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AUSTRALIA PACIFIC LNG

REPORT

Ecology Assessment Report

Q-4200-15-RP-1010

Australia Pacific LNG Upstream Phase1

Lot 23 AB47

Revision	Date	Description	Originator	Checked	QA/Eng	Approved
0	31/05/2012	Final	E Wyatt	D Rollinson	K Lazarus	A White
B	01/02/2012	Final draft	E Wyatt	D Rollinson		
A	06/12/2011	Issued for review	E Wyatt	N Wills Per		

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1. Definitions & abbreviations

1.1 Definitions

Define key terms and phrases used in the report are listed in the tables below.

Table 1: Definitions

Term	Definition
Remnant Vegetation	As defined by the Vegetation Management Act 2000 remnant vegetation is defined as vegetation, part of which forms the predominant canopy of the vegetation covering more than 50% of the undisturbed predominant canopy; and averaging more than 70% of the vegetation's undisturbed height.
Regional Ecosystem	As defined by the Vegetation Management Act 2000 a Regional Ecosystem is a vegetation community in a bioregion that is consistently associated with a particular combination of geology, landform and soil.
Regrowth Regional Ecosystem	As defined by the Regrowth Vegetation Code regrowth vegetation is vegetation indicated on a map certified by the chief executive as the regrowth vegetation and includes Endangered regional ecosystems, of concern regional ecosystem, a least concern regional ecosystem, vegetation not cleared since 31 December 1989, certain watercourses and areas deemed regrowth by the chief executive.
Threatened Ecological Community	Threatened ecological communities are those listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). An ecological community may be categorised as Critically endangered; Endangered or Vulnerable.
Referable Wetland	As defined by the Environmental Protection Regulation 2008, a referable wetland is an area shown as a wetland on a document called 'Map of referable wetlands' made available by the chief executive.
Watercourse	As defined by the Water Act 2000 a watercourse is a river, creek or other stream, including a stream in the form of an anabranch or a tributary, in which water flows permanently or intermittently, regardless of the frequency of flow event in a natural channel, whether artificially modified or not; or in an artificial channel that has changed the course of the stream.
Drainage feature	As defined by the Water Act 2000 a drainage feature means a natural landscape feature, e.g. gully, drain, drainage depression formed by the concentration of, or operates to confine or concentrate, overland flow water during and immediately after rainfall events. Such features only flow for a short duration after a rainfall event, regardless of the frequency of flow events; and commonly, does not have enough continuing flow to create a riverine environment.
Spring	A spring (as defined by the Water Act 2000) means the land to which water rises naturally from below the ground and the land over which the water then flows.
Declared Pest	Defined to mean a declared pest (flora and fauna) under the Land Protection (Pest and Stock Route Management) Act 2002

Term	Definition
Matters of National Environmental Significance	As defined in the EPBC Act, matters of national environmental significance. Provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.
Environmentally Sensitive Area	Environmentally Sensitive Areas (ESA's) are those defined as either Category A or B ESA's within the Environmental Protection Regulation 2008.
Wetland	As defined from the Wetland Mapping & Classification Methodology a wetland is an area of permanent or periodic/intermittent inundation, with water that is static or flowing fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m. Wetlands must have one or more of the following; i. at least periodically the land supports plants or animals that are adapted to and dependent on living in wet conditions for at least part of their life cycle, or ii. the substratum is predominantly undrained soils that are saturated, flooded or ponded long enough to develop anaerobic conditions in the upper layers, or iii. the substratum is not soil and is saturated with water, or covered by water at some time."
Threatened Species	Species of flora and fauna that is vulnerable to endangerment in the near future. Federal and State (Qld) listings and conservation status of threatened species are defined under the EPBC Act and Nature Conservation Act.

1.2 Abbreviations

Table 2: Abbreviations

Abbreviation	Description
BOM	Bureau of Meteorology
DERM	Department of Environmental Resource Management
EAR	Ecology Assessment Report
EPBC	Environmental Protection Biodiversity Conservation
EPA	Environmental Protection Act
MNES	Matters of National Environmental Significance
NCA	Nature Conservation Act
RE	Regional Ecosystem
SEWPAC	Sustainability, Environment, Water, Population and Communities
WONS	Weeds of National Significance

2. Introduction

Orogen QLD Pty Ltd (Orogen) has been commissioned by Origin Energy Resources Limited (the client/Origin) to prepare an Ecology Assessment Report (EAR) for the site identified by the client as Lot 23 on AB47 (the site) (Appendix A).

Orogen was approved by the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) on 28 June 2011 for the purpose of undertaking ecological assessment works for the Australia Pacific LNG Pty Limited (Australia Pacific LNG) Project (the Project).

3. Site Context

3.1 Background

This EAR has been prepared in consideration of potential development within the site for activities associated with the client's long-term coal seam gas (CSG) to liquefied natural gas (LNG) project (the project). This report is intended to guide the client in development planning through the presentation of data which articulates the ecological context of the site.

Setting

The site is located approximately 12 km south-southeast of Clifford in the Surat Basin in the Queensland Western Downs Region and Brigalow Belt bioregion (EPA, 2000) in central eastern Queensland (**Appendix A**). The site extends over an area of approximately 925.96 ha.

Land use consists of a mosaic of historically cleared grazing country and forested areas of remnant and regrowth vegetation.

3.1.1 Topography

The topography of the site is undulating between approximately 310 m and 360 m AHD (DME, 1975). The site generally drains in an easterly direction via a network of drainage lines to a 3rd order stream to the northeast and a 4th order stream to the southeast.

Queensland geological mapping (DME, 2008) shows the geology of the site to consist of:

- Jug – Gubberamunda Sandstone - Jurassic- Sandstone, minor conglomerate, siltstone; and
- Qa – Qa-NSB – Quaternary – Clay, silt, sand, gravel; floodplain alluvium.

3.1.2 Land Zones

The Department of Environment and Resource Management (DERM) regional ecosystem (RE) mapping depicts land zones 3, 5, 9 and 10 as occurring on the site (DERM, 2011a, DERM, 2011b).

Land zone 3 is described as "quaternary alluvial systems, including floodplains, alluvial plains, alluvial fans, terraces, levees, swamps, channels, closed depressions and fine textured palaeo-estuarine deposits".

Land zone 5 is described as "extensive, uniform near level or gently undulating Cainozoic plains with sandy or loamy soils".

Land zone 9 is described as "fine-grained sedimentary rocks, generally with little or no deformation, forming undulating landscapes with a broad range of fine textured soils of moderate to high fertility. Siltstones, mudstones, shales, calcareous sediments, and lithic and labile sandstones are typical rock types although minor interbedded volcanics may occur".

Land zone 10 is described as "medium to coarse-grained sedimentary rocks, with little or no deformation, forming plateaus, ledges and scarps. Includes siliceous sandstones, conglomerates and minor interbedded volcanic and springs associated with these rocks".

3.1.3 Climate

Climate statistics (BOM, 2011) for the nearest weather station of Roma Airport are:

- Mean annual temperature range of 12.8 – 27.7 degrees Celsius; and
- Mean annual rainfall of 591.3 mm.

4. Methodology

4.1 Desktop and Literature Review

Sources used to obtain information for the desktop and literature review are as follows:

- Nature Conservation (Wildlife) Regulation 2006 (NC Reg) and Nature Conservation Act 1992 (NCA) Protected Species Lists;
- Environmental Protection Biodiversity and Conservation Act 1999 (EPBC Act) protected matters search tool (DSEWPaC, 2011a);
- Geosciences Australia waterways mapping;
- Department of Environment and Resource Management regional ecosystem version 6.1 digital GIS layer (DERM, 2011b);
- Department of Environment and Resource Management wildlife online database (DERM, 2011c);
- Department of Environment and Resource Management WetlandMaps (DERM, 2011d);
- Department of Environment and Resource Management map of referable wetlands (DERM, 2011e);
- Department of Environment and Resource Management environmentally sensitive areas mapping (DERM, 2011f);
- Aerial photography interpretation;
- Origin supplied constraints/context mapping (e.g. soils, geology, waterways/wetlands, slope); and

Data searches using the EPBC Act protected matters search tool and the NCA wildlife online database were conducted using10 km and 25 km search radii respectively from the approximate centre of the Site.

A targeted literature review was conducted for matters of ecological significance relevant to the site including threatened species and threatened ecological community profiles to guide field ecologists on the ecological elements of particular focus for the field survey.

4.2 Field Survey

Scouting surveys were conducted in general accordance with the BioCondition – A Condition Assessment Framework for Terrestrial Biodiversity in Queensland – Assessment Manual – Version 2.1 (BioCondition Manual) (Eyre et al. 2011) and the Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Neldner et al. 2005).

The field surveys for this report were undertaken by Orogen between 19 September and 14 October 2011.

4.2.1 Vegetation Community Survey

General baseline botanical surveys were undertaken to describe dominant flora and vegetation community structure throughout the survey site. Botanical surveys were consistent with the tertiary level of data collection as described in the *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland* (Neldner *et al.* 2005).

As a general rule, the vegetation community surveys were undertaken within 50 m x 10 m plots for the purpose of typifying the ecotype under assessment. Vegetation community data was entered into the data fields provided by the Trimble data capture system. Where deemed appropriate, representative photo(s) were taken of the given habitat patch via the Trimble unit. A total of 55 formal vegetation community surveys were undertaken within

the Site. The location of the vegetation community survey sites are presented in **Appendix B**.

Relative abundance data was collected for each stratum within the community as per the data fields presented by the vegetation structure point data sheet of the Trimble unit.

Vegetation community polygons were confirmed, mapped and identified in accordance with Queensland regional ecosystem (biodiversity status) and general EPBC threatened ecological community criteria.

4.2.2 Habitat Survey

Habitat surveys were undertaken in conjunction with each vegetation community survey within the 50 m x 10 m quadrat and therefore a total of 55formal habitat survey sites were undertaken across the site(refer Appendix B).

Within each habitat survey site, a range of habitat features, such as log abundance, hollow tree size class and abundance were entered into the respective Trimble data sheet. Where deemed appropriate, representative photo(s) were taken of the given habitat patch via the Trimble unit. Photo aspect data is entered into the relevant data sheet within the Trimble unit.

4.2.3 Threatened Flora and Fauna Survey

Threatened species are those listed under the EPBC Act and NC Act.

Searches for threatened flora and fauna were undertaken within the vicinity of a vegetation structure point survey/habitat feature plot where field ecologists deemed the given area to be of sufficient potential for harbouring threatened species. Searches were undertaken for approximately one person hour per plot location. Searches of habitat features were not necessarily confined to within the vegetation community area/habitat feature quadrat. To account for the full hour allocated, the search area extended beyond but within the proximity of the plot.

Searches for threatened species were also conducted in additional locations based on incidental field observations of high quality habitat or identification of distinct ecological features through preliminary review of mapping and other background information for the property.

Any observations of threatened species (whether within search areas or opportunistically) were recorded using a dedicated flora site or fauna data sheet (within the Trimble data capture system). Where practicable, photo(s) were taken of the subject threatened species.

It is noted that any flora specimens deemed as potential threatened species and not conclusively identified by the Orogen ecologists were forwarded to the Queensland herbarium for verification.

4.2.4 Exotic Flora and Fauna Survey

Observations of environmental and declared pests, as defined by the *Land Protection (Pest and Stock Route Management) Act 2002* (DEEDI, 2010) and invasive species listed through the EPBC Act protected matters search tool were recorded via the respective Trimble data collection sheet. In the case of exotic flora, infestations may be recorded independently regardless of occurring outside of a vegetation community survey plot when opportunistically detected while traversing the Site. Pest species, if observed within a vegetation community survey plot, were entered into the flora species of other flora species data fields as provided by the Trimble data capture system.

4.2.5 Disturbance Survey

A disturbance survey was undertaken at each vegetation community/habitat feature survey site. Where evidence of disturbance was observed, it was recorded using the Trimble data capture system, and was categorised in terms of disturbance type (e.g. erosion, grazing),

severity (e.g. minimal, severe), and the estimated time of the most recent occurrence for the disturbance event (e.g. current, > 20 years).

4.2.6 Survey Limitations

A number of factors are considered likely to influence survey results for particular species or species groups. These factors are:

- Timing (seasons) and duration of the survey period;
- Weather conditions in the preceding seasons; and
- Restricted spatial area of the habitats within the site.

The surveys undertaken may not provide a true indication of seasonal habitat utilisation by fauna species within the site and some cryptic flora species may only be detected during particular flowering periods. The field investigations undertaken were limited to passive techniques (e.g. no live trapping) and were limited to Spring. Additional survey effort would be required to provide a more comprehensive inventory of species, both threatened and common.

Notwithstanding the precautionary principle was applied in determining a number of threatened species potentially utilising the habitats with the site.

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5. Results and Discussion

This section includes the results of assessments associated with the site and includes interpretation and discussion of key findings.

5.1 Desktop and Literature Review

The results of desktop searches relative to the site are provided below for ecological matters of international, national and state significance. Data sources used in desktop searches over the site are listed in Section 3.1. A more detailed description regarding potential occurrences and respective values of the site is provided in **Section 4.2**.

5.1.1 Matters of National Environmental Significance (MNES)

Tables 3-10 below summarise the results of an online search using the EPBC protected matters search tool. It is noted that not every MNES or other matters listed by the search results specifically relates to flora, fauna or ecological communities and therefore are not dealt with in this EAR. The complete EPBC Act report generated by the online search is provided in **Appendix C**.

5.1.1.1 Threatened Ecological Communities

Table 3: EPBC Act protected matters search tool results for threatened ecological communities predicted to occur at the site

Name	Status*
Brigalow (*Acacia harpophylla* dominant and co-dominant).	E
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	E
Weeping Myall Woodlands.	E

*Status under EPBC Act 1999: E = Endangered

5.1.1.2 Listed Flora

Table 4: EPBC Act protected matters search tool results for listed flora species predicted to occur at the site

Scientific Name	Common Name	Status*
Cadellia pentastylis	Ooline	V
Commersonia argentea	A shrub	V
Tylophora linearis	A vine	E

*Status under EPBC Act 1999: E = Endangered; V = Vulnerable

5.1.1.3 Listed Fauna

Table 5: EPBC Act protected matters search tool results for listed fauna species predicted to occur at the site

Class	Scientific Name	Common Name	Status*
Birds	*Geophaps scripta scripta*	Squatter Pigeon (southern)	V
	Neochmia ruficauda ruficauda	Star Finch	E
	Rostratula australis (formally *R. benghalensis australis* and *R. benghalensis s.* lat.)	Australian Painted Snipe	V
Mammals	*Chalinolobus dwyeri*	Large-eared Pied Bat	V
	Dasyurus hallucatus	Northern Quoll	E
	Nyctophilus timoriensis (South-eastern form)	Eastern Long-eared Bat	V
Reptiles	*Delma torquata*	Collared Delma	V
	Denisonia maculata	Ornamental Snake	V
	Egernia rugosa	Yakka Skink	V
	Furina dunmalli	Dunmall's Snake	V
	Paradelma orientalis	Brigalow Scaly-foot	V
	Rheodytes leukops	Fitzroy River Turtle	V

*Status under EPBC Act 1999: E = Endangered; V = Vulnerable

5.1.1.4 Migratory Species

Table 6 below presents the migratory species listed by the EPBC Act search results. It is noted that some species are listed more than once as they fall under more than one category for migratory species.

