Vegetation Clearing Strategy

Queensland Curtis LNG

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Revision Record

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Table of Contents

1.0 INTRODUCTION

This Vegetation Clearing Strategy (VCS) provides procedures to manage potential impacts to flora and fauna during clearing of vegetation for the proposed liquefied natural gas (LNG) processing and export facility on Curtis Island, near Gladstone in Central Queensland.

1.1 Project description

The proposed location of the LNG Facility is six km north east of Gladstone on the south-western side of Curtis Island (on the northern side of the Port of Gladstone), between Laird Point and Hamilton Point.

The LNG Facility site is approximately 275 hectares (ha) with an additional proposed wet lease area (below highest astronomical tide (HAT)) of approximately 83 ha. Vegetation clearing will occur across approximately 180 ha of the site.

Development of the LNG Facility on Curtis Island will involve the disposal of approximately 600,000 m^3 of excess cut and approximately 170,000 m^3 of site strip (primarily topsoil) at three locations within the site boundary (hereafter referred to as the Spoil Areas) – see *Figure 1.1*.

Areas shown as spoil disposal, LNG Plant and the perimeter (fence line and firebreak) will be areas where vegetation is removed. This strategy relates only to those areas.

1.2 Aims and objectives

This VCS aims to provide a detailed methodology to manage the potential fauna and flora impacts of clearing works for the Project, and avoid disturbance to vegetation outside of clearance boundaries.

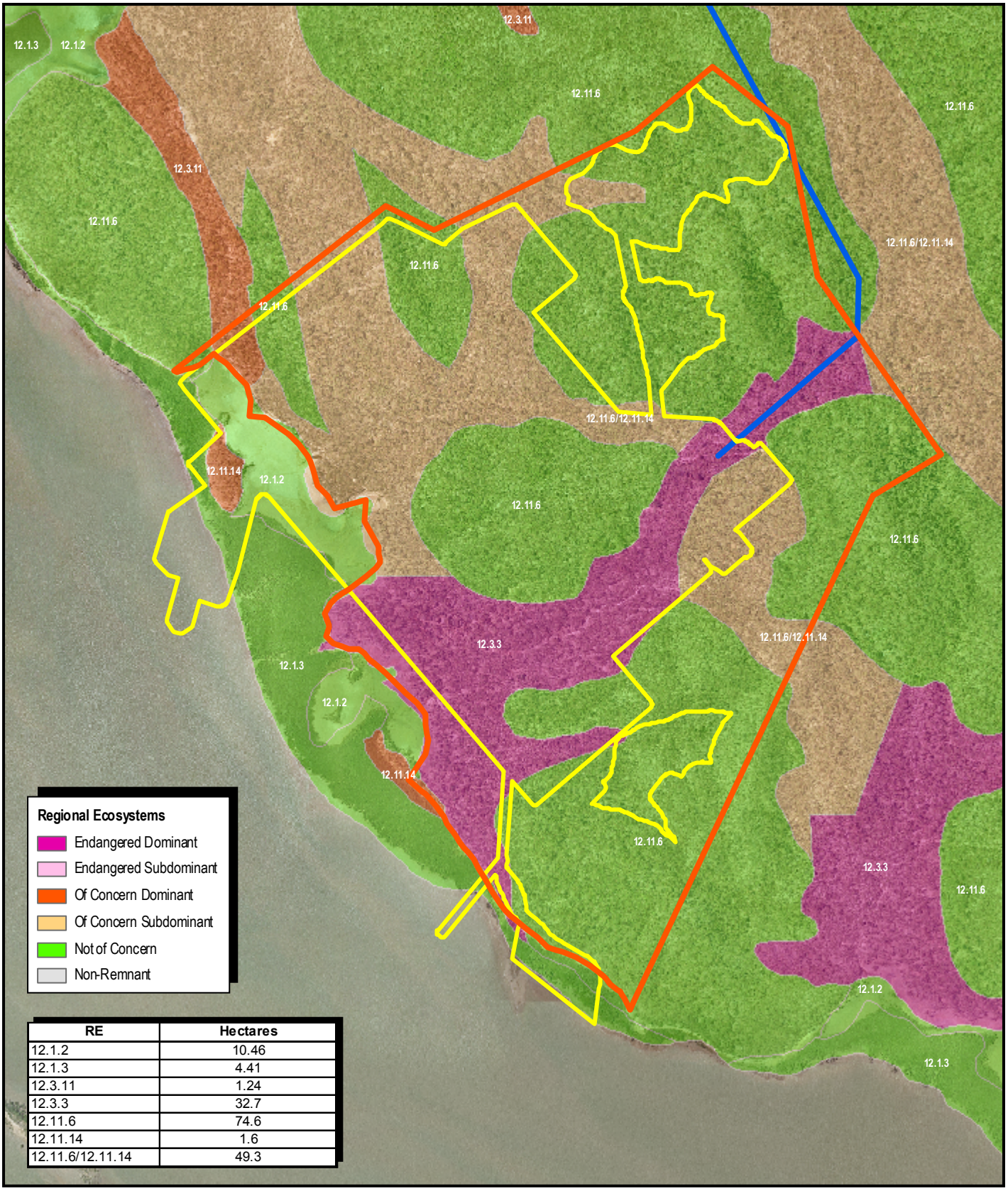
These objectives will be met by ensuring:

