

Australia Pacific LNG Project

Narrows Crossing Pipeline

Environmental Management Plan

Attachment 8 Australia Pacific LNG Offset
Strategy



Australia Pacific LNG Environmental Offset Strategy

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Environmental Offset Strategy

Table of Contents

1.	Executive Summary	3
2.	Introduction.....	7
2.1	Purpose and Scope	7
2.2	Project Background	8
2.3	Queensland State Government Offset Requirements	8
2.3.1	Terrestrial Offset Requirements	8
2.3.2	Freshwater Fish Offset Requirements	9
2.3.3	Marine Offset Requirements.....	9
2.4	Commonwealth Government Offset Requirements.....	10
2.5	Relationship to Coordinator-General's Conditions	11
3.	Project Clearing Footprint.....	12
4.	Methodologies for Calculating Offset Requirements	13
4.1	Gas Field	13
4.1.1	Regional Ecosystems and Threatened Ecological Communities .	13
4.1.2	Terrestrial Fauna Habitat.....	13
4.2	Gas Pipeline and LNG Facility.....	14
4.2.1	Regional Ecosystems and Threatened Ecological Communities .	14
4.2.2	Terrestrial Fauna Habitat.....	14
4.2.3	Terrestrial Flora Species	14
4.2.4	Freshwater Fish Habitat	14
4.2.5	Marine.....	15
4.2.6	World Heritage Values.....	15
5.	Proposed Vegetation and Biodiversity Offset Requirements.....	16
6.	Proposed Offsetting Principles and Objectives	18
6.1	Direct Offsets.....	18
6.2	Indirect Offsets	20
7.	Proposed Approach to Offset Staging	21
8.	Recommended Offset Multipliers for Direct Offsets	22
9.	Preliminary Availability of Suitable Offset Sites	23
9.1	Terrestrial	23
9.2	Freshwater.....	23
9.3	Marine.....	23
10.	Proposed Approach to Offset Management	24
11.	Conclusion.....	25

Environmental Offset Strategy

1. Executive Summary

Australia Pacific LNG is currently seeking Commonwealth and State Government approvals for its coal seam gas (CSG) to liquefied natural gas (LNG) Project (the Project). While the Project has been planned to avoid and minimise potential impacts to terrestrial and marine environments, the Project is expected to have unavoidable direct and indirect impacts as detailed in the Project's Environmental Impact Statement (EIS). As such, the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), the Queensland Department of Environment and Resource Management (DERM) and the Queensland Department of Employment Economic Development and Innovations (DEEDI) have confirmed that terrestrial and marine offsets will be required to compensate for significant unavoidable impacts.

This document has been prepared to outline the Project's environmental offset requirements and the Project's approach for offsetting. It includes the methodology applied in calculating areas to be offset, along with the proposed approach and principles to find, secure and manage direct offset sites through Project implementation. This document also describes the Project's approach to indirect offsets.

The total clearing of remnant vegetation and non-remnant regrowth Brigalow greater than 15 years of age required for the Project is anticipated to be 7,344ha.

Separated into the different Project components this comprises:

- LNG Facility – 148ha
- Gas Pipeline – 914ha
- Gas Fields – 6,282ha

The following tables provide a summary of the potential direct impacts by Project components and environmental value, reflecting State and Commonwealth offset requirements.

Table 1 - DSEWPaC Offsets

Project Component	Area to be offset (ha)	Environmental value to be offset
LNG Facility	1.18	<i>Xeromys myoides</i> (Water Mouse) ¹
Gas Pipeline	13.48	Brigalow (Regional Ecosystems (REs)) 11.12.21, 11.3.1, 11.4.3, 11.4.7, 11.9.5)
	0.37	Semi-evergreen vine thicket (REs 11.9.4, 11.9.4a, 11.9.4b, 11.11.18)
	23.50	<i>Cycas megacarpa</i> [130 plants]
	15.60	<i>Xeromys myoides</i> (Water Mouse)
Gas Fields	75.41	Brigalow (REs 11.3.1, 11.4.3, 11.4.7, 11.9.5)
	4.36	Semi-evergreen vine thicket (REs 11.9.4a, 11.9.4b)
	703.84	<i>Paradelma orientalis</i> (Brigalow scaly-foot)

¹ The existence of habitat for this species is currently being investigated

Environmental Offset Strategy

Gas Fields	238.63	<i>Furina dunmalli</i> (Dunmall's snake)
	66.77	<i>Egernia rugosa</i> (Yakka skink)

The total area of *Environment Protection and Biodiversity Conservation Act* (EPBC Act) listed Threatened Ecological Communities impacted by the Project is 93.62ha (13.85ha for the Gas Pipeline and 79.77ha for the Gas Fields).

Table 2 - DERM Offsets

Project Component	Area to be offset (ha)	Environmental value to be offset
LNG Facility	61.67	Of Concern RE (REs 12.11.14, 12.3.11)
Gas Pipeline	9.30	Endangered RE (REs 11.11.18, 11.12.21, 11.3.1, 11.4.12, 11.4.3, 11.4.7, 11.9.5)
	24.93	Of Concern RE (REs 11.11.10, 11.3.17, 11.3.2, 11.3.3, 11.3.4, 11.9.10, 11.9.7, 12.11.14, 12.3.11)
	TBA ²	Mapped Essential Habitat
Gas Fields	77.63	Endangered RE (REs 11.3.1, 11.4.12, 11.4.3, 11.4.7, 11.9.5)
	113.79	Of Concern RE (REs 11.3.17, 11.3.2, 11.3.3, 11.3.4, 11.9.10, 11.9.4a, 11.9.4b, 11.9.7)
	TBA ³	Mapped Essential Habitat

The total area of Endangered RE impacted by the Project is 86.93ha. The total area of Of Concern RE impacted by the Project is 200.39ha.