Table 6: EPBC Act protected matters search tool results for listed migratory species predicted to occur at the site

Group	Scientific Name	Common Name
Migratory Marine Birds	*Apus pacificus*	Fork-tailed Swift
	Ardea alba	Great Egret
	Ardea ibis	Cattle Egret
Migratory Terrestrial Species	*Haliaeetus leucogaster*	White-bellied Sea-Eagle
	Hirundapus caudacutus	White-throated Needletail
	Merops ornatus	Rainbow Bee-eater
Migratory Wetland Species	*Ardea alba*	Great Egret
	Ardea ibis	Cattle Egret
	Gallinago hardwickii	Latham's Snipe
	Nettapus coromandelianus albipennis	Australian Cotton Pygmy-goose

Group	Scientific Name	Common Name
	Rostratula australis	Australian Painted Snipe

5.1.1.5 Wetlands of International Significance – Ramsar Wetlands

No wetlands of international significance (Ramsar Wetlands) were identified by the EPBC Act protected matters search tool.

5.1.2 Other Matters

5.1.2.1 Listed Marine Species

Table 7 below provides a list of marine species identified by the protected matters search tool. It is noted that listed marine species are not a MNES, and rather falls under other matters provided by the protected matters search tool.

Table 7: EPBC protected matters search tool results for listed marine species predicted to occur at the site

Class	Scientific Name	Common Name
Birds	*Apus pacificus*	Fork-tailed Swift
	Ardea alba	Great Egret
	Ardea ibis	Cattle Egret
	Gallinago hardwickii	Latham's Snipe
	Haliaeetus leucogaster	White-bellied Sea-Eagle
Class	*Scientific Name*	Common Name
Birds	*Hirundapus caudacutus*	White-throated Needletail
	Merops ornatus	Rainbow Bee-eater
	Nettapus coromandelianus albipennis	Australian Cotton Pygmy-goose
	Rostratula benghalensis s. lat.	Painted Snipe

5.1.3 Extra Information

5.1.3.1 Invasive Species

The following tables present a summary of extra information provided by the EPBC Act protected matters search tool. They include a list of Invasive flora (**Table 8**) and pest fauna species (**Table 9**) identified by the desktop search.

Invasive flora species identified by the protected matters search tool in **Table 8** include weeds of national significance (WoNS) and '*other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity'*(SEWPAC, 2011a).

The pest fauna species identified from the EPBC protected matters search tool are listed in **Table 9**.

Table 8: EPBC protected matters search tool results for invasive flora species predicted to occur at the site

Scientific Name	Common Name
*Acacia nilotica subsp. indica**	Prickly Acacia
*Lantana camara**	Lantana
*Parthenium hysterophorus**	Parthenium Weed

* - Weed of National Significance

Table 9: EPBC protected matters search tool results for invasive fauna species predicted to occur at the site

Scientific Name	Common Name
Rhinella marinus (formerly *Bufo marinus*)	Cane Toad
Felis catus	Domestic Cat
Oryctolagus cuniculus	European Rabbit
Sus scrofa	Feral Pig
Vulpes vulpes	Red Fox

5.1.4 Nature Conservation Act

The following section summarises the results of a search using the Queensland Department of Environment and Resource Management wildlife online database (DERM, 2011c) for threatened (*Nature Conservation Regulation Act 1992*) flora and fauna within a 25 km radius of the site. A copy of the search is provided in **Appendix D.**

5.1.4.1 Listed Flora

No threatened flora species were listed by the NC Act (wildlife online) search tool results as being recorded within a 25 km radius of the site.

5.1.4.2 Listed Fauna

Table 10: Nature Conservation Act (wildlife online) search tool results for fauna

Class	Scientific Name	Common Name	Status*
Birds	*Calyptorhynchus lathami lathami*	Glossy Black-Cockatoo	V
	Nettapus coromandelianus	Cotton Pygmy Goose	NT
Reptiles	*Strophurus taenicauda*	Golden-tailed Gecko	NT

*Status under the Qld NC Act 2000: V = Vulnerable; NT = Near Threatened

5.1.5 Environmentally Sensitive Areas - Of Concern and Endangered Regional Ecosystems

A search of DERM's RE mapping was undertaken to identify Environmentally Sensitive Areas (ESA) mapped over the site. A search of DERM's ESA mapping (DERM, 2011f) was also undertaken to identify ESAs (pertinent to Chapter 5A activities defined by the EP Act) mapped over the site. It was determined that the site is designated as hosting category B ESAs (*endangered remnant REs*). It is noted RE mapping designates some of these category B ESAs as mixed polygons, consisting of *of concern remnant REs* (a category C ESA) (REs 11.3.25/11.3.2/11.9.10). Refer to **Appendix E** to view the desktop RE mapping designation

of the site**.** A description of each RE type mapped as occurring on the site is provided below in **Tables 11 – 13**.

In addition to endangered remnant REs, the search identified that the western boundary of the site is adjoined by a State Forest which is also a category B ESA.

While it is noted that no *concern at present* REs are not defined as an ESA, a description of the no concern at present REs mapped as occurring on site are listed in **Table 13** and presented in **Appendix E** to provide further ecological context around the Site.

It is noted that the proposed petroleum and gas activities of Australia Pacific LNG (as defined and controlled under the *Petroleum and Gas (Production and Safety) Act 2004* and EP Act), are exempt from assessment under the Vegetation Management Act 1999 (VMA). As such, the VMA class assigned to areas of remnant vegetation is not applicable. Assessment of remnant vegetation for this ecological assessment is therefore based on the biodiversity status of the remnant vegetation.

The desktop review of the sites RE designations identified the presence of endangered remnant vegetation. Specifically, endangered (dominant) RE 11.9.5a was shown to occur over the south eastern portion of the site. A smaller polygon containing endangered RE's 11.9.5/11.9.5a (70/30) is also mapped at northern area of the site.

Two mixed polygons designated as endangered (subdominant) REs are mapped on the site. One of these is designated as 11.3.25/11.3.2/11.9.10 (55/40/5) is mapped around the south eastern boundary of the site. The other endangered (subdominant) mixed polygon is located at the northern tip of the site and is designated as 11.3.2/11.9.10 (80/20).

One large polygon containing no concern at present RE 11.5.1 is mapped across the south western area of the site.

5.1.5.1 Endangered Regional Ecosystems

Table 11: Endangered* regional ecosystems mapped over the site

RE code	General description^	Description^
11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open-forest on fine-grained sedimentary rocks.	Open-forest dominated by *Acacia harpophylla* and/or *Casuarina cristata* (10-20m) or *Acacia harpophylla* with a semi-evergreen vine thicket understorey. Open-forest dominated by *C. cristata* is more common in southern parts of the bioregion. A prominent low tree or tall shrub layer dominated by species such as *Geijera parviflora* and *Eremophila mitchellii*, and often with semi-evergreen vine thicket species is often present. The latter include *Flindersia dissosperma*, *Brachychiton rupestris*, *Excoecaria dallachyana*, *Macropteranthes leichhardtii* and *Acalypha eremorum* in eastern areas, and species such as *Carissa ovata*, *Owenia acidula*, *Croton insularis*, *Denhamia oleaster* and *Notelaea microcarpa* in south-western areas. *Melaleuca bracteata* may be present along watercourses. Occurs on fine-grained sediments. The topography includes gently undulating plains, valley floors and undulating footslopes and rarely on low hills. The soils are generally deep texture-contrast and cracking clays. The cracking clays are usually black or grey to brown or reddish-brown in colour, often self-mulching and sometimes with gilgai microrelief in flatter areas. Some texture contrast soils are shallow to only moderately deep.
11.9.5a		11.9.5a: *Acacia harpophylla* predominates and forms a fairly continuous canopy (10-18m high). Other tree species such as *Eucalyptus populnea, Casuarina cristata, Cadellia pentastylis* and *Brachychiton* spp. may also be present in some areas and form part of

RE code	General description^	Description^
		the canopy or emerge above it. Scattered *Eucalyptus orgadophila* may occur, especially on upper slopes and crests. A dense tall shrub layer dominated by a range of species is usually present, while a more open low shrub layer often occurs. Common species in these layers include *Croton insularis, Denhamia oleaster, Apophyllum anomalum, Croton phebalioides, Alectryon diversifolius* and *Carissa ovata*. The ground layer is sparse, most frequently composed of *Ancistrachne uncinulata* and *Eragrostis megalosperma* and varies with the density of the shrub layers. Occurs on undulating plains and rises formed mainly on shales. The soils are predominantly cracking clay soils, which are strongly alkaline at or near the surface and acidic beneath, or dark brown and grey-brown gradational soils, with a coarse-textured surface grading into an alkaline, clayey subsoil. (BVG1M: 25a).
11.9.10	*Eucalyptus populnea*, *Acacia harpophylla* open-forest on fine-grained sedimentary rocks.	*Eucalyptus populnea* predominates forming a distinct but discontinuous canopy (15-18 m tall). *Acacia harpophylla* and sometimes *Casuarina cristata* usually forms a lower tree layer (8-14 m tall) which occasionally becomes the dominant layer. An open to moderately dense layer of tall shrubs is usually present and dominated by *Eremophila mitchellii* and *Geijera parviflora* with *Acacia excelsa*, *Atalaya hemiglauca*, *Psydrax oleifolia*, *Alectryon oleifolius* frequent. Scattered low shrubs such as *Carissa ovata* and *Eremophila deserti* are frequently present. The ground cover is usually sparse, and dominated by the grasses *Aristida ramosa*, *Enteropogon acicularis*, *Bothriochloa decipiens* and *Paspalidium spp*. Occurs on Cainozoic to Proterozoic consolidated, fine-grained sediments. Occurs on lower parts of undulating plains often with deep texture-contrast soils. Occurs on sodic and saline soils which may act as a discharge area if adjacent to alluvium.

* -Biodiversity Status, ^ - Descriptions from: Department of Environment and Resource Management, Qld Government (2011h). Regional Ecosystem Description Database (REDD).

5.1.5.2 Of Concern Regional Ecosystems

Table 12: Of concern*regional ecosystems mapped over the site

RE code	General description^	Description^
11.3.2	*Eucalyptus populnea* woodland on alluvial plains.	*Eucalyptus populnea* woodland to open-woodland. *E. melanophloia* may be present and locally dominant. There is sometimes a distinct low tree layer dominated by species such as *Geijera parviflora*, *Eremophila mitchellii*, *Acacia salicina*, *Acacia pendula*, *Lysiphyllum spp.*, *Cassia brewsteri*, *Callitris glaucophylla* and *Acacia excelsa*. The ground layer is grassy dominated by a range of species depending on soil and management conditions. Species include *Bothriochloa decipiens*, *Enteropogon acicularis*, *Aristida ramosa* and *Tripogon loliiformis*. Occurs on Cainozoic alluvial plains with variable soil types including texture contrast, deep uniform clays, massive earths and sometimes cracking clays.
11.3.25	Eucalyptus tereticornis or E. camaldulensis woodland	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

RE code	General description^	Description^
	fringing drainage lines.	dominant. An open to sparse, tall shrub layer is frequently present dominated by 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.

* -Biodiversity status, ^ - Descriptions from Regional Ecosystem Description Database (REDD), Department of Environment and Resource Management, Qld Government (DERM, 2011g).

5.1.5.3 No Concern at Present Regional Ecosystem

Table 13: No concern at present* regional ecosystems mapped over the Site

RE code	General description	Description
11.5.1	*Eucalyptus crebra, Callitris glaucophylla, Angophora leiocarpa, Allocasuarina luehmannii* woodland on Cainozoic sandplains/remnant surfaces.	*Eucalyptus crebra* and/or *E. populnea* +/- *Angophora leiocarpa* +/- *E. woollsiana* (in south of bioregion) dominate the woodland (to open-woodland) canopy. A low tree layer dominated by *Allocasuarina luehmannii* +/- *Melaleuca decora* +/- *Callitris glaucophylla* +/- *C. endlicheri* is usually present. In some areas *Allocasuarina luehmannii* low woodland is the dominant layer. The ground cover is usually sparse and dominated by perennial grasses. Occurs on Cainozoic sandplains, especially outwash from weathered sandstones. Duplex soils with sandy surfaces.

* -Biodiversity status, ^ - Descriptions from Regional Ecosystem Description Database (REDD), Department of Environment and Resource Management, Qld Government (DERM, 2011g).

5.1.6 Wetlands and Watercourses

A review of DERM's RE Mapping (DERM, 2011b), Wetland*Maps* (DERM, 2011d) and referable wetlands mapping (DERM, 2011e)was undertaken to identify wetland and watercourse designations within the Site. The results are summarised in **Table 14**.Desktop wetlands and watercourse mapping for the site is provided in **Appendix F**.

Table 14: Summary of wetland and watercourse mapping for the site

Identified Wetlands and Watercourses	Mapped Occurrence
Watercourses	**Appendix F** presents six 1st order and three 2nd order streams. The streams converge to two 3rd order streams which convey water from the site in an easterly direction one of which flows to a 4th order stream which runs along the southeast boundary (DERM, 2011b).
Wetlands	No wetlands are mapped for the site according to Wetland*Maps* (DERM, 2011d).
Referable Wetlands	No referable wetlands or associated trigger areas are mapped as occurring on or adjacent to the site(DERM, 2011e).

Sources: Regional Ecosystem and Remnant Map—Version 6 (DERM, 2011b); WetlandMaps (DERM, 2011d); Referable Wetlands Mapping (DERM, 2011e).