- all site personnel are inducted to the site;
- site preparation personnel are inducted to the clearing procedures detailed in this strategy;
- ecologists work closely with the on-ground construction crews during clearing works;
- areas and habitats of significance are investigated, flagged and mapped prior to clearing works beginning; and
- an environmental manager or delegate is on site during working hours.

1.3 Document structure

This VCS comprises the following sections:

- existing environment;
- clearing works – actions to be undertaken by contractors; and
- clearing strategy – how will the works be undertaken to reduce impacts to flora and fauna.



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12.1.3	4.41
12.3.11	1.24
12.3.3	32.7
12.11.6	74.6
12.11.14	1.6
12.11.6/12.11.14	49.3

Legend

- Proposed QCLNG Site Boundary
- Proposed Export Pipeline
- Boundary of Cleared Area

Source Note:

Aerial photo -Department of Infrastructure and planning for QCLNG Project

Projection: UTM MGA Zone 56 Datum: GDA 94

0 125 250 500 m

Disclamer: Positional Accuracy of RE Data mapped at a scale of 1:100,000 is 100 metres. Survey and Mapping of 2003 Remnant Vegetation Communities and Regional Ecosystems of Queensland, Version 5.0, EPA (Dec 2005), Certified Regional Ecosystem Map Amendments under the Vegetation Management Act (1999), EPA, 20/08/2008. Field Assessments undertaken by Unidel as reported in "Revised Regional Ecosystem Mapping"

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QUEENSLAND CURTIS LNG
A BG Group business

Project: Queensland Curtis LNG Project

Client: QGC - A BG Group business

Title: **Areas to be cleared at the LNG Facility**

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	JB	sEIS Appendix 11.1	Figure 1.1
Approved	SO	File No:	0086165b_SUP_GIS007_S11.1.1.1
Date	19.01.10	Revision	0

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1.4 Legislation and regulatory requirements

In Queensland, vegetation clearing is regulated by the *Vegetation Management Act 1999* (VM Act) (administered by the Department of Environment and Resources Management (DERM)), which provides a legislative framework for managing and assessing clearing of remnant vegetation on freehold and leasehold land; and the *Nature Conservation Act 1992* (NC Act) (administered by the Queensland Parks and Wildlife Service (QPWS)), which ensures that protected plants (i.e. all plants that are native to Australia) and their parts are not illegally removed from the wild or traded.

1.4.1 Clearing permits

Under the NC Act, those who wish to take protected plants from the wild, for any reason, may be required by law to obtain a licence, permit or authority from QPWS. This will be the case unless the activity is specifically exempt under a regulation or conservation plan under the Act (such as for timber harvesting of common species). Whether the activity is bound by, or exempt from, provisions of the NC Act, the clearing of native vegetation may also require development approval under other legislation from government agencies such as DERM, (for the VM Act).

A clearing permit (issued under the NC Act) may authorise the legitimate destruction or "taking" of common, rare, vulnerable and endangered plants in the wild, except where an exemption applies[1]. However, for the LNG Facility, it is not anticipated that a permit under the NC Act will be required, as no Endangered, Vulnerable or Rare (EVR) plant species were identified during site surveys. However, as habitat of the Powerful Owl (a listed Vulnerable species) will be removed for the development of the LNG Facility, a permit for habitat clearing activities will be required.

Once permitted, the Project will also be exempt from permits under the VM Act, as developments with a Petroleum Facility Licence are exempt.