Table 3 - DEEDI Offsets

Project Component	Area to be offset (ha)	Environmental value to be offset
LNG Facility	22.68	Saltpan and mangrove habitats (REs 12.1.2, 12.1.3)
	12.20	Marine environments potentially containing seagrass
	16.12	Other intertidal and sub-tidal areas
Gas Pipeline	11.00	Saltpan and mangrove habitats (REs 11.1.2, 11.1.4, 12.1.3)
	2.80	Marine environments potentially containing seagrass
	5.80	Other intertidal and sub-tidal areas

Table 3 lists areas of impacts to marine fish habitats. Potential freshwater fish habitat impacts are currently being assessed in consultation with DEEDI. In particular, potential

² The area to be offset for Mapped Essential Habitat is currently being recalculated based on the latest Essential Habitat mapping.

³ The area to be offset for Mapped Essential Habitat is currently being recalculated based on the latest Essential Habitat mapping.

Environmental Offset Strategy

impacts of the Gas Pipeline construction on freshwater fish passage are currently being investigated and suitable offsets will be developed where appropriate.

Development of the Project will occur over a 30 year development timeframe and as such the exact location of clearing activities for some components of the Project is yet to be determined. As a result of the uncertainty surrounding the quantification of potential impacts, it is proposed that offsets required in accordance with relevant offset policies for the gas fields component of the Project will occur in five year increments as per the five year Operational Plans. This staged approach will facilitate provision of suitable offsets in a manner that maximises success and benefit and meets the timing requirements of the Project while incorporating the incremental and long-term nature of the Project.

The implementation of the initial offset package for the Project will be supported by a process of measuring and accounting direct impacts against offsets provided. For each subsequent five year development program, it is proposed that an offsets package is developed to offset direct impacts (balancing any shortfall or overrun in offset areas already provided) at least 12 months in advance of the commencement of significant construction works⁴.

The same values are proposed to be offset applying the same multipliers for each subsequent offset proposal. This approach will provide significant incentive for Australia Pacific LNG to develop and/or adopt new technologies to reduce the direct impacts in the gas fields.

A Reconciliation Statement presenting information about offsets and direct impacts for the whole of the Project will be developed annually and submitted to the Queensland Coordinator-General and relevant State and Commonwealth administering authorities.

The offset multipliers proposed for this Project are consistent with the intent of the Queensland Government Policy for Vegetation Management Offsets (2009) relating to the *Vegetation Management Act 1999* (VM Act) and *Nature Conservation Act 1992* (NC Act) and the Commonwealth *Draft Policy Statement: Use of environmental offsets under the EPBC Act* (Draft Policy Statement 2007). Table 4 below presents proposed multipliers.

⁴ It is proposed that significant construction works be defined as assembly and commissioning of pipelines or export facilities but exclude earthworks and clearing. This will allow exact footprints to be better defined prior to finalisation of offsets.

Environmental Offset Strategy

Table 4 – Offset multipliers

Environmental value	Proposed multiplier	Multiplier source
VM Act Endangered Regional Ecosystem	2	Policy for Vegetation Management Offsets (VMO Policy)
VM Act Of Concern Regional Ecosystem	2	
NC Act Essential Habitat	1	DERM consultation
EPBC Act Threatened Ecological Communities	8-10	As per recent publicly available DSEWPaC approval conditions for other LNG proponents
EPBC Act listed Flora Species	6*	
MNES threatened species habitat	1	

* based on area or number of individuals impacted. Offset may be obtained through propagation and planting and / or managed recruitment.