5.2 Field Survey

The results of the field surveys undertaken by Orogen between 19 September and 14 October 2011 are summarised in the following sections. The field survey results have been presented in the context of providing additional/supplementary information to further explore the initial findings of the desktop review. A cumulative list of flora detected during the survey is provided in **Appendix G,** and a list of fauna species detected during the survey is provided in **Appendix H.** For the purpose of the study, all fauna species of ecological significance and pest fauna observed were noted, while common fauna species were recorded opportunistically.

5.2.1 Matters of National Environmental Significance *(MNES)*

MNES are provided under the EPBC Act and include threatened ecological communities, threatened species (flora and fauna), migratory and marine species, and invasive species (flora and fauna).Field survey results concerning MNES are provided below.

5.2.1.1 EPBC Threatened Ecological Communities

The surveys identified the potential presence of two EPBC listed threatened ecological communities identified by the desktop searches. These communities are:

- Brigalow (*Acacia harpophylla* dominant and co-dominant); and
- Semi-evergreen vine thickets (SEVT) of the Brigalow Belt (North and South) and Nandewar Bioregions

A summary of the occurrence of these communities within the site is provided in **Table 15**. The extent of these communities across the site is demonstrated in **Appendix I.** The mapped occurrences of SEVT and Brigalow in **Appendix I** show polygons containing 100% composition of these EPBC communities and also transitional ecotypes (mixed polygons) that contain elements of the threatened EPBC communities**.** If these areas are found to be a constraint to proposed development footprints, it is recommended that further finer scale assessment of key determining criteria for these EPBC communities is undertaken.

Table 15: Threatened EPBC listed ecological communities potentially occurring on the site

Name	Status*	Occurrence on site
Brigalow (*Acacia harpophylla* dominant and co-dominant)	E	This community was observed at various locations throughout the site (refer **Appendix I**).
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E	Not recorded during survey.
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	E	The occurrence of this community was observed at various locations within the site (refer **Appendix I**). Some areas were represented by 100 % stands of SEVT, while other areas exhibited transitional characteristics between SEVT and other vegetation community types.
Weeping Myall Woodlands.	E	Not recorded during survey.

*Status under EPBC Act 1999: E = Endangered

5.2.1.2 EPBC Listed Flora

No EPBC protected flora species were recorded during the field survey. The site is, however, considered to provide potential habitat for a number of the EPBC protected flora species identified by the protected matters search tool. The EPBC listed flora species identified by the online search, and a brief discussion on the perceived habitat value of the site for these species is provided below in **Table 16**. Recommendations including mitigation of potential impacts to these species are discussed in more detail in **Section 5**.

Table 16: EPBC protected flora species recorded or potentially occurring on the site

Scientific Name	Common Name	Status*	Likelihood of Occurrence
Cadellia pentastylis	Ooline	V	**Potentially occurring** The areas supporting semi-evergreen vine thickets (SEVT) represent potential habitat for this species. In addition, other areas of the site such as relatively undisturbed patches of Brigalow and other sclerophyll communities represent potential habitat for this species. **Low to moderate value**. Actual abundance cannot be determined prior to the undertaking of detailed surveys within clearing footprints (refer to recommendations in **Section 5**). Additional actions (e.g. relocation/seed collection) would be recommended if this species is subsequently identified within clearing footprints (refer **Section 5**).
Commersonia argentea	A shrub	V	**Potentially occurring** The site offers potential habitat for *Commersonia argentea* which is known to be associated with a number of flora species and general habitat values noted to be present on the site (Threatened Species Scientific Committee, 2008). **Low to moderate value.** Actual abundance cannot be determined prior to the undertaking of detailed surveys within clearing footprints (refer to recommendations in **Section 5**). Additional actions (e.g. relocation/seed collection) would be recommended if this species is subsequently identified within clearing footprints (refer **Section 5**).
Tylophora linearis	A vine	E	**Potentially occurring** The site offers potential habitat for *Tylophora linearis* which is known to be associated with a number of flora species and general habitat values noted to be present on the site (SEWPAC, 2011). **Low to moderate value** (depending on level of disturbance/condition of RE's present) Actual abundance cannot be determined prior to the undertaking of detailed surveys within clearing footprints (refer to recommendations in **Section 5**). Additional actions (e.g. relocation/seed collection) would be recommended if this species is subsequently identified within clearing footprints (refer **Section 5**).

*Status under the EPBC Act: E = Endangered; V = Vulnerable

5.2.1.3 EPBC Listed Fauna

No EPBC listed threatened fauna species were recorded during field survey.

The site is, however, considered to provide potential habitat for a number of the EPBC threatened fauna species identified by the protected matters search tool. The EPBC listed fauna species identified by the online search, and a brief discussion on the perceived habitat value of the site for these species is provided below in **Table 17**.

Table 17: EPBC protected fauna species recorded or potentially occurring on the site

Class	Scientific Name	Common Name	Status*	Likelihood of Occurrence
Birds	*Geophaps scripta scripta*	Squatter Pigeon (southern)	V	**Potentially occurring** The site offers potential habitat for the Squatter Pigeon which is known to be associated with general habitat values noted to be present on the site (Threatened Species Scientific Committee, 2008b). **Moderate value** around waterways. **Low values** in cleared or highly modified communities.
	Neochmia ruficauda ruficauda	Star Finch	E	**Potentially occurring.** The vegetation within the site would provide suitable habitat resources for the Star Finch. **Moderate value** given the small size of this species and expected home range.
	Rostratula australis (formally R. benghalensis australis and R. benghalensis s. lat.)	Australian Painted Snipe	V	Unlikely to occur. The site lacks substantial wetlands required for this species. Low value to species.
Fish	*Maccullochella peelii peelii*	Murray Cod	V	Unlikely to occur. The site lacks permanent waterways for this species. The riverine corridor within the eastern portion of the site and other waterways within the site may provide potential habitat during high flow periods. Low value to species.
Mammals	*Chalinolobus dwyeri*	Large-eared Pied Bat	V	**Potentially occurring.** The vegetation within the site represents potential foraging habitat for the Large-eared Pied Bat. **Low to moderate** value in terms of foraging value. The vegetation represents a small area of habitat relative to the species large foraging range and mobility.

Class	Scientific Name	Common Name	Status*	Likelihood of Occurrence
	Dasyurus hallucatus	Northern Quoll	E	**Potentially occurring.** It is likely that this species could traverse the site due to its extensive home range, mobility and the availability of opportunistic food resource (roadside carrion). There is also potential denning habitat provided by tree hollows and hollow logs shown to occur on site. However, overall the site represents lower value relative to core habitat in the wider landscape. **Low to moderate value.**
	Nyctophilus timoriensis (South-eastern form)	Eastern Long-eared Bat	V	**Potentially occurring.** The vegetation within the site represents potential foraging habitat for this species. The site also contains potential roosting habitat in the form of tree hollows. **Moderate to high value** in terms of potential roosting habitat, particularly within areas supporting remnant ecosystems (given the relatively higher abundance of tree hollows in these communities). **Low to moderate value** in terms of foraging value. The vegetation represents a small area of habitat relative to the species large foraging range and mobility.
Reptiles	*Delma torquata*	Collared Delma	V	**Potentially occurring.** The site contains some rocky slopes and associated vegetation types that may provide potential habitat for this species. **Moderate to high value** in areas supporting rocky slopes and associated RE's. **Low values** in cleared or highly modified communities.
	Denisonia maculata	Ornamental Snake	V	**Potentially occurring.** Some parts of the site, particularly areas supporting patches of Brigalow, represent potential habitat for this species. **Moderate value** in areas supporting Brigalow communities. **Low values** in cleared or highly modified communities.

Class	Scientific Name	Common Name	Status*	Likelihood of Occurrence
	Egernia rugosa	Yakka Skink	V	**Potentially occurring.** The vegetation within the site represents potential habitat for this species. In particular, parts of site supporting RE's are considered to represent higher quality habitat for the species. **Moderate value** in areas supporting RE's. **Low values** in cleared or highly modified communities.
	Furina dunmalli	Dunmall's Snake	V	**Potentially occurring.** The vegetation within the site represents potential habitat for this species. In particular, parts of site supporting RE's are considered to represent higher quality habitat for the species. **Moderate value** in areas supporting RE's. **Low values** in cleared or highly modified communities.
	Paradelma orientalis	Brigalow Scaly-foot	V	**Potentially occurring.** The vegetation within the site represents potential habitat for this species. In particular, parts of site supporting RE's are considered to represent higher quality habitat for the species. **Moderate value** in areas supporting RE's. **Low values** in cleared or highly modified communities.
	Rheodytes leukops	Fitzroy River Turtle	V	Unlikely to occur. This species is only found in the Fitzroy River and its tributaries (SEWPAC, 2011b).

*Status under the EPBC Act: E = Endangered; V = Vulnerable

5.2.1.4 EPBC Listed Migratory Species

One (1) migratory species, the Rainbow Bee-Eater (*Merops ornatus*) was detected within the site during the surveys.

The site is also considered to support potentially suitable habitat resources for other listed migratory species identified by the protected matters search tool. Despite this, the habitats present within the site are likely to comprise only a very small component of any migratory species range. Further, the site does not contain intertidal or oceanic habitats and the site does not contain any substantial wetlands. Overall, the site is highly unlikely to contain an 'important area' of habitat for migratory species.

The EPBC listed migratory species identified by the online search, and a brief discussion on the perceived habitat value of the site for these species is provided below in **Table 18**.

It is noted that some species such as Cattle Egret *(Ardea ibis)* are listed under more than one migratory category (e.g. migratory marine species and migratory wetlands species) in the results of the protected matters search tool. Such duplications have been omitted from the following Table.

Table 18: EPBC protected migratory species recorded or potentially occurring on the site

Class	Scientific Name	Common Name	Likelihood of Occurrence
Birds	*Apus pacificus*	Fork-tailed Swift	Potentially occurring. The vegetation within the site would provide suitable habitat resources for the Fork-tailed Swift. **Low value** as the vegetation represents a small area of habitat relative to the species' large foraging range and mobility.
	Ardea alba	Great Egret	Potentially occurring. The vegetation within the site would provide suitable habitat resources for the Great Egret. **Low value** as the vegetation represents a small area of habitat relative to the species' large foraging range and mobility.
	Ardea ibis	Cattle Egret	Likely to occur. The vegetation within the site would provide suitable habitat resources for the Cattle Egret. **Low value** as the vegetation represents a small area of habitat relative to the species' large foraging range and mobility.
	Haliaeetus leucogaster	White-bellied Sea-Eagle	Potentially occurring The site does not contain large permanent water bodies or estuarine environments and therefore lacks preferred foraging habitat for the White-bellied Sea-Eagle. This species, may, however, forage over the site opportunistically. This species may also utilise trees within the site for nesting, however, this species usually chooses nest sites that are within proximity to large bodies of permanent water. **Overall value generally low** given the species' large foraging range and mobility, and lack of preferred foraging habitat within the site. **Potentially high value** should any nest

Class	Scientific Name	Common Name	Likelihood of Occurrence
			sites be identified within the site.
	Hirundapus caudacutus	White-throated Needletail	Potentially occurring. The vegetation within the site would provide suitable habitat resources for the White-throated Needletail. **Low value** as the vegetation represents a small area of habitat relative to the species large foraging range and mobility.
	Merops ornatus	Rainbow Bee-eater	Recorded within the site The vegetation within the site would provide suitable habitat resources for the Rainbow Bee-eater. **Low value** as the vegetation represents a small area of habitat relative to the species large foraging range and mobility.
	Gallinago hardwickii	Latham's Snipe	Unlikely to occur. The site lacks substantial wetlands.
	Nettapus coromandelianus albipennis	Australian Cotton Pygmy-goose	Unlikely to occur. The site lacks substantial wetlands.
	Rostratula australis *(formally R. benghalensis australis and R. benghalensis s. lat.)*	Australian Painted Snipe	Unlikely to occur. The site lacks substantial wetlands.

5.2.1.5 Wetlands of National Significance – Ramsar sites

Orogen field surveys did not find any wetlands of national significance on the site. In addition, the site was not found to contain habitat that could be classified as a wetland of national significance according to classification under the EPBC Act.

5.2.2 Other Matters

5.2.2.1 EPBC Listed Marine Species

One (1) marine, species listed by the EPBC Act, the Rainbow Bee-Eater (*Merops ornatus*), was detected within the site during the surveys.

The site is considered to support potentially suitable habitat resources for other listed marine species identified by the protected matters search tool, particular birds. (**Table 19**) Despite this, the habitats present within the site are likely to comprise only a very small component of any marine species range. Further, the site does not contain intertidal or oceanic habitats and does not contain any substantial wetlands. Overall, the site is highly unlikely to contain an 'important area' of habitat for listed marine species.

Table 19: EPBC protected marine species recorded or potentially occurring on the site

Class	Scientific Name	Common Name	Likelihood of Occurrence
Birds	*Ardea ibis*	Cattle Egret	Likely to occur. The vegetation within the site would provide suitable habitat resources for the Cattle Egret. **Low value** as the vegetation represents a small area of habitat relative to the species' large foraging range and mobility.
	Gallinago hardwickii	Latham's Snipe	Unlikely to occur. The site lacks substantial wetlands.
	Haliaeetus leucogaster	White-bellied Sea-Eagle	Potentially occurring The site does not contain large permanent water bodies or estuarine environments and therefore lacks preferred foraging habitat for the White-bellied Sea-Eagle. This species, may, however, forage over the site opportunistically. This species may also utilise trees within the site for nesting, however, this species usually chooses nest sites that are within proximity to large bodies of permanent water. **Overall value generally low** given the species' large foraging range and mobility, and lack of preferred foraging habitat within the Site. **Potentially high value** should any nest sites be identified within the site.
	Hirundapus caudacutus	White-throated Needletail	Potentially occurring. The vegetation within the site would provide suitable habitat resources for the White-throated Needletail. **Low value** as the vegetation represents a small area of habitat relative to the species large foraging range and mobility.
	Merops ornatus	Rainbow Bee-eater	Recorded within the site The vegetation within the site would provide suitable habitat resources for the Rainbow Bee-eater. **Low value** as the vegetation represents a small area of habitat relative to the species large foraging range and mobility.
	Nettapus coromandelianus albipennis	Australian Cotton Pygmy-goose	Unlikely to occur. The site lacks substantial wetlands.
	Rostratula benghalensis s. lat.	Painted Snipe	Unlikely to occur. The site lacks substantial wetlands.

