*Grewia latifolia*	dysentery plant	S	w03, w05, w15, w24	d16, d20, d35, d58
Sparrmanniaceae	*	*Triumfetta rhomboidea*	paroquet burr	S	w01	
Sterculiaceae		*Brachychiton rupestris*	Queensland bottle tree	T		d02, d13, d18
Sterculiaceae		*Sterculia quadrifida*	peanut tree	ST	w11, w12	
Thymelaeaceae		*Wikstroemia indica*	tie bush	S	w29	
Ulmaceae		*Aphananthe philippinensis*	rough-leaved elm	ST	w14	d13
Verbenaceae	*	*Lantana camara*	lantana	S	w01, w03, w06, w08, w10, w11, w12, w14, w16, w20, w21, w22, w23, w24, w29	d02, d04, d05, d06, d09, d11, d14, d16, d22, d25, d32, d40, d42, d43, d46, d52
Verbenaceae		*Phyla nodiflora*	lippia	F	w18	d36
Verbenaceae	*	*Stachytarpheta jamaicensis*	snakeweed	F	w01, w02, w03, w04, w05, w06, w08, w16, w17, w20, w23, w24, w25, w30	d03, d11, d19, d22, d24, d25, d40, d43, d45, d46, d52

Family	Status	Taxon	Common Name	Life Form	Wet Season Site	Dry Season Site
Violaceae		*Hybanthus enneaspermus*	spade flower	F	w29	
Violaceae		*Viola hederacea*	native violet	F	w16	
Vitaceae		*Clematicissus opaca*	small-leaved water vine	L	w03, w04	d49
Xanthorrhoeaceae		*Xanthorrhoea johnsonii*	Johnson's grass tree	S		d27, d53, d56

Notes:
* = exotic species, N = near threatened (NC Act)

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.

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Review History

Rev No.	Author	Reviewer		Approved for Issue		
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0	A. Franks	J. Durbin	J. Durbin	J. Durbin	J. Durbin	11/5/2011
1	A. Franks	D. Butler	D. Butler	D. Butler	D. Butler	21/11/2011