Areas along the foreshore contain plants which are 'Marine Plants' under the Queensland *Fisheries Act 1994* and permits for clearing of these plants will be required. The administering authority for marine plant permits is the Department of Employment, Economic Development and Innovation (DEEDI) (previously the Department of Primary Industries and Fisheries).

1 Sourced from http://www.epa.qld.gov.au/register/p01655aa.pdf

2.0 EXISTING ENVIRONMENT

This chapter describes the existing environment of the LNG Facility.

2.1 Vegetation

Curtis Island, north of Graham Creek, comprises Curtis Island National Park and Curtis Island Conservation Park. Vegetation in the National Park is a mosaic of coastal heath, grassland, paperbark woodland, open eucalypt forest and dry rainforest. The National Park is undeveloped and attracts a limited amount of local tourism (ERM 2009).

Vegetation within the LNG Facility boundary ranges from open woodland, with individual eucalypts and iron bark trees to closed medium density undergrowth of eucalypt saplings. Open woodlands occupy approximately 65 per cent of the site, with medium density saplings occupying the remaining 35 per cent. The sapling understorey includes larger trees distributed relatively evenly throughout.

The dominant vegetation types consist of *Corymbia citriodora* (Lemon-scented Gum) woodland, *Eucalyptus tereticornis* (Forest Red Gum) woodland with *Eucalyptus crebra* (Narrow-leaved Ironbark). *Xanthorrhoea* spp. occurs in limited distribution across the site, and occupies approximately five per cent of the total area. A vegetation map is provided as *Figure 2.1*.

2.2 Landforms and soils

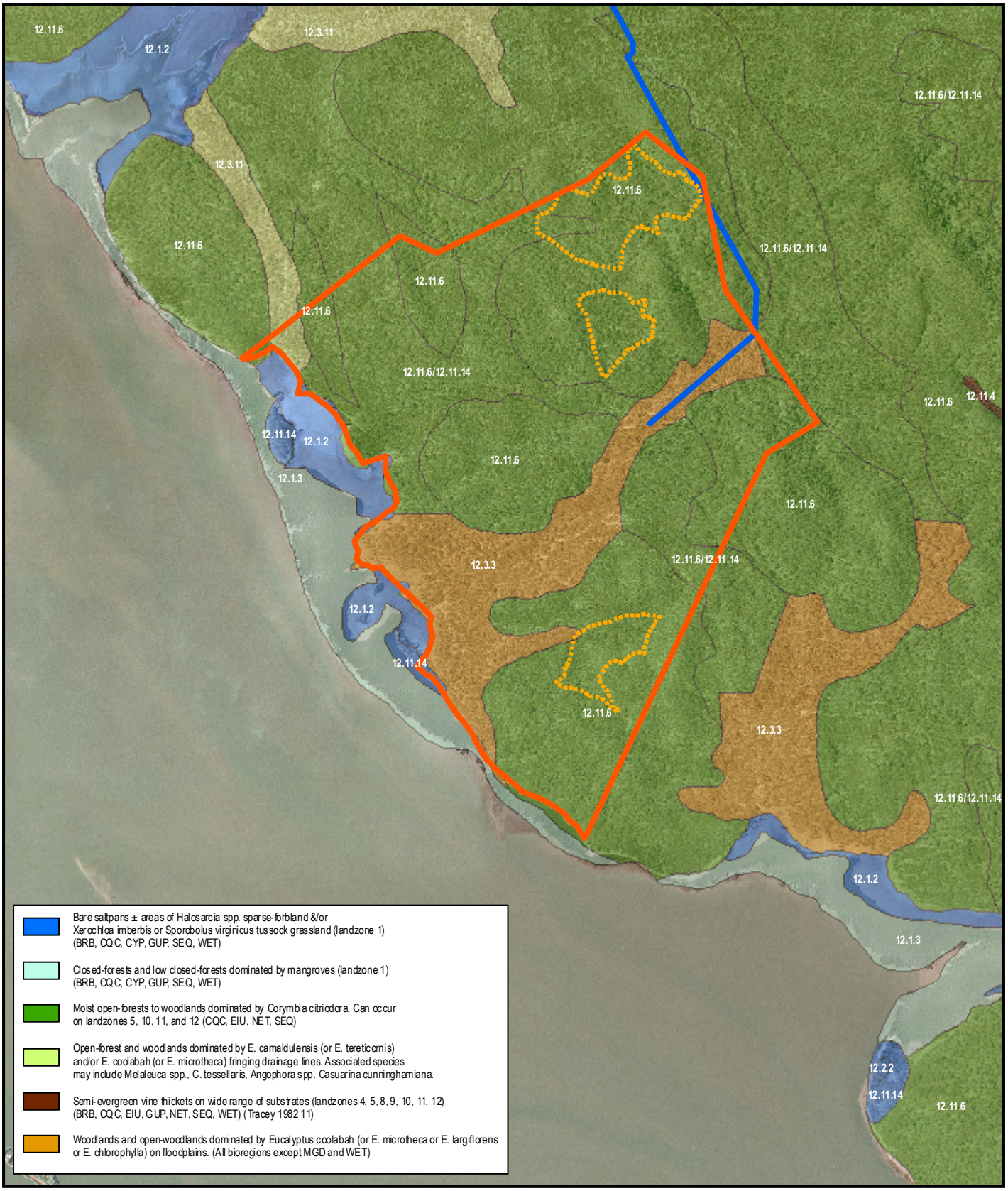
The dominant underlying geology of the study area is the Wandilla Formation of the Curtis Island Group consisting of mudstone, quartz greywacke, and pale grey chert. The estuary environments associated with Graham Creek and Port of Gladstone consist of Holocene sediments of gravel, silt and clay alluvium and associated mangrove swamps, mud flats and salt pans (ERM 2009).