MNES = Matters of National Environmental Significance

2. Introduction

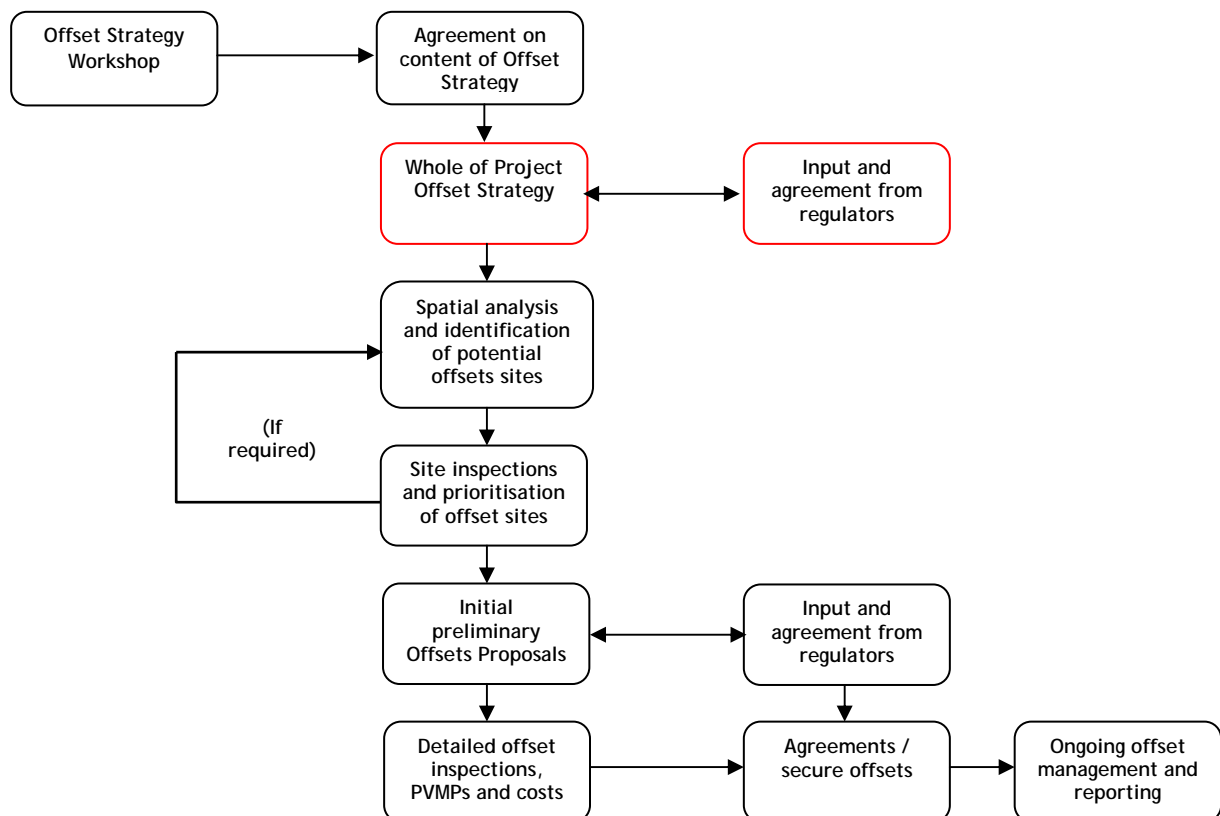
2.1 Purpose and Scope

This report describes the whole-of-project environmental offset requirements of the Australia Pacific LNG Project (the Project). It includes the methodology applied in calculating areas to be offset, along with the proposed approach and principles to find, secure and manage direct offset sites through Project implementation. This document also describes the Project's approach to indirect offsets.

State and Commonwealth offset requirements are addressed separately in this report reflecting the separation of the regulatory and policy requirements at each level of Government. Offset requirements are also categorised into the three Project elements: Gas Fields; Gas Pipeline; and the Liquefied Natural Gas (LNG) Facility.

An overview of how this strategy fits into the overall offset process is provided in Figure 1.

Figure 1 – Flowchart of Offset Process



Environmental Offset Strategy

2.2 Project Background

The Project is an equal joint venture between Origin Energy and ConocoPhillips, the third largest energy company in the United States.

The Project involves development of gas fields in south-central Queensland and an LNG Facility on Curtis Island near Gladstone, and construction and operation of pipelines and associated supporting infrastructure connecting the gas fields and LNG Facility.

The Project is expected to invest up to A\$35 billion until 2020, and has an anticipated Project life of at least 30 years. Maximum potential development of the Project will comprise drilling and completion activities targeting 350 to 500 wells per annum, but may increase to 600 during peak development. Construction of up to 10,000 wells is expected over the life of the Project. Each well will have associated infrastructure and be linked by pipelines to the LNG facility on Curtis Island near Gladstone.

2.3 Queensland State Government Offset Requirements

The Queensland Government Environment Offsets Policy (2009) describes offsets as an action taken “to counterbalance unavoidable, negative environmental impacts that result from an activity or a development. An offset may be located within or outside the geographic site of the impact. Environmental Offsets are only applicable when the impacts cannot be avoided or minimised, and if all other Government environmental standards have been met”. The Policy provides the guiding framework for environmental offsets in Queensland. This policy framework includes a series of existing and draft specific issue offset policies that are administered by different government agencies including:

- Policy for Vegetation Management Offsets (2009) (DERM). Under this policy offsets are a means of meeting relevant performance requirements of the applicable Regional Vegetation Management Code. While application of this policy is not a legal requirement for petroleum activities, it has guided the development of offset multipliers.
- Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss (2002) (DEEDI). The guiding principles used for marine offsets are the *Offset measures – Marine Fish Habitat* which is an assessment and decision making process under the Section 76L of the *Fisheries Act 1994*. For specific offset requirements, reference must also be made to *Offset measures – Marine Fish Habitat* titled Fish Habitat Management Operation Policy (FHMOP 005) (2002) which defines procedures and requirements for marine offsets.
- Draft Policy for Biodiversity Offsets (DERM). One of the aims of this policy is to “ensure a better environmental outcome on a State-wide basis where biodiversity values are lost to impacts from development and other activities”. While application of this draft policy is not currently a legal requirement, it has guided the development of offset multipliers.

2.3.1 Terrestrial Offset Requirements

The offsets for significant impacts on terrestrial flora, fauna and biodiversity are generally expressed in terms of areas of vegetation.

Environmental Offset Strategy

The principal characteristics for vegetation offsets are outlined in this section; however individual circumstances may warrant different outcomes. Generally, vegetation and biodiversity offsets include:

- offsets must be legally secured (eg a Voluntary Declaration under the *Vegetation Management Act 1999*, a statutory covenant under the *Land Title Act 1994*, or a Nature Refuge or other covenant on land title or as protected area tenure via an agreement with DERM)
- area multipliers may apply. These will be finalised on a case by case basis in consultation with DERM
- offsets should, where appropriate, be close to where the disturbance occurred
- an offset will most often be advanced non-remnant regrowth, but may be degraded remnant habitat
- offsets should have limited weed cover in the ecologically dominant layer
- offsets generally require management for 5 – 20 years
- all offsets must be supported by a Property Vegetation Management Plan (PVMP) that includes monitoring and reporting requirements.