5.2.3 Extra Information

5.2.3.1 Invasive Species Identified by the Protected Matters Search Tool

As presented in **Table 20** below, no weeds of national significance or other weeds listed by the protected matters search tool were observed during the field survey. All other non-native flora observed during the field survey is listed in **Appendix G.**

As presented in **Table 21** below, two (2) invasive pest fauna species listed by the protected matters search tool were detected during the survey. All other non-native fauna observed during the field survey is listed in **Appendix H.**

Table 20: Weeds listed by the EPBC protected matters search tool as potentially occurring at the Site

Scientific Name	Common Name	Occurrence Within the site
*Acacia nilotica subsp. indica**	Prickly Acacia	Not detected
*Lantana camara**	Lantana	Not detected
*Parthenium hysterophorus**	Parthenium Weed	Not detected

Table 21: Pest Fauna listed by the EPBC protected matters search tool as potentially occurring at the site

Scientific Name	Common Name	Occurrence Within the site
Rhinella marinus (formerly Bufo marinus)	Cane Toad	**Observed** at 4 formal survey sites: 9, 11, 13 and 17.
Felis catus	Domestic Cat	Not detected
Oryctolagus cuniculus	European Rabbit	Not detected
Sus scrofa	Feral Pig	**Observed** opportunistically within the site.
Vulpes vulpes	Red Fox	Not detected

5.2.4 Nature Conservation Act

Field survey results concerning NC ACT protected flora and fauna are provided in the following sections.

5.2.4.1 Listed Flora

No flora species scheduled as threatened under the NC Reg were recorded during the field survey.

The site is considered to provide potential habitat for a number of NC Act threatened flora species; however no records of threatened flora were identified on DERM's wildlife online database for the search area (25 km radius).

5.2.4.2 Listed Fauna

A total of three (3) fauna species protected by the NC Act were identified during the field survey. These species were:

- Grey Goshawk (*Accipiter novaehollandiae*);
- Painted Honeyeater (*Grantiella picta*); and
- Golden-tailed Gecko (*Strophurus taenicauda*).

The locations where these species were observed are presented in (**Appendix J**).Records of the Golden-tailed Gecko in the site's locality (25k m radius of the site) were noted through desktop searches (wildlife online). There were no records of the Painted Honeyeater and Grey Goshawk identified by the desktop search (wildlife online) within the site's locality.

The site is also considered to provide potential habitat for a number of threatened fauna species identified by the search of DERM's wildlife online database. The threatened fauna species identified by the online search and a brief discussion on the perceived habitat value of the site for these species is provided below in **Table 22**.

Table 22: Nature Conservation Act protected fauna recorded or potentially occurring on the site

Class	Scientific Name	Common Name	Status*	Likelihood of Occurrence
Birds	*Accipiter novaehollandiae*	Grey Goshawk	NT	**Recorded within the site.** This species was observed flying overhead at survey site 27. The vegetation throughout the site represents suitable hunting habitat for the Grey Goshawk. This species may also utilise trees within the site for nesting. **Overall value generally low** given the species' large foraging range and mobility. **Potentially high value** should any nest sites be identified within the site.
	Calyptorhynchus lathami lathami	Glossy Black-Cockatoo	V	Potentially occurring. The site was found to contain suitable food trees (*Casuarina sp*.) for the Glossy Black-Cockatoo. The site was found to contain hollow bearing trees with large enough cavities for providing potential breeding habitat for the species. Such trees were however, scattered in low densities and were primarily associated with the RE vegetation, lacking dense stands of food trees. Overall, the site was found to contain relatively low densities of preferred food trees and this vegetation is unlikely to represent a high value area of habitat for the species. **Low value** due to relatively limited foraging and breeding resources. The potential for utilisation of any hollow bearing trees within the site is considered to be low given the lack of dense stands of food trees within proximity.
	Grantiella picta	Painted Honeyeater	V	**Recorded within the site.** This species was observed flying overhead at survey site32. The vegetation within the site was found to support Mistletoe of which provides preferred food resources for the Painted Honeyeater. This species may also forage on nectar and fruits of a range of other vegetation throughout the Site. The habitats at the site also contain suitable nesting resources for this species, particular areas supporting hollow stumps, and tree hollows. **Overall low values** due to relatively low abundance of preferred foraging resources. **Potentially moderate value** in REs due to higher abundance of potential nesting resources.

Class	Scientific Name	Common Name	Status*	Likelihood of Occurrence
	Melithreptus gularis gularis	Black-chinned Honeyeater	NT	Highly likely to occur. The vegetation throughout the site represents suitable habitat for the Black-chinned Honeyeater. This species was observed during the surveys undertaken (by Orogen) in Lot 4, which adjoins the south of the Site. **Low value** given the species large foraging range and mobility, and occurrence of suitable habitat throughout the local area.
	Nettapus coromandelianus	Cotton Pygmy Goose	NT	Unlikely to occur. The site lacks substantial wetlands.
Reptiles	*Strophurus taenicauda*	Golden-tailed Gecko	NT	**Recorded within the Site.** This species was recorded at two formal survey sites: 29 and 31 (refer **Appendix J**). **Moderate to high value** in areas supporting RE vegetation given the small size of this species, relatively limited mobility, and expected home range. **Low values** in cleared or highly modified communities with limited timber or bark resources.

*Status under the Qld NC Act 2000: V = Vulnerable; NT = Near Threatened

5.2.4.3 Other Significant Flora and Fauna

Four (4) species of 'type A restricted plants' were recorded during the surveys. These species were:

- Tiger Orchid (*Cymbidium canaliculatum*);
- Yellow Hyacinth-orchid (*Dipodium hamiltonianum*);
- Narrow Leaved Bottle Tree (*Brachychiton rupestris*);and
- Kurrajong (*Brachychiton populneus subs trilobus*).

Environmentally Sensitive Areas – Of Concern and Endangered Regional Ecosystems

Two ESA categories were observed onsite during field surveys, being category B (*endangered remnant*) and category C (*of concern remnant*). Whilst not an ESA, the no concern at present RE type identified onsite is also discussed in the following, in order to provide context around the ecological condition of the site.

Distribution of REs on site has been mapped by Orogen based on field survey data. Several RE polygons have been confirmed as different to those shown for the site on DERMs mapping. Field results were assessed against the criteria for REs given by Neldner *et al.* (2005) such that vegetation must contain 50 % pre-clearing cover and 70 % of the pre-clearing height for the vegetation type.

A total of seven (7) remnant REs were identified within the site during the field survey. The REs identified within the site are listed below and the extent of these REs onsite is presented by **Appendix K**.

- Endangered: - 11.9.4, 11.9.5/11.9.5a, 11.9.10;
- Of concern: - 11.3.2, 11.3.25; and
- No concern at present: 11.5.5, 11.10.9.

A brief summary regarding the occurrence of these REs is provided in **Tables 23-25** below and the location of these communities is demonstrated in **Appendix K**. As discussed in **Section 4.1.5,** the conservation status for the REs is in accordance with the biodiversity status, not the status assigned under the VMA.

The field surveys identified that several RE polygons shown for the site on DERMs mapping were not consistent with the vegetation occurring within respective areas onsite. The inconsistencies can be summarised as:

- On site vegetation assemblages often did not match the RE codes assigned by the mapping;
- Some areas not currently mapped by DERM as containing remnant RE were found to contain vegetation that would satisfy the criteria for remnant classification; and
- Some areas mapped by DERM as Remnant RE polygons were found to contain vegetation that would not meet the criteria of remnant status. These areas are demonstrated in **Appendix K** as regrowth vegetation.

5.2.4.4 Endangered Regional Ecosystems

Table 23: Endangered regional ecosystems identified on the site

RE code	General description	Occurrence on site
11.9.4	Semi-evergreen vine thicket on fine-grained sedimentary rocks	Two polygons containing a 100% composition of this RE and three mixed polygons containing this RE type were identified. In addition, one mixed polygon was identified to contain regrowth of this RE.
11.9.5/11.9.5a	*Acacia harpophylla* and/or *Casuarina cristata* open-forest on fine-grained sedimentary rocks.	This was the most commonly recorded *Endangered* RE within the site and was observed at various locations throughout the site (refer **Appendix K**). Some polygons have been identified as containing 100% of 11.9.5, while other polygons have been identified as containing a mix of this RE. Three polygons were identified to contain vegetation considered more aligned to 11.9.5a.
11.9.10	*Eucalyptus populnea, Acacia harpophylla* open-forest on fine-grained sedimentary rocks.	Recorded within various mixed polygons, generally situated in the south eastern portion of the Site.

5.2.4.5 Of Concern Regional Ecosystems

Table 24: Of concern regional ecosystems identified on the site

RE code	General description	Occurrence on site
11.3.2	*Eucalyptus populnea* woodland on alluvial plains.	Recorded within various mixed polygons, generally situated in the northern and also south eastern portion of the site.
11.3.25	*Eucalyptus tereticornis or E. camaldulensis* woodland fringing drainage lines	Three polygons containing 100% of this RE and two mixed polygons containing this RE type were identified.

5.2.4.6 No Concern at Present Concern Regional Ecosystems

Table 25: No concern at present regional ecosystems identified on the site

RE code	General description	Occurrence on Site
11.5.5	*Eucalyptus melanophloia, Callitris glaucophylla* woodland on *Cainozoic* sandplains/remnant surfaces. Deep red sands	This was the most commonly recorded *no concern at present* RE within the site and was observed at various locations throughout the site (refer **Appendix K**). Some polygons have been identified as containing 100% of 11.5.5 while other polygons have been identified as containing a mix of this RE.
11.10.9	*Callitris glaucophylla* woodland on coarse-grained sedimentary rocks.	Recorded within various mixed polygons, generally situated in the south eastern portion of the site.

5.2.5 Essential habitat

Essential habitat is a vegetation ecosystem that is designated as such by DERM as it is considered to form potential habitat to a species that is listed as; endangered, vulnerable or near threatened under the Qld Nature Conservation (Wildlife) Regulation 2006 (NC Reg). Essential habitat mapping is provided in conjunction with regional ecosystem maps by DERM and is represented as diagonal blue lines over a remnant vegetation polygon. Essential habitat species records are represented as a blue dot.

Review of the mapping indicates that no essential habitat is designated as occurring on site.

5.2.6 Wetlands and Watercourses

Orogen field surveys confirmed the presence of 1st, 2nd, 3rd and 4th order streams within the site as identified by the Wetlands*Maps* search. These streams are considered to be consistent with the definition of a watercourse in accordance with the *Water Act 2000*.

The extent of disturbance observed at streams investigated during the survey varied. The primary disturbances include erosion, with contributing factors such as historic clearing and access by livestock.

Following review of API, it is identified that some of the 1st order streams originate within the Site. Of particular note is a 4th order stream/riverine corridor located at the south eastern boundary Site. Following API, it appears that the majority of the minor streams within the site eventually drains into this 4th order stream which is a branch of Horse Creek.

The surveys identified some water features within the site that are not currently shown as watercourses in the constraints mapping, would in fact satisfy the definition of a watercourse (in accordance with the *Water Act 2000*). These features were recorded opportunistically at vegetation and habitat survey sites and therefore the full extent of the unmapped water features observed within the site is not fully described by this report. Furthermore, it is likely that additional unmapped watercourses are present within the Site.

The locations of the unmapped water courses identified during the surveys are demonstrated in **Appendix L**.

The survey identified that some features within the site currently mapped as watercourses are more closely aligned to the definition of a drainage feature as per *Water Act 2000.* The features identified as drainage lines are presented in **Appendix L** (denoted in yellow in **Appendix L**)

5.2.7 Declared Plants

A total of three (3) species listed as declared plants under the Qld *Land Protection (Pest and Stock Route Management) Act 2002* were detected during the field survey. These species are listed in **Table 26** below. Other non-native (introduced) species recorded during the fieldworks are listed in **Appendix G**.

Table 26: Declared plants recorded during the ecological field survey

Scientific Name	Common Name	Class	Occurrence
*Opuntia aurantiaca**	Tiger Pear	2	Recorded at survey locations 38 and 51.
*Opuntia stricta**	Common Prickly Pear	2	Recorded at survey locations 34 and 36.
*Opuntia tomentosa**	Velvet Tree Pear	2	Recorded at survey locations: 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 28, 30, 32, 39, 41, 45, 47, 48, 49, 51, 52, 54 and 55.

5.2.8 Declared Animals

A total of two (2) species listed as declared animals under the Qld *Land Protection (Pest and Stock Route Management) Act 2002* were detected during the field survey. These species were the Feral Pig (*Sus scrofa*) and Dingo (*Canis familiaris dingo*) which are both class 2 pest animals.

5.2.9 Disturbance

In general, the site was found to have been subject to varying levels of disturbance at each survey site. The disturbance types most commonly recorded across the site were: grazing, logging and mechanical clearing. Evidence of erosion, thinning and fire was also frequently observed, including within remnant vegetation.

Time frames for the respective disturbance events were noted to range from currently occurring to occurring greater than 20 years ago. Recent or currently active disturbances were typically recorded as erosion and grazing. Historical logging and clearing is evident throughout most of the sites vegetated areas and is likely associated with past agricultural practices given the context of the site.

6. Conclusion and Recommendations

In conclusion, desktop data review and ecological field surveys identified that the site offers a varying level of ecological constraint. Some areas within the site have been identified to offer a high level of ecological constraint, while other areas offer low level ecological constraint. The varying level of ecological constraint is attributed to the fact that the site supports high value remnant vegetation, (of which some communities are aligned with EPBC listed communities), while other areas of the site have been significantly degraded due to historic land use, including broad scale clearing, blade ploughing and grazing.

The known and potential elements of ecological value within the site include:

- Occurrence of two ecological communities protected under the EPBC Act within the site:
  - Brigalow (*Acacia harpophylla* dominant and co-dominant); and
  - Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions.

- Known habitat for three fauna species listed as threatened by the NC Act (detected within the site):
  - Grey Goshawk (*Accipiter novaehollandiae*);
  - Painted Honeyeater (*Grantiella picta*); and
  - Golden-tailed Gecko (*Strophurus taenicauda*).

- Potential habitat resources for a variety threatened flora and fauna species listed by the EPBC Act and/or NC Act.

- Occurrence of two ESA categories within the site, and also adjoining lands within 50 m. These being category B (endangered remnant) and category C (of concern remnant). The western boundary of the site is adjoined by a State Forest which is a category B ESA (pertinent to chapter 5A activities defined by the EP Act).

- Whilst not an ESA, the site was also found to contain no concern at present RE types. These communities were identified to be in relatively good condition and were found to contain a variety of high value habitat resources (e.g. hollow bearing trees), including potential resources for threatened flora and fauna species listed by the EPBC Act and/or NC Act.