There has been no comprehensive assessment for the occurrence of potential acid sulphate soils (ASS) on the southern sections of Curtis Island. However, areas of Quaternary Holocene mud and sand on the mainland directly adjacent to the proposed Curtis Island study area have been identified as having ASS with a depth ranging to five metres. The same geological features of Quaternary Holocene mud and sand have been identified on the estuarine sections of Curtis Island, particularly areas surrounding Graham Creek. It is therefore considered likely that ASS are located in areas of Curtis Island below five metres AHD (ERM 2009).

No parts of the study area have been identified on either the Queensland Environmental Management Register (EMR) or Contaminated Land Register (CLR).

2.3 Topography

The LNG Facility site has an elevation between 10 m and 25 m Australian Height Datum (AHD) throughout the majority of the site. The site rises from sea level (along its western boundary) up to more than 80 m near the eastern site boundary. The LNG Facility footprint is located within a basin-like structure with hills on the southern, northern and western boundaries.



Legend

- Proposed QCLNG Site Boundary
- Proposed Export Pipeline
- Spoil Disposal Area

Source Note:

Aerial photo -Department of Infrastructure and planning for QCLNG Project

Projection: UTM MGA Zone 56 Datum: GDA 94

0 125 250 500 m

Disclamer: Positional Accuracy of RE Data mapped at a scale of 1:100,000 is 100 metres. Survey and Mapping of 2003 Remnant Vegetation Communities and Regional Ecosystems of Queensland, Version 5.0, EPA (Dec 2005), Certified Regional Ecosystem Map Amendments under the Vegetation Management Act (1999), EPA, 20/08/2008. Field Assessments undertaken by Unidata as reported in "Revised Regional Ecosystem Mapping"

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Project	Queensland Curtis LNG Project
Client	QGC - A BG Group business

Title: **Vegetation Map for the LNG Facility**

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	JB	sEIS Appendix 11.1	Figure 2.1
Approved	SO	File No:	0086165b_SUP_GIS008_S11.1.2.1
Date	19.01.10	Revision	0

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2.4 Drainage and waterways

Two main ephemeral watercourses flow from north-east to south-west through the LNG Facility. There are several smaller first and second order ephemeral watercourses flowing into the main creeks from the elevated areas on the south and north of the site. The creeks observed across the site generally range in width between two to five metres with typical depth of 0.5 m-1.5 m, but ranging up to more than five metres in one watercourse in the upper slopes of the site towards the eastern site boundary.

There are no perennial fresh surface water bodies in the vicinity of the LNG Facility site. However, there are a number of overland flow paths and ephemeral streams, which serve as drainage channels during intermittent rainfall events.

2.5 Weeds

Three declared weed species occur within the LNG facility site:

- *Cryptostegia grandiflora* (Rubber Vine) Class 2;
- *Opuntia* sp. (Prickly Pear) Class 1; and
- *Lantana camara* (Lantana) Class 3.