2.3.2 Freshwater Fish Offset Requirements

Potential impacts of the Project on freshwater fish habitats are currently being investigated. Impacts will be addressed in accordance with DEEDI's *Fish Habitat Management Operational Policy FHMOP 005 (2002)*. This policy sets out, among other things, works or related activities in declared Fish Habitat Areas that may be authorised under self-assessable codes and Development Approvals that are not self-assessable.

While much of the potential impacts will be self-assessable against the *Code for self-assessable development Minor waterway barrier works on low order inland waterways*, or the *Code for self-assessable development Temporary waterway barrier works*, some works may have more significant impacts and would therefore require offsetting in accordance with the requirements of the *Fisheries Act 1994*. The nature and scale of potential impacts will be assessed further as construction planning progresses.

Where offsets are required consideration will be given to the contribution of funding towards fish passage projects identified in consultation with DEEDI.

2.3.3 Marine Offset Requirements

Marine impacts must be addressed under DEEDI's *Fish Habitat Management Operational Policy FHMOP 005 (2002)* and *Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss: FHMOP 005*. This policy applies to all works where marine fish habitats are to be permanently or temporarily lost, or otherwise modified, causing loss of fisheries resources and fish habitats. Impacts can be compensated through:

- land exchange or land acquisition of productive wetlands (links should be made to FHA program and/or Acquisition Program)

Environmental Offset Strategy

- creation of replacement/alternate fish habitat and monitoring of the effectiveness of habitat and/or
- contribution to a State-wide Compensation Program (to fund research or extension on fish habitats)

The proposed approach to offsetting impacts on marine ecosystems involves identifying and securing strategic properties located adjacent to existing Fish Habitat and Protected Areas to enhance existing marine fish habitat values, and increasing the fish habitat and protected area estate and rehabilitation of degraded fish habitat in Queensland. Prioritisation can be given to the long-term protection and management (rehabilitation) of degraded coastal and marine ecosystems within the Great Barrier Reef World Heritage Area and in proximity to the impact site. The provision of marine offsets will also address impacts on migratory shorebirds listed under the EPBC Act through the protection and management of coastal ecosystems that provide feeding and roosting habitat for these species.

2.4 Commonwealth Government Offset Requirements

The DSEWPaC *Draft Policy Statement: Use of environmental offsets under the EPBC Act* (Draft Policy Statement 2007) defines offsets as “actions taken outside a development site that compensate for the impacts of that development – including direct, indirect or consequential impacts”.

It is recognised that unavoidable impacts on Matters of National Environmental Significance (MNES), as listed under the EPBC Act, may require direct or indirect offsets where these impacts are significant.

The Draft Policy Statement principles for the use of environmental offsets under the EPBC Act will be used to prioritise and select offsets. As agreed with DSEWPaC, environmental offsets will:

- be targeted to the matter protected by the EPBC Act that is being impacted
- include a flexible approach to the design and use to achieve long-term and certain conservation outcomes which are cost effective for proponents
- deliver a real conservation outcome
- be developed as a package of actions - which may include both direct and indirect offsets
- be commensurate with the magnitude of the impacts of the development, as a minimum, and ideally deliver outcomes that are ‘like for like’
- be located within the same general area as the development activity
- be delivered in a timely manner and be long lasting
- be enforceable, monitored and audited.

In addition to the ecological values requiring offsets, offsets located within the Great Barrier Reef World Heritage area will also be prioritised. Indirect offset options that can be implemented to improve knowledge, understanding and management leading to improved

Environmental Offset Strategy

conservation outcomes for the Great Barrier Reef World Heritage Area and its values will also be considered.

2.5 Relationship to Coordinator-General's Conditions

The Coordinator-General's report and associated conditions for the Project contain approval conditions that relate to offsets and the content of the Strategy. Specifically, Appendix 1, Part 1, Condition 5, (2, a-h) specifies the required content of the Strategy. Table 5 shows where these conditions have been addressed in this Strategy.

Table 5 – Summary of CG Report Appendix 1, Part 1, Condition 5, (2, a-h)

Appendix 1, Part 1, Condition 5, (2, a-h)	Reference to information contained in this Strategy
a. Principles adopted for the environmental offsets strategy	Section 6 – Proposed Offsetting Principles and Objectives
b. Procedures to identify the requirements for environmental offsets for specific components of the Project over the life of the Project	Section 4 – Methodologies for Calculating Offset Requirements Section 7 – Proposed Approach to Offset Staging
c. Relevance to any legislative requirements for offsets	Section 2.3 – Queensland State Government Offset Requirements Section 2.4 – Commonwealth Government Offset Requirement
d. Mechanisms to secure and manage environmental offsets for long term protection of values	Section 2.3.1, first bullet point
e. Location, size and values that must be offset	Section 5 – Proposed Vegetation and Biodiversity Offset Requirements
f. Location, size and values of the offsets proposed	Section 6 – Proposed Offsetting Principles and Objectives Potential offset sites have been identified from spatial analysis and preliminary site inspections are currently underway.
g. Management measures, including funding, required to maintain or enhance values for the life of the offset	Section 10 – Proposed Approach to Offset Management
h. A system for reporting to the CG on offset arrangements, their management; how offset values are met and maintained; and the reconciliation process.	Section 7 – Proposed Approach to Offset Staging

3. Project Clearing Footprint

The Project is expected to require the clearing of the following areas⁵ of remnant vegetation and non-remnant regrowth Brigalow:

- LNG Facility – 148ha
- Gas Pipeline – 914ha
- Gas Fields – 6,282ha

These areas total 7,344ha.