- Watercourses (as defined by the Water Act 2000) at various locations within the site, including 1st, 2nd, 3rd and 4th order streams. Watercourses were also observed within 100m of the site in adjoining lands.

- Recorded occurrence of Type A restricted plants:

  - Tiger Orchid (*Cymbidium canaliculatum*);
  - Yellow Hyacinth-orchid (*Dipodium hamiltonianum*);
  - Narrow Leaved Bottle Tree (*Brachychiton rupestris*);and
  - Kurrajong (*Brachychiton populneus subs trilobus*).

- Varying levels of existing and historic disturbances, with the most commonly recorded disturbance events being: grazing, logging and mechanical clearing.

- Recorded occurrence of three (3) species listed as declared plants under the *Qld Land Protection (Pest and Stock Route Management) Act 2002*, namely:
  - Tiger Pear (*Opuntia aurantiaca*);
  - Common Prickly Pear (*Opuntia stricta*); and
  - Velvet Tree Pear (*Opuntia tomentosa*).

- Recorded occurrence of two (2) species listed as declared animals under the *Qld Land Protection (Pest and Stock Route Management) Act 2002,* namely:
  - Feral Pig (*Sus scrofa*); and
  - Dingo (*Canis familiaris dingo*).

It is recommended that the findings of this report are considered during detailed development planning works such that disturbance to the ecological values of the site and locality may be avoided wherever practicable. Where disturbance is unavoidable, impact mitigation measures are to be implemented in accordance with the approved site environmental management plan and regulatory approval conditions.

7. References

Bean, A.R. (2004). The taxonomy and ecology of *Solanum* subg. Leptostemonum (Dunal) Bitter (Solanaceae) in Queensland and far north-eastern New South Wales, Australia. Austrobaileya 6(4): 734-736.

BOM (2011). Bureau of Meteorology - Climate statistics for Australian Locations. Australian Government.http://www.bom.gov.au/climate/data/.

Cogger, H., (2000). *Reptiles and Amphibians of Australia*. Revised edition. Reed Books Australia, Sydney.

DEC (2005). *Threatened Species Populations and Ecological Communities of NSW*, Department of Environment and Climate Change, NSW Government. http://www.threatenedspecies.environment.nsw.gov.au/tsprofile/index.aspx

DECC (2008). *Atlas of NSW Wildlife*. Department of Environment and Climate Change. http://wildlifeatlas.nationalparks.nsw.gov.au/wildlifeatlas/watlas.jsp.

DEEDI (2010). *Declared Plants of Queensland*. Department of Employment, Economic Development and Innovation, Brisbane http://www.dpi.qld.gov.au/documents/Biosecurity_EnvironmentalPests/IPA-Declared-Plants-Qld-PP1.pdf

DEH (2005). Species information at Department of the Environment and Heritage http://www.environment.gov.au/biodiversity/threatened/publications

DME (1975). *National Topographic Map Series, Australia 1:100 000 Topographic Survey.* Department of Minerals and Energy, Commonwealth of Australia.

DME (2008). Queensland Geological Mapping (polygonised vector) Data: Regional & 1:100 00 Sheet areas (DVD). Department of Mines and Energy, Queensland.

DERM (2011a). *Regional Ecosystem geological descriptions,* The Department of Environment and Resource Management, Brisbane. http://www.derm.qld.gov.au/wildlife-ecosystems/biodiversity/regional_ecosystems

DERM (2011b). *Regional Ecosystem and Remnant Map—version 6.1 for the purpose of the Vegetation Management Act 1999*. Online RE Maps, The Department of Environment and Resource Management, Brisbane. http://www.derm.qld.gov.au/REMAP

DERM (2011c). Wildlife Online. Department of Environment and Resource Management, Brisbane. http://www.derm.qld.gov.au/wildlife-ecosystems/wildlife/wildlife_online

DERM, (2011d). Wetland*Maps* – Version 2.0. Department of Environment and Resource Management, Qld Government Available online at: http://www.epa.qld.gov.au/wetlandinfo/site/MappingFandD/WetlandMapsAndData/WetlandMaps.html

DERM, (2011e).*Map of Referable Wetlands*. Department of Environment and Resource Management, Brisbane. [URL: http://www.derm.qld.gov.au/wildlife-ecosystems/ecosystems/referable-wetlands-form.php

DERM (2011f). *Environmentally Sensitive Areas – Chapter 5 Activities (EP Act).*http://www.derm.qld.gov.au/ecoaccess/maps_of_environmentally_sensitive_areas.php

DERM (2011g). Regional Ecosystem Description Database (REDD). http://www.derm.qld.gov.au/wildlife-ecosystems/biodiversity/regional_ecosystems/_how_to_download_redd.html

DERM (2011h). *Regrowth Vegetation Map—version 2* for the purpose of the Vegetation Management Act 1999. Online RE Maps, The Department of Environment and Resource Management, Brisbane. http://www.derm.qld.gov.au/REMAP

DERM (2011i).Essential Habitat Map–version 3 for the purpose of the Vegetation Management Act 1999. Online RE Maps, The Department of Environment and Resource Management, Brisbane. http://www.derm.qld.gov.au/REMAP

DEWHA, (2009). *Species Profile and Threats Database*. Department of the Environment, Water, Heritage and the Arts, Canberra. http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

DSEWPaC (2011a). *Protected Matters Search Tool*. Department of Sustainability, Environment, Water, Population and Communities. Canberra ACT. http://www.environment.gov.au/epbc/pmst/index.html

DSEWPaC, (2011b). Species Profile and Threats Database. Available on the Department of Sustainability, Environment, Water, Population and Communities website at: http://www.environment.gov.au/cgi-bin/sprat/public

EPA (2000). *Bioregional Map of Queensland V0001.* Environmental Protection Authority, Queensland. http://www.derm.qld.gov.au/vegetation/pdf/bioregion_v0001.pdf

EPA(2005). Fitzroy River Turtle, viewed 20 December 2007,http://www.epa.qld.gov.au/nature_conservation/wildlife/az_of_animals/fitzroy_river_turtle/

Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. andFranks, A.J. (2011). *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.1.* Department of Environmentand Resource Management (DERM), Biodiversity and Ecosystem Sciences, Brisbane.

Menkhorst, P. and Knight, F. (2004) *A Field Guide to the Mammals of Australia*. Oxford University Press, Melbourne.

Neldner, V.J., Wilson, B.A., Thompson E.J., 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.

NRM (2003). *List of the 200 Most Invasive Environmental Weeds in South East Queensland*. Queensland Government Department of Natural Resources and Mines. June 2003. http://www.dpi.qld.gov.au/documents/Biosecurity_EnvironmentalPests/IPA-Assessment-Invasive-Plants.pdf

Olsen, P. (1995) *Australian birds of prey*. University of New South Wales Press, Sydney.

PlantNet (2006). *The Plant Information Network System of Botanic Gardens Trust, Sydney, Australia.* Accessed online 28/11/2006 at http://plantnet.rbgsyd.nsw.gov.au/search/simple.htm

Threatened Species Scientific Committee, (2008a). Approved Conservation Advice for Commersonia sp. Cadarga. Department of the Environment, Water, Heritage and the Arts. http://www.environment.gov.au/biodiversity/threatened/species/pubs/67216-conservation-advice.pdf

Threatened Species Scientific Committee, (2008b). Approved Conservation Advice for *Geophaps scripta scripta* (Squatter Pigeon (southern)). Department of the Environment, Water, Heritage and the Arts. http://www.environment.gov.au/biodiversity/threatened/species/pubs/64440-conservation-advice.pdf

Threatened Species Scientific Committee, (2008c). Approved Conservation Advice for *Neochmia ruficauda ruficauda*(Star Finch (eastern)). Department of the Environment, Water, Heritage and the Arts. http://www.environment.gov.au/biodiversity/threatened/species/pubs/26027-conservation-advice.pdf

Walker, J., Hopkins M.S., McDonald, R.C., Isbell, R.F., and Speight, J.G. (1990). Australian Soil and Land Survey - Field Handbook 2nd edition. CSIRO.

Wilson, S. (2005). A Field Guide to Reptiles of Queensland. Reed New Holland, Australia.

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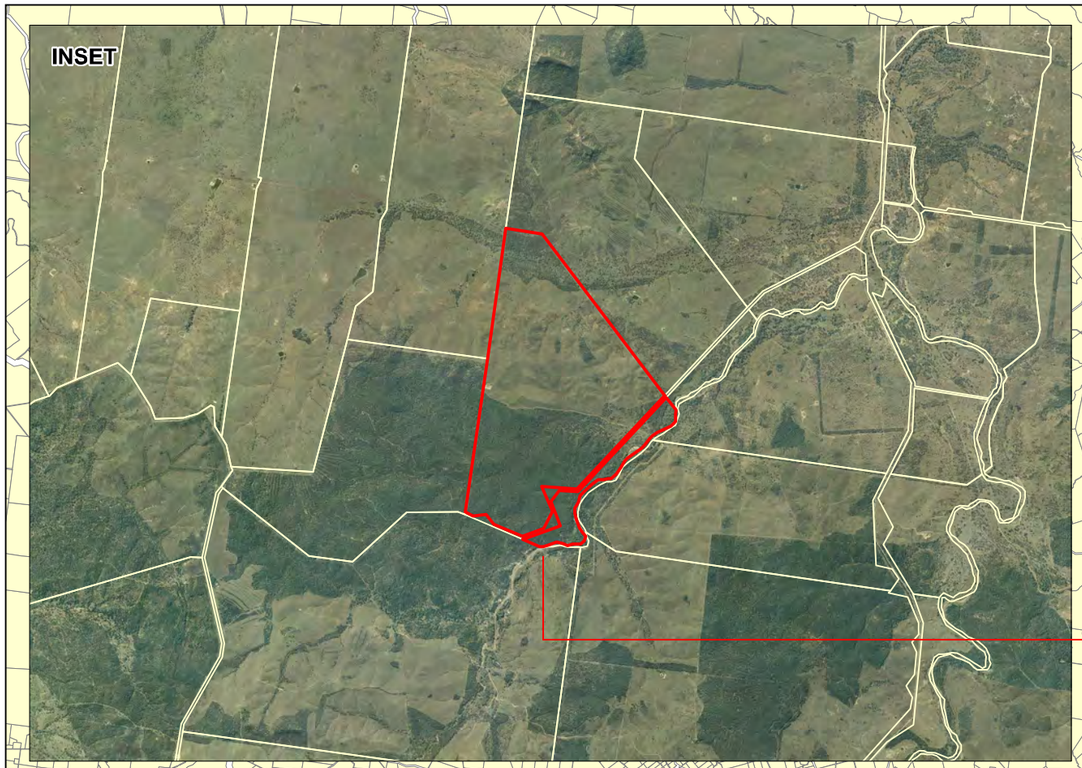
Appendix A

LOCALITY PLAN



TAROOM
WANDOAN
MITCHELL
ROMA
WALLUMBILLA
YULEBA
DULACCA
MILES
CHINCHILLA
SURAT

Legend
- Site Boundary (Lot 23 AB47)
- Cadastral Boundaries
- Localities

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GIS Section - HSSE

Locality Plan

Date: 29 November, 2011

Project: Australia Pacific LNG
Locality: Lot 23AB47
Rev: A
Map ID: GISWR_05098_LOCALITY
Doc ID:

REV	DESCRIPTION	DATE	DRAWN	CHECK	QA	APP
A	Issued for Review	2011-11-29	KCG			

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Map produced for Orogen (Qld) Pty Ltd field reporting requirements.

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Datum: GDA 94 Z55 Units: Kilometres Scale 1:800,000 @ A3

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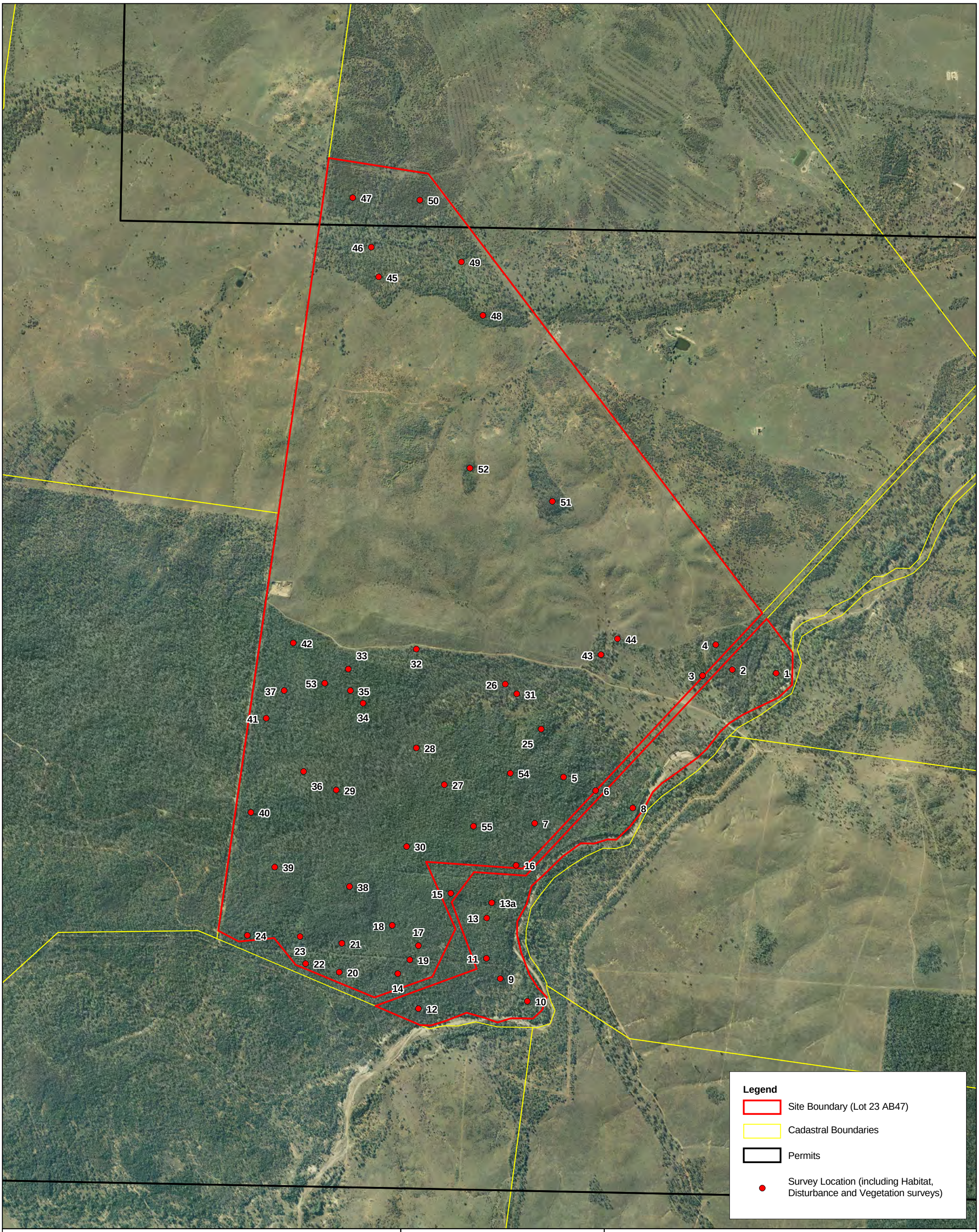
Appendix B

ECOLOGICAL SURVEY LOCATIONS MAP



GIS Section - HSSE

Ecological Survey Locations Map

Date: 29 November, 2011

Project: Australia Pacific LNG
Locality: Lot 23AB47
Rev: A
Map ID: GISWR_05098_ECOSVY
Doc ID:

REVISIONS

REV	DESCRIPTION	DATE	DRAWN	CHECK	QA	APP
A	Issued for Review	2011-11-29	KCG			

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Appendix C

RESULTS FROM EPBC PROTECTED MATTERS SEARCH TOOL

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

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.