The most abundant of these is Prickly Pear, which is most prevalent around the marine fringes. Generally, weeds are in low abundance within the LNG Facility site. The weed species that most commonly occur are herbaceous and non-problematic.

2.6 Fauna

The LNG Facility provides habitat for the following species that could be affected by vegetation clearing:

- arboreal mammals that utilise hollows for shelter – including *Trichosurus vulpecula* (Brush-tailed Possum) and *Petaurus breviceps* (Sugar Glider);
- reptiles that utilise ground debris and trees for shelter. Species previously recorded on site were predominantly skinks and geckoes. Snake species were limited in diversity and abundance;
- amphibians that utilise ground debris, drainage lines and trees for shelter (native Green Tree Frogs are common as were *Bufo marinus* (Cane Toad));
- ground-dwelling mammals that utilise ground debris for shelter. None were recorded during previous fauna surveys within the site;
- microchiropteran bats that utilise hollows, dense vegetation and bark for shelter; and
- birds that utilise trees for nesting, including Tyto alba (Barn Owl) and *Ninox strenua* (Powerful Owl).

There is a requirement by DEEDI that any feral species captured be euthanised. The EPC Contractor responsible for the development of the LNG Facility will develop a feral animal eradication plan to deal with these species prior to any preclearing surveys being undertaken.

3.0 CLEARING WORKS

Clearing of vegetation at the LNG Facility site will be undertaken as described within this chapter, although the specific work method will be refined by the appointed EPC Contractor. The process by which the clearing works will be managed to ensure minimal impact to native flora and fauna are described in *Chapter 4*.

3.1 Clearing and grubbing

Clearing of approximately 180 ha for the facility is expected to be performed by a crew of four to eight bulldozers, at a rate of approximately two hectares per day. Site clearing will be a 24 hour operation, however, for safety reasons, trees and shrubs will be knocked down and stockpiled only during the day shift. The stumps and roots will be grubbed by bulldozer and stockpiled. Erosion and sediment control facilities will be installed prior to clearing, and expanded as the clearing advances.

3.2 Mulching

Stockpiled vegetation will be processed by large mobile mulching machines It is expected that approximately 150,000 m^3 of mulch will be generated. Mulched material will be reused on site wherever possible, for example, as an initial cover in cleared areas, to prevent erosion. Mulch that can not be utilised will be blended with the stripped soil at spoil disposal Area A.

3.3 Stripping

Topsoil will be removed by dozers and scrapers, down to the underlying in-situ clay, to provide a suitable fill foundation or to eliminate contamination of fill material in the cut areas. Some of the topsoil (approximately 10,000 m^3) will be temporarily stockpiled for later use as a growing medium. The remainder of the topsoil will be hauled to the spoil disposal areas. The stripping and subsequent earthworks are expected to be performed on a 24-hour basis.

4.0 VEGETATION CLEARING STRATEGY

This chapter provides the strategy to manage the clearing works described in *Chapter 3*, to ensure impacts to the native flora and fauna of the LNG Facility site, and immediate surrounds are managed.

4.1 General requirements for all clearing works

This section provides information on general measures and requirements associated with the specific vegetation clearing actions.

4.1.1 Timing of Work

Vegetation clearing will commence as soon as practicable following Project approval (subject to any conditions) as it forms part of the site preparation activities on Curtis Island. As such, works are currently planned to commence at the beginning of July 2010. A key constraint on the progress of vegetation clearing and site preparation activities is the rainy season, therefore works are scheduled to avoid the wet season. This timing coincides with the Powerful Owl breeding season (April to September) hence mitigation measures will be implemented to limit impact on this species, which is listed as Vulnerable under the NC Act. Detailed measures to mitigate impacts on Powerful Owls are outlined in *Volume 5, Chapter 7* and *Volume 11* of the drat EIS and supplementary EIS.

It is anticipated that vegetation clearing (logging) will be undertaken in phases across the site.

The timing for other vegetation clearing components are provided (with the specific actions) in *Table 4.2* to *Table 4.4*.