The total Project footprint transects or is located within:

- Three bioregions:
 - South East Queensland (SEQ) (LNG facility, gas pipeline)
 - Brigalow Belt South (BBS) bioregion (gas fields and gas pipeline)
 - Brigalow Belt North (BBN) bioregion (gas pipeline)
- Thirteen subregions:
 - Burnett-Curtis Hills and Ranges (LNG Facility, gas pipeline)
 - Dulacca Downs (gas fields)
 - Eastern Darling Downs (gas fields)
 - Inglewood Sandstones (gas fields)
 - Tara Downs (gas fields)
 - Taroom Downs (gas pipeline, gas fields)
 - Callide Creek Downs (gas pipeline)
 - Barakula (gas pipeline, gas fields)
 - Southern Downs (gas pipeline, gas fields)
 - Banana - Auburn Ranges (gas pipeline)
 - Carnarvon Ranges (gas pipeline)
 - Mount Morgan Ranges (gas pipeline)
 - Marlborough Plains (gas pipeline).

⁵ The areas to be cleared will be further refined throughout Project life.

4. Methodologies for Calculating Offset Requirements

This section provides an overview of the methodologies used to determine offset requirements and how these areas were calculated and quantified for the gas fields, pipeline and LNG Facility.

4.1 Gas Field

4.1.1 Regional Ecosystems and Threatened Ecological Communities

Development of the gas fields will occur over a 30 year timeframe and as such the exact location of some proposed infrastructure has not been determined. In order to avoid and minimise the potential impacts of infrastructure development ecological constraints mapping has been developed that will guide the design and location of infrastructure.

During the broad scale scouting process undertaken during the EIS studies Regional Ecosystem mapping covering the gas fields was updated to reflect the vegetation present on the ground. The proposed indicative layout was overlaid onto updated Regional Ecosystem mapping to determine the extent of impacts on each Regional Ecosystem type.

Application of constraints mapping in the design process is a key step in minimising disturbance to vegetation. The impact on remnant vegetation is further reduced through detailed ground truthing prior to all new ground disturbances.

The impact on remnant vegetation is mitigated through rehabilitation of disturbed areas not required for operations.

Potential clearing areas were developed using an indicative layout of well sites buffered to take into account associated infrastructure requirements, which was overlaid on top of revised Regional Ecosystem mapping.

4.1.2 Terrestrial Fauna Habitat

Known fauna records, literature reviews and field studies, on a sub-regional (or provincial) scale, were reviewed to determine which conservation significant species may be impacted by the development of the gas fields. A total of 214 sites across a range of REs were surveyed to determine the suitability of potential habitat for each conservation significant fauna species. Habitat suitability rankings were developed for each site and each conservation significant species⁶. An expert panel was convened to consider the habitat factors of each species and determine which vegetation types might provide habitat for each species.

A series of mitigation measures were developed to reduce potential fauna impacts through broad scale and detailed scouting and adopting rigorous field protocols. Where the application of mitigation measures still resulted in a significant impact on conservation

⁶ The suitability of habitat for Death adder was not assessed during field surveys, however, the proportion of sites with suitable habitat was assumed to be the same as Brigalow scaly-foot.

Environmental Offset Strategy

significant species (or their potential habitat) the areas of remnant vegetation that may provide habitat for these species is proposed to be offset.

For each species that are proposed to be offset the area of potential habitat directly impacted by the Project was calculated by:

- considering which REs would provide suitable habitat for each species; and
- the proportion of each RE likely to contain habitat features that would support target species (based on the proportion of survey sites for each RE that contained good quality habitat).

4.2 Gas Pipeline and LNG Facility

4.2.1 Regional Ecosystems and Threatened Ecological Communities

The location of proposed infrastructure was overlaid on top of revised mapping (based on extensive flora surveys) to determine total direct impacts. The proposed right of way (ROW) for the pipeline is 40m. For the purpose of disturbance calculations, a disturbance width of 50m was used, to take into account additional clearing that may be required in association with construction e.g. wider ROW at crossings, access, vehicle turn around areas, storage areas and other infrastructure requirements similar to those presented in the EIS.

4.2.2 Terrestrial Fauna Habitat

Detailed field surveys have been undertaken along the majority of the gas pipeline and throughout the LNG Facility footprint. These surveys considered the extent and quality of potential habitat for conservation significant fauna species. Relevant mitigation measures were developed and communicated in the EIS.

Through the assessment process and after the application of relevant mitigation measures it was determined that where impacts were still significant the impacts would be offset.

4.2.3 Terrestrial Flora Species

Detailed flora surveys have been undertaken along the majority of the gas pipeline and throughout the LNG Facility footprint. During these surveys several flora species were identified as potentially impacted. Through the assessment process and after the application of relevant mitigation measures it was determined that where impacts were still significant the impacts would be offset.

4.2.4 Freshwater Fish Habitat

Potential impacts of the Project on freshwater fish habitats are currently being investigated. The nature and scale of potential impacts will be assessed further as construction planning progresses.