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: 01/11/11 10:44:22

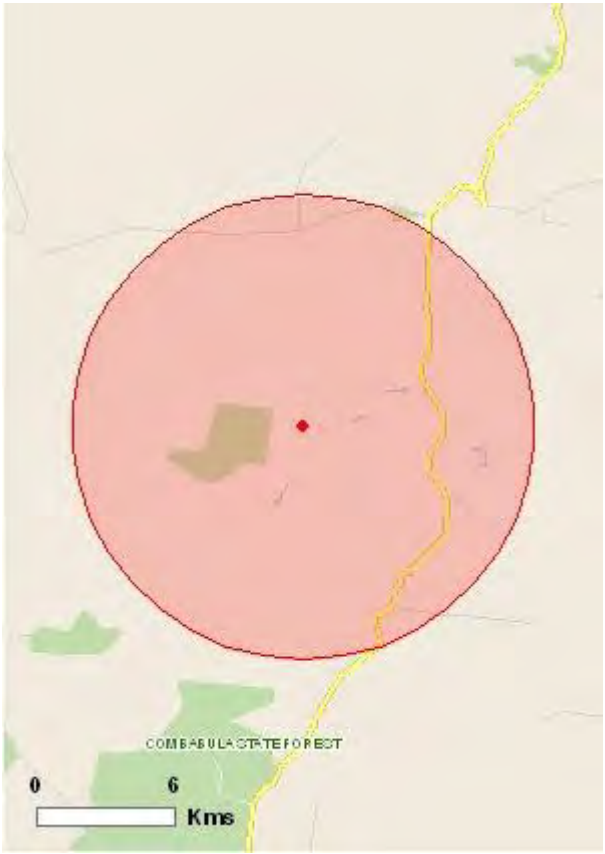
Summary

Details

Matters of NES
Other matters protected by the EPBC Act
Extra Information

Caveat

Acknowledgements



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Coordinates
Buffer: 10.0Km

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:	None
National Heritage Places:	None
Wetlands of International Significance (Ramsar Wetlands):	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communitites:	4
Threatened Species:	15
Migratory Species:	11

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:	9
Whales and Other Cetaceans:	None

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:	None
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	8
Nationally Important Wetlands:	None

Details

Matters of National Environmental Significance

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
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	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
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Threatened Species [Resource Information]

Name	Status	Type of Presence
BIRDS		
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Rostratula australis Australian Painted Snipe [77037]	Vulnerable	Species or species habitat may occur within area
MAMMALS		
Chalinolobus dwyeri Large-eared Pied Bat, Large	Vulnerable	Species or species habitat may occur within area

Pied Bat [183]		
Dasyurus hallucatus		
Northern Quoll [331]	Endangered	Species or species habitat may 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
PLANTS		
Cadellia pentastylis		
Ooline [9828]	Vulnerable	Species or species habitat likely to occur within area
Commersonia argentea		
a shrub [82761]	Vulnerable	Species or species habitat likely to occur within area
Tylophora linearis		
[55231]	Endangered	Species or species habitat may occur within area
REPTILES		
Delma torquata		
Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Denisonia maculata		
Ornamental Snake [1193]	Vulnerable	Species or species habitat may occur within area
Egernia rugosa		
Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Furina dunmalli		
Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Paradelma orientalis		
Brigalow Scaly-foot [59134]	Vulnerable	Species or species habitat may occur within area
Rheodytes leukops		
Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle [1761]	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
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
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		
Ardea alba		
Great Egret, White Egret [59541]		Species or species habitat may occur within area

Ardea ibis		
Cattle Egret [59542]		Species or species habitat may occur within area
Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Nettapus coromandelianus albipennis		
Australian Cotton Pygmy-goose [25979]		Species or species habitat may occur within area
Rostratula benghalensis s. lat.		
Painted Snipe [889]	Vulnerable*	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		
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
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
Merops ornatus		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
Nettapus coromandelianus albipennis		
Australian Cotton Pygmy-goose [25979]		Species or species habitat may occur within area
Rostratula benghalensis s. lat.		
Painted Snipe [889]	Vulnerable*	Species or species habitat may occur within area

Extra Information

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
Frogs		
Bufo marinus		
Cane Toad [1772]		Species or species habitat likely to occur within area
Mammals		
Felis catus		
Cat, House Cat, Domestic Cat		Species or species habitat likely to occur within area

[19]

Oryctolagus cuniculus Rabbit, European Rabbit [128]	Species or species habitat likely to occur within area
Sus scrofa Pig [6]	Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]	Species or species habitat likely to occur within area

Plants	
Acacia nilotica subsp. indica Prickly Acacia [6196]	Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]	Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]	Species or species habitat likely to occur within area

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

-26.18697 149.52251

Acknowledgements

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

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

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

Please feel free to provide feedback via the Contact Us page.

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Last updated: Thursday, 16-Sep-2010 09:13:25 EST

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| Australian Government |

Appendix D

RESULTS FROM WILDLIFE ONLINE SEARCH

Queensland Government

Wildlife Online Extract

Search Criteria: Species List for a Specified Point
Species: All
Type: All
Status: Rare and threatened species
Records: All
Date: All
Latitude: 26.187
Longitude: 149.5225
Distance: 25
Email: ewyatt@orogenqld.com.au
Date submitted: Tuesday 01 Nov 2011 10:00:49
Date extracted: Tuesday 01 Nov 2011 10:01:16

The number of records retrieved = 3

Disclaimer

As the DERM is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

No statements, representations or warranties are made about the accuracy or completeness of this information. The State of Queensland disclaims all responsibility for this information and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Anatidae	*Nettapus coromandelianus*	cotton pygmy-goose		NT		2
animals	birds	Cacatuidae	*Calyptorhynchus lathami*	glossy black-cockatoo		V		1
animals	reptiles	Diplodactylidae	*Strophurus taenicauda*	golden-tailed gecko		NT		4

CODES

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

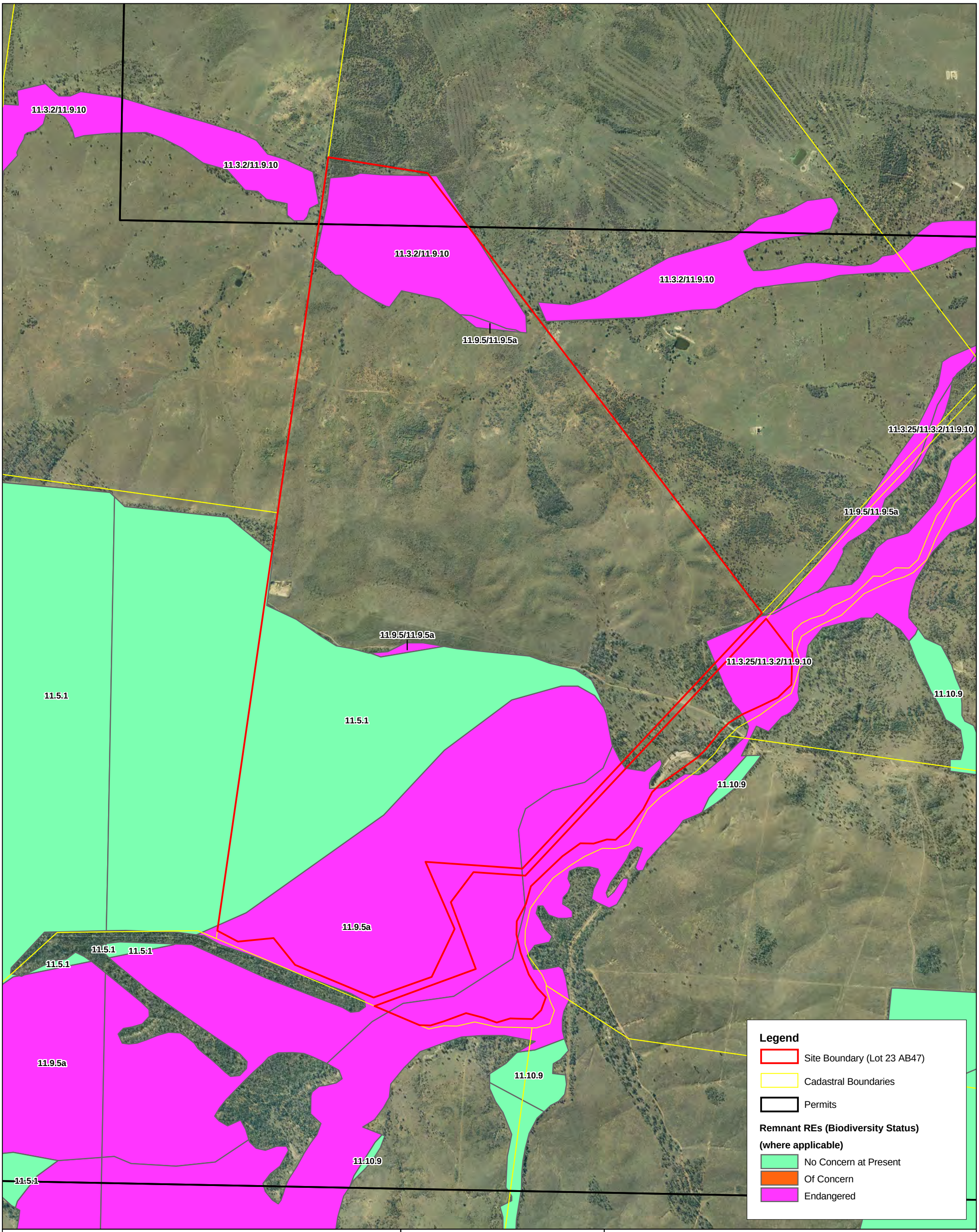
Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992.* The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ( ).

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

DERM REGIONAL ECOSYSTEM MAPPING FOR THE SITE



GIS Section - HSSE

DERM Regional Ecosystem Mapping for the Site

Date: 29 November, 2011

Project: Australia Pacific LNG
Locality: Lot 23AB47
Rev: A
Map ID: GISWR_05098_RE
Doc ID:

REVISIONS

REV	DESCRIPTION	DATE	DRAWN	CHECK	QA	APP
A	Issued for Review	2011-11-29	KCG			

Digital Cadastre (DCDB), Remnant Regional Ecosystems - Copyright (C) The State of Queensland (Department of Environment and Resource Management) 2011
Permit Boundaries - Copyright (C) The State of Queensland (Department of Employment, Economic Development and Innovation) 2011

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400 0 400 800 1200

Datum: GDA 94 Z55 Units: Metres Scale 1:20,000 @ A3

Wor: T:\Data\APLNG - HSSE\Work_Requests\GISWR_05098\23AB47\GISWR_05098_23AB47.wor

Appendix F

WETLANDS AND WATERCOURSES MAP

Legend

- Site Boundary (Lot 23 AB47)
- Cadastral Boundaries
- Permits

Wetlands & Watercourses

- Lacustrine
- Palustrine
- Riverine
- Stream Order Buffer (100m)
- Flood Modelling
- Watercourse

GIS Section - HSSE

Wetlands and Watercourses Map

Date: 29 November, 2011

Project: Australia Pacific LNG
Locality: Lot 23AB47
Rev: A
Map ID: GISWR_05098_WET
Doc ID:

REVISIONS

REV	DESCRIPTION	DATE	DRAWN	CHECK	QA	APP
A	Issued for Review	2011-11-29	KCG			

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Permit Boundaries - Copyright (C) The State of Queensland (Department of Employment, Economic Development and Innovation) 2011

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400 0 400 800 1200

Datum: GDA 94 Z55 Units: Metres Scale 1:20,000 @ A3

Wor: T:\Data\APLNG - HSSE\Work_Requests\GISWR_05098\23AB47\GISWR_05098_23AB47.wor

Appendix G

FLORA SPECIES RECORDED DURING OROGEN FIELD SURVEY

APPENDIX G

Table G - Flora Recorded During Orogen Fieldworks

Family	Scientific Name	Common Name	Form
ADIANTACEAE	*Cheilanthes distans*	Bristly cloak fern	fern
ADIANTACEAE	*Cheilanthes sieberi*	Cloak Fern	fern
AMARANTHACEAE	*Achyranthes aspera*	Chaff Flower	herb
APIACEAE	*Hydrocotyle acutiloba*	-	creeper
APOCYNACEAE	*Alstonia constricta*	Quinine Tree	shrub/tree
APOCYNACEAE	*Carissa ovata*	Currant Bush	shrub
APOCYNACEAE	*Parsonsia lanceolata*	Rough silkpod	climber
APOCYNACEAE	*Secamone elliptica*	Corky Milk Vine	climber
ASCLEPIADACEAE	*Gomphocarpus physocarpus**	Balloon Cotton Bush	shrub
ASTERACEAE	*Calotis cuneifolia*	Purple Burr Daisy	herb
ASTERACEAE	*Calotis lappulacea*	Yellow Burr Daisy	herb
ASTERACEAE	*Cassinia laevis*	Cough Bush	shrub
ASTERACEAE	*Cirsium vulgare**	Spear Thistle	herb
ASTERACEAE	*Olearia sp*	-	shrub
ASTERACEAE	*Onopordum acanthium**	Scotch Thistle	herb
ASTERACEAE	*Senecio hispidulus*	Hill Fireweed	herb
ASTERACEAE	*Senecio sp.*	A Fireweed	herb
ASTERACEAE	*Senecio murrayanus*	A Fireweed	herb
ASTERACEAE	*Vittadinia dissecta*	Dissected New Holland Daisy	herb
BIGNONIACEAE	*Pandorea pandorana*	Wonga Wonga Vine	vine
CACTACEAE	*Opuntia aurantiaca**[D]	Tiger Pear	shrub
CACTACEAE	*Opuntia stricta**[D]	Common Prickly Pear	shrub
CACTACEAE	*Opuntia tomentosa**[D]	Velvet Tree Pear	shrub
CAPPARACEAE	*Apophyllum anomalum*	Warrior Bush	shrub