4.1.2 Roles and Responsibilities

The roles and responsibilities of key parties in the Vegetation Clearing Strategy are listed in *Table 4.1.*

Table 4.1 Roles and Responsibilities

Role	Responsibility
Owner (QCG)	Manage EPC Contractor.
EPC Contractor	Manage all contractors on site and ensure all specifications are met. Appoint a Site Environmental Manager to oversee environmental matters such as vegetation clearing and fauna relocation.
Ecologist	Assist and monitor clearing activities including map hollow bearing trees, capture and relocate displaced fauna during hollow-bearing tree felling, monitor tree felling and fencing activities, and assist with seed collection. To be appointed by the EPC Contractor or Owner (dependant upon final contract arrangements).
Fencing Contractor	Implement fencing activities and ensure required specifications are met, including the reuse of felled timber where practicable.
Logging Contractor	Implement logging / clearing activities and ensure required specifications are met.
Note: Details of activities are provided in *Tables 4.2 – 4.4*.	

4.1.3 Fauna Management Contacts

The phone number and details of the following personnel will be listed on the sites contact lists and mentioned during inductions:

- Site Environmental Manager;
- local veterinarian;
- a registered wildlife carer;
- a snake handler;
- ecologists with site experience; and
- Queensland Parks and Wildlife Service (QPWS) local contact.

These personnel will be nominated prior to any works beginning and their agreement sought to provide services if and as required. If an animal is injured at any time during clearing or construction activities then the Site Environmental Manager will be notified and the relevant personnel contacted.

4.1.4 Site Inductions

All site personnel will be inducted to the site and induction material will include details on what to do in the event that fauna are injured, fauna are observed in poor condition, or fauna are observed within works areas.

4.1.5 Preclearing Surveys – Clearing

The following procedure will be followed at least one week prior to the vegetation clearing program commencing:

1. map and mark (flag) hollow-bearing trees within the LNG Facility site;
2. map and mark Powerful Owl nest trees;
3. map and mark trees within the LNG Facility site that contains bee hives; and
4. report on the above and provide any specific recommendations for clearing works.

The purpose of these surveys is to allow for the identification of trees that could be providing habitat for fauna, and consequently those trees that will require supervision by ecologists (or an experienced animal handler) when being removed. Further specifications are provided in *Table 4.2* to *Table 4.4*.

4.1.6 Preclearing surveys - Grubbing

Two days prior to any grubbing, preclearing surveys will be undertaken by ecologists. The aim of these surveys is to overturn ground debris and clear any fauna species likely to be impacted by heavy machinery during the removal of shrubs and ground debris. Fauna likely to be encountered will include snakes, amphibians and small ground-dwelling mammals.

A certified snake handler will be required on site during these activities. Bats may also be encountered during these works, and if required, should only be handled by qualified personnel.

4.2 Clearing Procedures – Detailed Measures

Preclearing surveys and vegetation clearing supervision will be conducted by qualified ecologists experienced in identification of the native fauna likely to occur on the site. Documents reporting previous survey results from the site (including reports contained in the QCLNG draft EIS and supplementary EIS) will be reviewed by survey personnel prior to commencing preclearing surveys.

The following measures will be considered in all clearing works at the LNG Facility:

1. if a Powerful Owl nest (containing eggs or chicks) is located at the site, the nest tree will be left standing until the birds have fledged. A 50 metre buffer of vegetation will be left around the nest tree during this period.

2. hollow bearing trees (HBT's) that are occupied (by possums, gliders, etc) will be left to stand for a minimum of 24 hours to allow resident fauna to relocate. If animals are still present after this time, HBTs will be felled and the animals trapped and relocated by qualified personnel;

3. the clearing of habitat trees will be minimised and where practical, they will be retained for use in rehabilitation or landscaping at the site;

4. the ecologist or animal handler will bag/trap and transfer animals caught;

5. injured animals will be taken to a local wildlife carer or vet (located on the Gladstone mainland) – contact details will be supplied to surveyors and clearing contractors; and

6. a clearing report outlining any fatalities and the number and species of animals relocated will be detailed each day by the ecologist.

4.3 Specific Actions

Table 4.2 to *Table 4.4* provide specific actions to manage the vegetation clearing activities. The tables include the predicted timeframe for implementation, and the parties responsible for implementation and action.