Environmental Offset Strategy

4.2.5 Marine

The proposed footprint of the LNG Facility and the gas pipeline crossing of The Narrows will have impacts on several intertidal and sub-tidal zones. These impacts were quantified by overlaying the proposed footprint of the development over revised RE mapping relevant to marine ecosystems. Intertidal and sub-tidal areas that are not mapped as Regional Ecosystems or as seagrasses are assumed to consist of non-vegetated substrate and may include sand and mud flats and sand bars at estuary mouths. The potential impacts on sub-tidal zones were calculated based on the footprint of proposed infrastructure including mapped seagrasses but exclude those areas already addressed under Gladstone Port Corporation's Western Basin Environmental Impact Statement and Supplementary Report.

4.2.6 World Heritage Values

The aspects of the gas pipeline and the LNG Facility that impact areas below the mean low water mark lie within the Great Barrier Reef World Heritage Area. Furthermore, Curtis Island itself is a continental island situated within the Great Barrier Reef World Heritage Area.

Ongoing consultation with DSEWPaC is needed to identify the world heritage values that may need to be offset. It is, however, recognised that the formal criteria against which the Great Barrier Reef was listed in 1981 contain an indication of the values that may be impacted. These criteria included:

- *Outstanding example representing a major stage of the earth's evolutionary history*
 - with references to continental islands and their flora and fauna
- *Outstanding example representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment*
 - with references to mangroves and seagrasses, feeding and/or breeding grounds for international migratory seabirds, cetaceans and sea turtles, and the diversity of flora and fauna including fishes, seabirds, marine reptiles, marine mammals, and terrestrial flora and fauna
- *Contain unique, rare and superlative natural phenomena, formations and features and areas of exceptional natural beauty*
 - with references to forested continental islands complete with freshwater streams, coastal and adjacent islands with mangrove systems of exceptional beauty, rich variety of landscapes and seascapes including rugged mountains with dense and diverse vegetation, and migrating whales, dolphins, dugong, whale sharks, sea turtles, seabirds and concentrations of large fish
- *Provide habitats where populations of rare and endangered species of plants and animals still survive*
 - with references to continental island flora, sea turtle rookeries, seagrass beds, mangroves, and species of plants and animals of conservation significance

5. Proposed Vegetation and Biodiversity Offset Requirements

The Project will require the areas to be offset over the life of the Project based on the proposed clearing footprint and with consideration of current policy requirements as detailed in Section 2.3 and 2.4.

In accordance with the Commonwealth *Policy Statement: Use of environmental offsets under the EPBC Act* (Draft Policy Statement 2007) where the Project may have a significant impact on a Matter of National Environmental Significance (as defined in the EPBC Act) this impact will be offset. DSEWPaC offsets are presented in Table 6 below.

Consistent with Queensland offset policies offsets are proposed for impacted areas of Endangered and Of Concern REs, and areas of mapped Essential Habitat. DERM and DEEDI offsets are presented in Tables 7 and 8 below.

The following tables provide a summary of the potential direct impacts by Project components and environmental value, reflecting State and Commonwealth offset requirements.

Table 6 - DSEWPaC Offsets

Project Component	Area to be offset (ha)	Environmental value to be offset
LNG Facility	1.18	<i>Xeromys myoides</i> (Water Mouse) ⁷
Gas Pipeline	13.48	Brigalow (Regional Ecosystems (REs)) 11.12.21, 11.3.1, 11.4.3, 11.4.7, 11.9.5)
	0.37	Semi-evergreen vine thicket (REs 11.9.4, 11.9.4a, 11.9.4b, 11.11.18)
	23.50	<i>Cycas megacarpa</i> [130 plants]
	15.60	<i>Xeromys myoides</i> (Water Mouse)
Gas Fields	75.41	Brigalow (REs 11.3.1, 11.4.3, 11.4.7, 11.9.5)
	4.36	Semi-evergreen vine thicket (REs 11.9.4a, 11.9.4b)
	703.84	<i>Paradelma orientalis</i> (Brigalow scaly-foot)
	238.63	<i>Furina dunmalli</i> (Dunmall's snake)
	66.77	<i>Egernia rugosa</i> (Yakka skink)

The total area of EPBC Act listed Threatened Ecological Communities impacted by the Project is 93.62ha (13.85ha for the Gas Pipeline and 79.77ha for the Gas Fields)

⁷ The existence of habitat for this species is currently being investigated

Environmental Offset Strategy

Table 7 - DERM Offsets

Project Component	Area to be offset (ha)	Environmental value to be offset
LNG Facility	61.67	Of Concern RE (REs 12.11.14, 12.3.11)
Gas Pipeline	9.30	Endangered RE (REs 11.11.18, 11.12.21, 11.3.1, 11.4.12, 11.4.3, 11.4.7, 11.9.5)
	24.93	Of Concern RE (REs 11.11.10, 11.3.17, 11.3.2, 11.3.3, 11.3.4, 11.9.10, 11.9.7, 12.11.14, 12.3.11)
	TBA ⁸	Mapped Essential Habitat
Gas Fields	77.63	Endangered RE (REs 11.3.1, 11.4.12, 11.4.3, 11.4.7, 11.9.5)
	113.79	Of Concern RE (REs 11.3.17, 11.3.2, 11.3.3, 11.3.4, 11.9.10, 11.9.4a, 11.9.4b, 11.9.7)
	TBA ⁹	Mapped Essential Habitat

The total area of Endangered RE impacted by the Project is 86.93ha. The total area of Of Concern RE impacted by the Project is 200.39ha.