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Family	Scientific Name	Common Name	Form
CAPPARACEAE	*Capparis arborea*	Wild Lime	tree/shrub
CAPPARACEAE	*Capparis lasiantha*	Nepine	shrub
CASUARINACEAE	*Casuarina cristata*	Belah	tree
CELASTRACEAE	*Denhamia pittosporoides*	-	shrub/tree
CELASTRACEAE	*Elaeodendron australe*	Red Olive Plum	tree
CHENOPODIACEAE	*Sclerolaena birchii**	Galvinised Burr	shrub
CHENOPODIACEAE	*Einadia hastata*	Berry Saltbush	herb
CHENOPODIACEAE	*Einadia nutans*	A Saltbush	herb
CHENOPODIACEAE	*Einadia sp.*	A Saltbush	herb
CHENOPODIACEAE	*Maireana microphylla*	Small-leaf Bluebush	shrub
CUPRESSACEAE	*Callitris glaucophylla*	White Cypress Pine	tree
CYPERACEAE	*Cyperus sp.*	A sedge	sedge
CYPERACEAE	*Gahnia sp*	A Sedge	sedge
EBENACEAE	*Diospyros humilis*	Small-leaved Ebony	tree
ERYTHROXYLACEAE	*Erythroxylum sp.* (Splityard Creek L. Pedley 5360)	Erythroxylum	shrub/tree
EUPHORBIACEAE	*Croton insularis*	Silver Croton	tree
EUPHORBIACEAE	*Croton phebalioides*	A Croton	shrub
EUPHORBIACEAE	*Petalostigma pubescens*	Quinine Tree	tree
FABACEAE	*Glycine sp*	-	scrambler
FABACEAE	*Hovea longipes*	-	shrub/tree
FABACEAE	*Hovea sp*	-	shrub
FABACEAE	*Indigofera australis*	Australian Indigo	shrub
FABACEAE	*Indigofera brevidens*	-	shrub
FABACEAE	*Indigofera sp.*	-	shrub
FABACEAE	*Senna artemesioides subsp. zygophylla*	Butter Bush	shrub
FABACEAE	*Senna barclayana*	Pepper Leaf Senna	shrub

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Family	Scientific Name	Common Name	Form
FABACEAE	*Senna coronilloides*	-	shrub
FABACEAE	*Senna sp.*	-	shrub
GOODENIACEAE	*Goodenia glabra*	-	herb
JUNCACEAE	*Eleocharis sp.*	A spike rush	rush
JUNCACEAE	*Juncus sp.*	A rush	rush
LAMIACEAE	*Spartothamnella juncea*	Bead Bush	shrub
LORANTHACEAE	*Amyema congener subsp. rotundifolia*	A mistletoe	shrub
MALVACEAE	*Abutilon oxycarpum*	-	shrub
MALVACEAE	*Sida sp.*	-	forb
MELIACEAE	*Owenia acidula*	Gruie	tree
MIMOSACEAE	*Acacia amblygona*	Fan Wattle	shrub
MIMOSACEAE	*Acacia decora*	A wattle	shrub
MIMOSACEAE	*Acacia excelsa subs excelsa*	Ironwood	tree
MIMOSACEAE	*Acacia harpophylla*	Brigalow	tree
MIMOSACEAE	*Acacia jucunda*	A wattle	shrub/tree
MIMOSACEAE	*Acacia implexa*	Hickory Wattle	tree
MIMOSACEAE	*Acacia leiocalyx subs leiocalyx*	Black Wattle	shrub/tree
MIMOSACEAE	*Acacia salicina*	Sally Wattle	shrub/tree
MIMOSACEAE	*Acacia stenophylla*	River Myall	tree
MYOPORACEAE	*Eremophila longifolia*	Emubush	shrub
MYOPORACEAE	*Eremophila mitchellii*	False Sandalwood	tree
MYRTACEAE	*Angophora floribunda*	Rough-barked Apple	tree
MYRTACEAE	*Corymbia clarksoniana*	Clarkson's bloodwood	tree
MYRTACEAE	*Corymbia tessellaris*	Moreton Bay Ash	tree
MYRTACEAE	*Eucalyptus camaldulensis*	River Red Gum	tree
MYRTACEAE	*Eucalyptus crebra*	Narrow-leaved Ironbark	tree

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Family	Scientific Name	Common Name	Form
MYRTACEAE	*Eucalyptus fibrosa subsp. nubila*	Dusky-leaved Ironbark	tree
MYRTACEAE	*Eucalyptus melanophloia*	Silver-leaved Ironbark	tree
MYRTACEAE	*Eucalyptus orgadophila*	Mountain Coolibah	tree
MYRTACEAE	*Eucalyptus populnea*	Poplar Box	tree
MYRTACEAE	*Eucalyptus tereticornis*	Qld Blue Gum	tree
OLEACEAE	*Jasminum simplicifolium subsp. australiense*	Stiff Jasmine	climber
OLEACEAE	*Notalaea microcarpa*	Native Olive	tree
ORCHIDACEAE	*Cymbidium canaliculatum*[A]	Tiger Orchid	orchid
ORCHIDACEAE	*Dipodium hamiltonianum*[A]	Yellow Hyacinth-orchid	orchid
PAPAVERACEAE	*Argemone ochroleuca**	Mexican Poppy	herb
PASSIFLORACEAE	*Passiflora aurantia var. aurantia*	Blunt-leaved Passionfruit	twiner
PHORMIACEAE	*Dianella sp.*	A flax lily	sedge
PHYLLANTHACEAE	*Breynia oblongifolia*	Coffee Bush	shrub
PHYLLANTHACEAE	*Bridelia leichhardtii*	Small-leaved Brush Ironbark	tree
PITTOSPORACEAE	*Auranticarpa rhombifolia*	Diamond-leaf Pittosporum	tree
PITTOSPORACEAE	*Bursaria incana*	Box Thorn	shrub/tree
PITTOSPORACEAE	*Bursaria spinosa*	Spiny Bursaria	shrub/tree
PITTOSPORACEAE	*Pittosporum angustifolium*	Weeping Pittosporum	shrub/tree
POACEAE	*Ancistrachne uncinulata*	Hooky Grass	grass
POACEAE	*Aristida calycina*	Dark Wire Grass	grass
POACEAE	*Aristida caput-medusae*	Many-headed Wire Grass	grass
POACEAE	*Aristida jerichoensis*	Jericho Wiregrass	grass
POACEAE	*Aristida sp.*	-	grass
POACEAE	*Aristida vagans*	Threeawn Speargrass	grass
POACEAE	*Arundinella nepalensis*	Reed Grass	grass
POACEAE	*Austrostipa verticillata*	Slender Bamboo Grass	Grass

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Family	Scientific Name	Common Name	Form
POACEAE	*Cenchrus ciliaris (syn. Pennisetum ciliare)**	Buffel Grass	grass
POACEAE	*Chloris sp.*	A grass	grass
POACEAE	*Chloris ventricosa*	Plump Windmill Grass	grass
POACEAE	*Cymbopogon refractus*	Barbed-wire Grass	grass
POACEAE	*Enneapogon nigricans*	A grass	grass
POACEAE	*Enneapogon sp.*	A grass	grass
POACEAE	*Enteropogon acicularis*	Twirly Windmill Grass	grass
POACEAE	*Enteropogon ramosus*	Curly Windmill Grass	grass
POACEAE	*Enteropogon sp*	A grass	grass
POACEAE	*Eragrostis brownii*	Brown's Lovegrass	grass
POACEAE	*Eragrostis parviflora*	Weeping Lovegrass	grass
POACEAE	*Eragrostis sp.*	A lovegrass	grass
POACEAE	*Eriochloa sp.*	A grass	grass
POACEAE	*Heteropogon contortus*	Black Speargrass	grass
POACEAE	*Leptochloa digitata*	Umbrella Cane Grass	grass
POACEAE	*Panicum sp.*	A grass	grass
POACEAE	*Paspalidium caespitosum*	Brigalow Grass	grass
POACEAE	*Paspalidium sp*	-	grass
POACEAE	*Sorghum sp.*	A grass	grass
POACEAE	*Sporobolus caroli*	Yakka Grass	grass
POACEAE	*Sporobolus creber*	Western Rat-tail Grass	grass
POACEAE	*Sporobolus elongatus*	Slender Rat's Tail Grass	grass
POACEAE	*Themeda triandra*	Kangaroo Grass	grass
PROTEACEAE	*Hakea leucoptera*	Needlewood	tree
PROTEACEAE	*Hakea lorea subsp. lorea*	Bootlace Oak	tree
RHAMNACEAE	*Alphitonia excelsa*	Red Ash	tree
RUBIACEAE	*Asperula cunninghamii*	Twining Woodruff	herb

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Family	Scientific Name	Common Name	Form
RUBIACEAE	*Psydrax oleifolia*	-	shrub/tree
RUBIACEAE	*Psydrax sp.*	-	shrub/tree
RUTACEAE	*Citrus glauca*	Desert Lime	shrub/tree
RUTACEAE	*Flindersia collina*	Broad-leaved Leopard Tree	tree
RUTACEAE	*Geijera parvifolia*	Wilga	shrub
SANTALACEAE	*Exocarpos latifloius*	Broad-leaved Native Cherry	shrub
SANTALACEAE	*Santalum lanceolatum*	Sandalwood	tree
SAPINDACEAE	*Alectryon diversifolius*	Scrub Boonaree	shrub
SAPINDACEAE	*Alectryon oleifolius*	Boonaree	shrub
SAPINDACEAE	*Atalaya hemiglauca*	Whitewood	tree
SAPINDACEAE	*Dodonaea stenophylla*	A Hop Bush	shrub
SAPINDACEAE	*Dodonaea viscosa subsp. spatula*	Sticky Hop Bush	shrub
SAPINDACEAE	*Dodonaea viscosa subsp. viscosa*	A Hop Bush	shrub
SOLANACEAE	*Solanum mitchellianum*	-	shrub
SOLANACEAE	*Solanum semiarmatum*	Prickly Nightshade	shrub
SOLANACEAE	*Solanum sp.*	-	shrub
STERCULIACEAE	*Brachychiton populneus subsp. trilobus*[A]	Kurrajong	tree
STERCULIACEAE	*Brachychiton rupestris*[A]	Narrow Leaved Bottle Tree	tree
TILIACEAE	*Grewia latifolia*	-	shrub
VERBENACEAE	*Verbena aristigera* (syn V. tenuisecta)*	Mayne's Pest	herb
XANTHORRHOEACEAE	*Lomandra longifolia*	Spiny-headed Mat-rush	rush
XANTHORRHOEACEAE	*Lomandra sp.*	Mat Rush	rush

Note: Table does not include a comprehensive list of pasture grassland weeds.
*** - Introduced species**
D – Declared plants under the *Land Protection (Pest and Stock Route Management) Act 2002*
A – Type A Restricted Plants

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Appendix H

FAUNA SPECIES RECORDED DURING OROGEN FIELD SURVEY

APPENDIX H

Table H1 Fauna Species Recorded During the Orogen Surveys.

Class	Scientific Name	Common Name
Amphibians	*Litoria caerulea*	Common Green Treefrog
	Litoria dentata	Bleating Treefrog
	*Rhinella marinus (formerly Bufo marinus)**	Cane Toad
Birds	***Accipiter novaehollandiae*[NT]**	**Grey Goshawk**
	Alectura lathami	Australian Brush-Turkey
	Aprosmictus erythropterus	Red-Winged Parrot
	Aquila audax	Wedge-tailed Eagle
	Cacatua galerita	Sulphur-crested Cockatoo
	Centropus phasianinus	Pheasant Coucal
	Coracina novaehollandiae	Black-faced Cuckoo-shrike
	Corvus coronoides	Australian Raven
	Cracticus tibicen	Australian Magpie
	Cracticus torquatus	Grey Butcherbird
	Dacelo novaeguineae	Laughing Kookaburra
	Dromaius novaehollandiae	Emu
	Eolophus roseicapillus	Galah
	Eopsaltria australis	Eastern Yellow Robin
	Geopelia humeralis	Bar-shouldered Dove
	Gerygone fusca	Western Gerygone
	Gerygone albogularis	White-throated Gerygone
	***Grantiella picta*[V]**	**Painted Honeyeater**
	Malurus cyaneus	Superb Fairy-wren
	Malurus melanocephalus	Red-backed Fairy-wren
	Manorina melanocephala	Noisy Miner

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Class	Scientific Name	Common Name
	Meliphaga lewinii	Lewin's Honeyeater
	Merops ornatus[M]	Rainbow Bee-eater
	Oriolus sagittatus	Olive-backed Oriole
	Philemon corniculatus	Noisy Friarbird
	Platycerus adscitus palliceps	Pale-headed Rosella
	Plectorhyncha lanceolata	Striped Honeyeater
	Pomatostomus temporalis temporalis	Grey-Crowned Babbler (Eastern)
	Rhipidura albiscapa	Grey Fantail
	Scythrops novaehollandiae	Channel-billed Cuckoo
	Sericornis frontalis	White-browed Scrubwren
	Struthidea cinerea	Apostlebird
	Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet
	Trichoglossus haematodus moluccanus	Rainbow Lorikeet
Mammals	*Canis familiaris dingo*[D]	Dingo
	Macropus giganteus	Eastern Grey Kangaroo
	Macropus rufogriseus	Red-necked Wallaby
	Nyctophilus gouldi	Gould's Long-eared Bat
	*Sus scrofa**[D]	Pig
	Tachyglossus aculetaus	Short-beaked Echidna
	Trichosurus vulpecula	Common Brushtail Possum
	Wallabia bicolor	Swamp Wallaby
Reptiles	*Antaresia maculosa*	Spotted Python
	Cryptophis nigrescens	Small-eyed Snake
	Egernia striolata	Tree Skink
	Gehyra dubia	Dubious Gecko
	Heteronotia binoei	Bynoe's Gecko

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Class	Scientific Name	Common Name
	Hoplocephalus bitorquatus	Pale-headed Snake
	Lerista fragilis	Eastern Mulch-slider
	Pogona barbata	Bearded Dragon
	Ramphotyphlops proximus	Proximus Blind Snake
	Saiphos equalis	Three-toed Skink
	***Strophurus taenicauda*[NT]**	**Golden-tailed Gecko**
	Varanus tristis	Black-tailed Monitor
	Varanus varius	Lace Monitor

Note: Table does not include a comprehensive list of common fauna species.