Table 4.2 Vegetation Clearing Actions – Project Approval

Stage	Action	Specifications	Timeframe
Project Approval - 3 months	1. Native seed aquisition	The acquisition of seeds from native tree species will be via a suitably experienced organisation (such as Greening Australia). Seed can then be used to provide stock for areas to be rehabilitated or revegetated, or to provide visual screens.	Project Approval - 1 month
	2. Mark clearance boundaries	Boundaries are to be marked in one colour of flagging that is not to be used for any other tasks.	Project Approval - 1 month
	3. Delineate access tracks	Tracks are to be flagged with one colour of flagging that is not to be used for any other tasks.	Project Approval - 2 months
	4. Install temporary fencing prior to clearing commencing	No trees are to be felled and there will be no machinery incursion outside of the LNG Facility boundary. Temporary fencing will identify no-go areas that will not be entered by personnel and/or machinery.	Project Approval - 2 months
		Temporary fencing will be of a type that allows ground-dwelling fauna to move out of the clearance areas	Project Approval - 2 months
	5. Map of stages for clearing/ work plan method to be provided to ecologists	A staged plan to allow for preclearing field surveys.	Project Approval - 2 months
	6. Consult with QPWS to nominate areas for relocation of fauna from the LNG Facility site	Areas for relocation will be similar in habitat type and vegetation type. Areas for each fauna type will be formulated with National Parks officers and agreed prior to any works commencing.	Project Approval - 2 months

Table 4.3 Vegetation Clearing Actions – Clearing

Stage	Action	Specifications	Timeframe
Pre clearance - Clearing	1. Hollow-bearing trees (HBT) to be mapped (GPS) and flagged	Ecologists to undertake hollow-bearing tree mapping and flagging (one colour of flagging only to be used for all hollow-bearing trees and this information provided to ground clearance crews).	Project Approval - 3 months
		Ecologists may conduct trapping for arboreal species to allow for relocation prior to felling. This will be decided depending on the area to be cleared eg. Open woodland species will be relocated to similar habitat.	1 month prior to felling
		Each HBT is to be numbered; size and number of hollows to be recorded, as well as species and diameter at breast height (DBH). Any other specifics also recorded (ensure that any trees with bee hives are noted).	Project Approval - 3 months
Clearing	2. Trees that are not hollow bearing will be logged first	All HBTs to be cleared should be felled last (where practicable) to allow fauna a chance to relocate prior to felling.	Final stage of clearing
	3. Ecologists to supervise felling of all hollow-bearing trees	Experienced ecologists will be on site to capture and relocate any displaced fauna during hollow-bearing tree felling.	At all times
		On-ground construction personnel will work in close communication with the ecologists when felling hollow-bearing trees	At all times
		Tree felling will be conducted in a manner that reduces impacts to the hollow-bearing parts of the trees and allow for ecologists to check hollows once the tree has been felled. Where hollows can not be inspected easily, these can be cut off and placed in adjacent conservation areas to allow fauna to move out.	At all times
		Once trees are felled, any displaced fauna captured are to be handled by the ecologist or other appropriately qualified personnel	At all times
		All captured species will be handled and released under the control of the ecologist or other appropriately qualified personnel	At all time

Table 4.4 Vegetation Clearing Actions – Grubbing

Stage	Action	Specifications	Timeframe
Preclearing – Grubbing	1. Preclearing surveys to be undertaken for ground-dwelling fauna	Preclearing surveys are to be undertaken by experienced ecologists and should include a snake handler.	Two days prior to grubbing
		The need for installation of pit fall traps will be assessed prior to clearing. This will reduce the impacts to reptile species where there is predicted significant habitat for these species.	Two days prior to grubbing
		Surveys will involve inspection of potential fauna habitats including dense tussocks, woody debris and rocky areas.	Two days prior to grubbing
Grubbing	2. Capture of displaced fauna	At least one experienced animal handler will be on site during grubbing works to capture any displaced fauna that were not located during preclearing surveys.	During grubbing works

4.4 Reporting

Each clearing program undertaken will be documented by the ecologists involved on site. Details to be reported include:

- tree felled (species, number of hollows and location);
- details of any species captured (number and type);
- area to which the individual/s was relocated;
- details on the condition of the individual captured (eg. any injuries, disoriented etc.); and
- details of any feral animal species euthanised.

A register of fauna sightings will also be set up and contractors will be encouraged to report all sightings during clearing activities. Reports on activities will be submitted to a DERM project contact officer on a monthly basis.

No tree felling will occur during the night time. If this is to be altered at any time then DERM will be notified and the potential impacts of this activity on fauna will be assessed.

The contact details of the Site Environmental Manager, or his delegate, will be provided to contractors so that any breach of the actions specified in this strategy can be reported.