Table 8 - DEEDI Offsets

Project Component	Area to be offset (ha)	Environmental value to be offset
LNG Facility	22.68	Saltpan and mangrove habitats (REs 12.1.2, 12.1.3)
	12.20	Marine environments potentially containing seagrass
	16.12	Other intertidal and sub-tidal areas
Gas Pipeline	11.00	Saltpan and mangrove habitats (REs 11.1.2, 11.1.4, 12.1.3)
	2.80	Marine environments potentially containing seagrass
	5.80	Other intertidal and sub-tidal areas

Table 8 lists areas of impacts to marine fish habitats. Potential freshwater fish habitat impacts are currently being assessed in consultation with DEEDI.

⁸ The area to be offset for Mapped Essential Habitat is currently being recalculated based on the latest Essential Habitat mapping.

⁹ The area to be offset for Mapped Essential Habitat is currently being recalculated based on the latest Essential Habitat mapping.

6. Proposed Offsetting Principles and Objectives

Australia Pacific LNG places great importance on making a positive contribution to the economy, people, local community and the environment in which it operates. Implementation of the Environmental Offset Strategy provides one such opportunity to make a positive contribution to the local environment.

6.1 Direct Offsets

While all proposed offset sites will meet the intent of relevant State and Commonwealth offset policies, the process for identifying and prioritising potential offset sites will encompass a number of elements that reflect Australia Pacific LNG's commitment to achieving outstanding ecological and social outcomes.

A number of criteria have been developed to compare and prioritise potential offset sites. These criteria will be applied through the spatial analysis and assessment matrix process and through individual site inspections. Mature regrowth vegetation in good condition is targeted to reduce the risk of offsets failing and to achieve remnant status in the minimum timeframe. The following sections provide an overview of proposed offset prioritisation criteria.

Broad spatial assessment

- tenure and land use constraints
 - occurs on appropriate tenure (non industrial or urban land uses)
 - no existing mining, extraction or petroleum leases (off Australia Pacific LNG controlled land)
 - not on Good Quality Agricultural Land (Class A)
- distance from area of impact
 - within Australia Pacific LNG controlled land or study area
 - within the same bioregion and relevant sub-region or province (including coastal sub-regions for coastal impacts)
 - within or adjacent to World Heritage Area (where relevant)
- connectivity
 - within bioregional corridors
 - adjacent to existing protected areas
 - within key investment areas
 - between existing patches of remnant vegetation

Environmental Offset Strategy

Site Specific Assessment

- size (comparative to available offset options)
 - classed and ranked in deciles
- mature vegetation
 - classed and ranked by cover (approximation for maturity)
- existing level of protection
 - non-remnant
 - high value regrowth
 - remnant
- habitat potential
 - coincides with existing records (essential habitat)
 - structure of vegetation, ground cover and debris
 - presence of water bodies, streams and wetlands
 - slope and morphology
- spatial arrangement
 - edge-to-area ratio
 - proximity to special features

From the key prioritisation criteria outlined above, two criteria are central to the proposed approach; size of the offset, and connectivity.

Size

Larger offset sites that fulfil multiple criteria will be prioritised as they are less susceptible to edge effects and are more likely to sustain viable and more varied populations of native flora and fauna than smaller patches.

Connectivity

Offsets with links to other areas of native vegetation, particularly in cleared or highly modified environments, provide a greater enhancement of biodiversity and long term conservation outcomes. Corridors play an important role in both providing habitat and assisting in wildlife movement and genetic flow.

Corridors have been identified at different geographical scales by State and local governments. Offsets within Bioregional Wildlife Corridors will be prioritised.

Greenhouse Gas Offset Opportunities

During the offset identification and implementation opportunities to include bio-sequestration of greenhouse gas offsets will be investigated.

Environmental Offset Strategy

Where Will Offsets be Located?

Given the spatial extent of the Project and its various components, it is proposed that offset properties will be largely located within 100km of the study area as defined in the EIS.

6.2 Indirect Offsets

Where direct offsets are not possible or practical, the following indirect offsets are being considered:

- actions that reduce threatening processes
- studies that can lead to improved conservation outcomes
- monitoring of populations where there is little current knowledge
- providing financial support to projects in the Project area to improve fish passage.

A number of indirect offset programs are currently being investigated. More details on the nature of these programs will be provided prior to the submission of the offset program. However, Australia Pacific LNG's indirect offset program will integrate with the Western Basin Dredging and Disposal Project, Curtis Island Environmental Management Precinct and/or LNG Projects where practical.

Indirect offsets will be especially relevant for addressing impacts on migratory marine species such as turtles and dugongs.

7. Proposed Approach to Offset Staging

Development of the Project will occur over a 30 year development timeframe and as such the exact location of clearing activities for some components of the Project is yet to be determined. As a result of the uncertainty surrounding the quantification of potential impacts, it is proposed that offsets required in accordance with relevant offset policies for the gas fields component of the Project will occur in five year increments as per the five year Operational Plans. This staged approach will facilitate provision of suitable offsets in a manner that maximises success and benefit and meets the timing requirements of the Project while incorporating the incremental and long-term nature of the Project.

The implementation of the initial offset package for the Project will be supported by a process of measuring and accounting direct impacts against offsets provided. For each subsequent five year development program, it is proposed that an offsets package is developed to offset direct impacts (balancing any shortfall or overrun in offset areas already provided) at least 12 months in advance of the commencement of significant construction works¹⁰.

The same values are proposed to be offset applying the same multipliers for each subsequent offset proposal. This approach will provide significant incentive for Australia Pacific LNG to develop and/or adopt new technologies to reduce the direct impacts in the Gas Fields.

A Reconciliation Statement presenting information about offsets and direct impacts for the whole of the Project will be developed annually and submitted to the Queensland Coordinator-General and relevant State and Commonwealth administering authorities.