NT- Near Threatened - Qld Nature Conservation Regulation 2006,
V - Qld Nature Conservation Regulation 2006,
M – EPBC Listed Migratory species
*** - Introduced species**
D – Declared animals under the *Land Protection (Pest and Stock Route Management) Act 2002*

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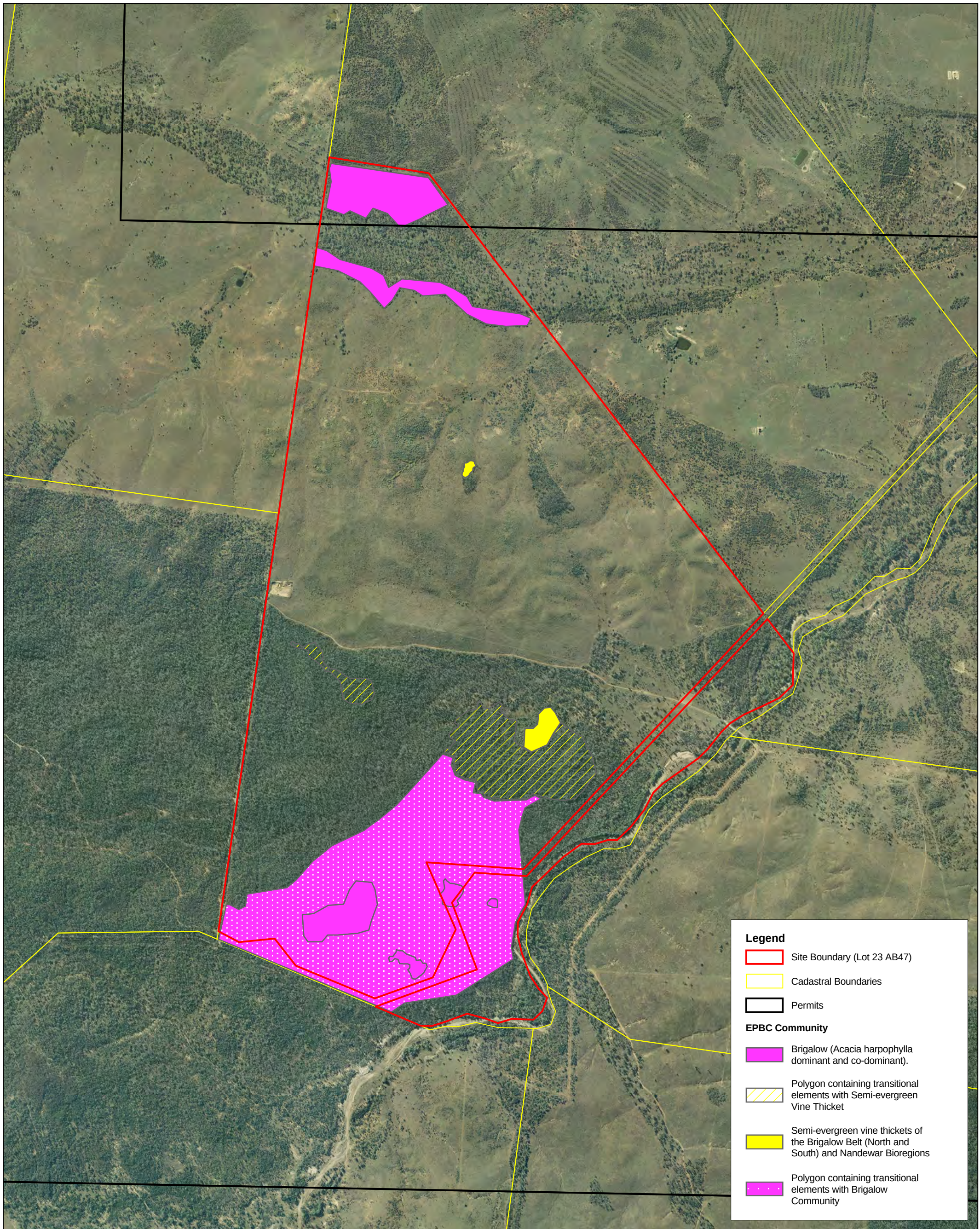
Appendix I

EPBC VEGETATION COMMUNITIES IDENTIFIED ON THE SITE



GIS Section - HSSE

EPBC Vegetation Communities Identified on the Site

Date: 29 November, 2011

Project: Australia Pacific LNG
Locality: Lot 23AB47
Rev: A
Map ID: GISWR_05098_EPBCVEG
Doc ID:

REVISIONS

REV	DESCRIPTION	DATE	DRAWN	CHECK	QA	APP
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Datum: GDA 94 Z55 Units: Metres Scale 1:20,000 @ A3

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Appendix J

THREATENED SPECIES IDENTIFIED WITHIN THE SITE

Legend

- Site Boundary (Lot 23 AB47)
- Cadastral Boundaries
- Permits

Species

- Grey Goshawk (Accipiter novaehollandiae)^
- Golden-tailed Gecko (Strophurus taenicauda)*
- Painted Honeyeater (Grantiella picta)^

^ - Near Threatened NC Regulation
* - Vulnerable NC Regulation

GIS Section - HSSE

Threatened Species Identified within the Site

Date: 29 November, 2011

Project: Australia Pacific LNG
Locality: Lot 23AB47
Rev: A
Map ID: GISWR_05098_THREAT
Doc ID:

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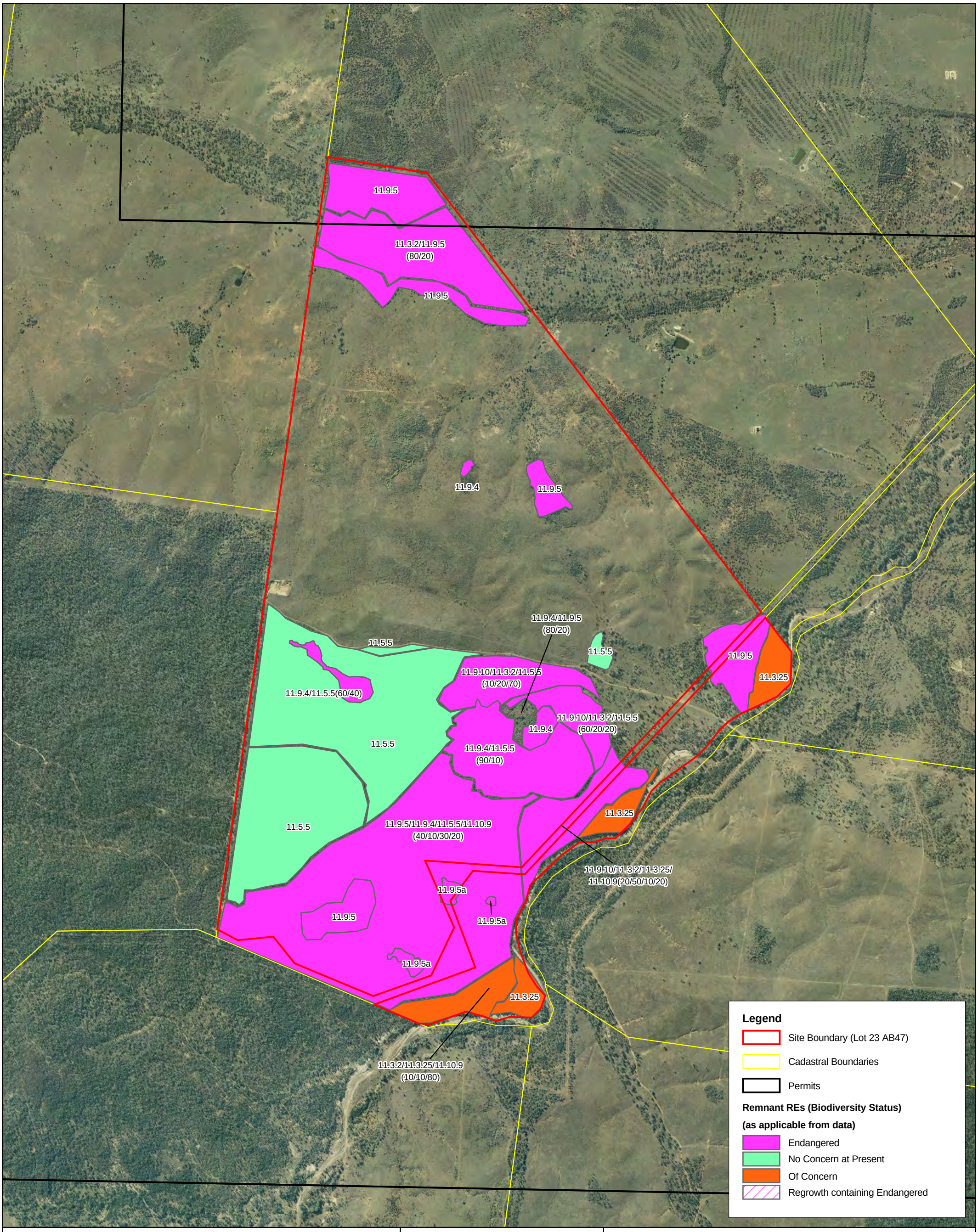
Appendix K

GROUND-TRUTHED REMNANT REGIONAL ECOSYSTEMS MAP



GIS Section - HSSE

Ground-truthed Remnant Regional Ecosystems Map

Date: 29 November, 2011

Project: Australia Pacific LNG

Locality: Lot 23AB47

Rev: A

Map ID: GISWR_05098_EPBCVEG

Doc ID:

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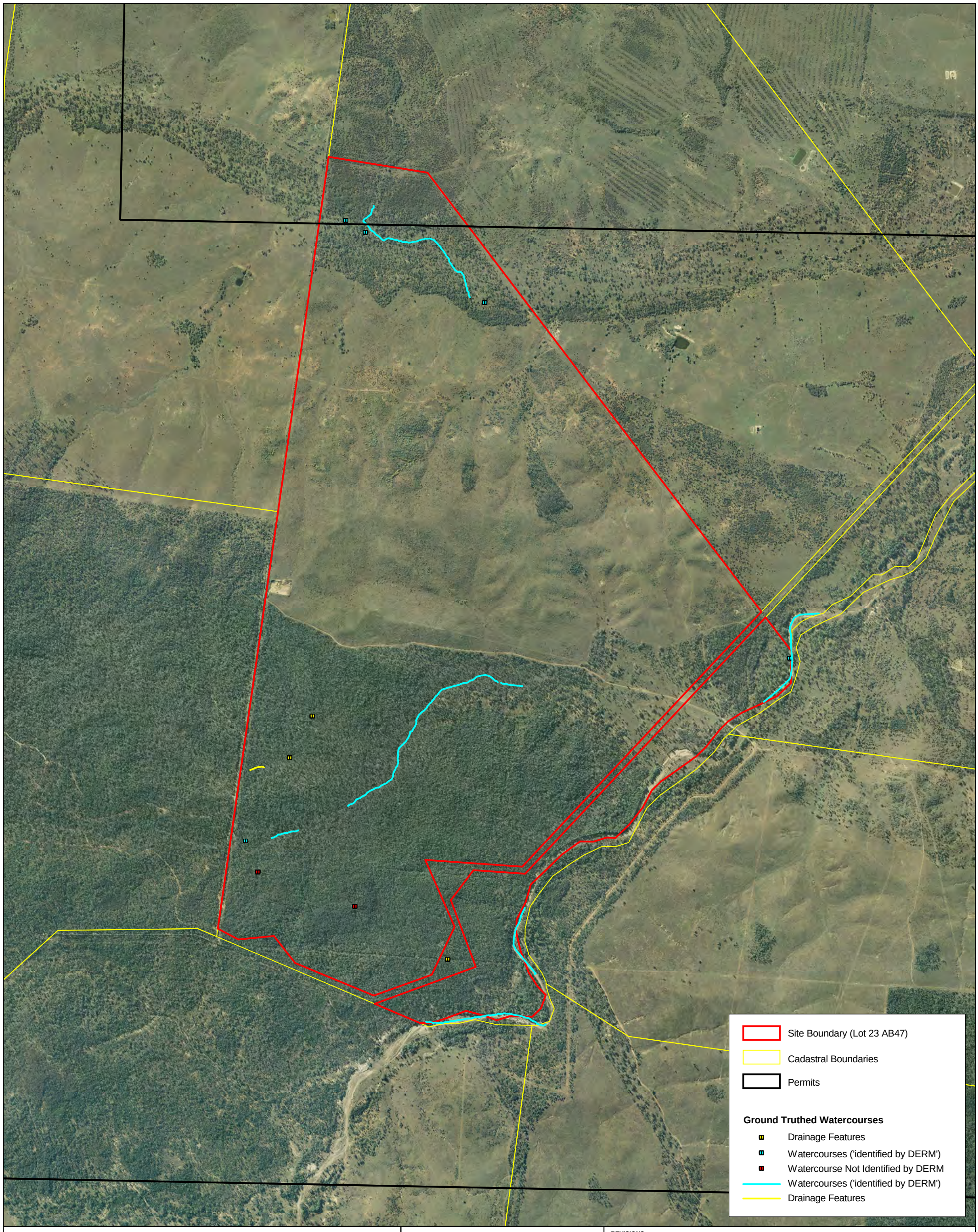
Appendix L

GROUND-TRUTHED WETLANDS AND WATERCOURSES MAP



GIS Section - HSSE

Ground-truthed Wetlands, Watercourses and Drainage Features

Date: 29 November, 2011

Project: Australia Pacific LNG
Locality: Lot 23AB47
Rev: A
Map ID: GISWR_05098_GTWET
Doc ID:

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Datum: GDA 94 Z55 Units: Metres Scale 1:20,000 @ A3

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