The offset multipliers proposed for this Project are consistent with the intent of the Queensland Government Policy for Vegetation Management Offsets (2009) relating to the *Vegetation Management Act 1999* (VM Act) and *Nature Conservation Act 1992* (NC Act) and the Commonwealth *Draft Policy Statement: Use of environmental offsets under the EPBC Act* (Draft Policy Statement 2007). The table below presents proposed multipliers.

¹⁰ It is proposed that significant construction works be defined as assembly and commissioning of pipelines or export facilities but exclude earthworks and clearing. This will allow exact footprints to be better defined prior to finalisation of offsets.

8. Recommended Offset Multipliers for Direct Offsets

While it is recognised that multipliers applied to areas requiring offsets will be negotiated on a case by case basis (and will include a potential reduction in the scale of multipliers through the consideration of indirect offsets) this section provides proposed multipliers for different offset types. Relevant offset policies identify that lower offset multipliers are appropriate where offsets (among other things) have similar or higher conservation values and achieve strategic outcomes.

The following table provides proposed multipliers for DERM assessed and DSEWPaC assessed offsets and are subject to a review process prior to finalisation.

Table 9 – Offset multipliers

Environmental value	Proposed multiplier	Multiplier source
VM Act Endangered Regional Ecosystem	2	Policy for Vegetation Management Offsets (VMO Policy)
VM Act Of Concern Regional Ecosystem	2	
NC Act Essential Habitat	1	DERM consultation
EPBC Act Threatened Ecological Communities	8-10	As per recent publicly available DSEWPaC approval conditions for other LNG proponents
EPBC Act listed Flora Species	6*	
MNES threatened species habitat	1	

* based on area or number of individuals impacted. Offset may be obtained through propagation and planting and / or managed recruitment.

MNES = Matters of National Environmental Significance

9. Preliminary Availability of Suitable Offset Sites

9.1 Terrestrial

Considerable offsetting opportunities exist within the Brigalow Belt Bioregion in relatively close proximity to the Project footprint.

Agricultural land use in the Project area is characterised by beef cattle grazing, and to lesser extents, dry-land cropping, irrigated cropping, and intensive animal production. Cropping mainly occurs on the deep, dark cracking and non-cracking clay soils (particularly of alluvial origin), which are the most productive soils in the region. The area's shallow texture contrast soils are predominantly used for grazing on improved and native pastures, with less fertile areas supporting nature conservation, forestry and/or extensive grazing based on native pastures. In line with the new industrial designation of the Curtis Island Industry Precinct, agricultural land uses on this site are ceasing.

Fertile soils that dominate much of the flatter, low-lying landscape are predominantly cleared for agriculture. Where uncleared, these soils support the remaining patches of threatened communities such as Brigalow (*Acacia harpophylla*) – Belah (*Casuarina cristata*) open forest, poplar box open forest and, rarely, semi-evergreen vine thicket (SEVT).

Preliminary investigations have revealed extensive tracts of regrowth Brigalow throughout the Project area largely consistent with pull and regrow farming practices of pastoralists throughout the region. Pull and grow is a technique pastoralists use to improve soil quality, and enhance fodder production. Brigalow is a leguminous root suckering species that rarely recruits from seedlings in the wild. Pulling Brigalow scrub creates extensive sucker populations. These areas of regrowth Brigalow represent significant offsetting opportunities for the Project.

Potential offset sites have been identified through a spatial analysis process that incorporates the principles outlined in Section 6 followed by individual site inspections. Based on recent offset experience in the Brigalow Belt Bioregion it is likely that there are a significant number of potential offset sites available for the majority of vegetation types.

9.2 Freshwater

Potential opportunities for freshwater fish habitat offsets will be identified in consultation with DEEDI and will be considered on a catchment by catchment basis.

9.3 Marine

Potential marine offset sites are available in the Curtis Island Environmental Management Precinct and Port Curtis/Fitzroy River region. Offset sites can be located so as to enhance the values of declared Fish Habitat Areas (potentially including Fitzroy River, Corio Bay, Cawarral Creek, Baffle Creek and Kolan Fish Habitat Areas) and the Great Barrier Reef World Heritage Areas. While these sites are suitable for meeting offset policy requirements, confirmation of use for offsets will be subject to negotiations with landholders.

10. Proposed Approach to Offset Management

Individual offset sites will be managed through a legal instrument of protection as outlined in Section 2.3.1. Property Vegetation Management Plans (PVMP) will be developed as attachments to support these legal instruments and will include site specific strategies for management of the offsets sites with the aim of maximising their key ecological values.

PVMPs will be prepared by suitably qualified restoration ecologists utilising an iterative process that involves the land owner, experienced restoration contractors and where needed advice from the department and external technical research institutes. The development of the PVMP will be accompanied by the preparation of a detailed budget for the works that includes an annual cash flow and provision for CPI related price increases. The budget will be verified by the restoration contractors and funds will be managed via a suitably approved offset trust or via the proponent through arrangements approved by regulators.

11. Conclusion

The planning and design of the Project has avoided ecological impacts where possible and has identified numerous mitigation measures for implementation during construction and operation to further minimise impacts. Through the assessment process and after the application of relevant mitigation measures it was determined that where impacts were still significant the impacts would be offset. It is anticipated that these offsets will provide a long-term net ecological benefit.

As outlined in this document Australia Pacific LNG are proposing to develop offsets in accordance with the intent of relevant State and Commonwealth offset policies.