7 TERRESTRIAL ECOLOGY

7.1 INTRODUCTION

This chapter of the Queensland Curtis LNG (QCLNG) Project's supplementary environmental impact statement (EIS) addresses terrestrial ecology related submissions received about the Pipeline Component of the draft EIS. In addition to addressing submissions, this chapter also discusses the findings of additional studies and field assessments undertaken since the release of the draft EIS. These additional studies have been conducted to both supplement the terrestrial ecology information presented in the draft EIS and to assess potential impacts that may arise from amendments to the Project description of the Project's Pipeline Component.

The amendments to the Project description are detailed in *Volume 2*, *Chapter 12* of the sEIS. In summary, the key amendments to the Project description include:

- refinements to the alignment and route of the Export Pipeline and the Collection Header
- increase and decrease of the corridor width of various sections of the Collection Header
- aligning of the Export Pipeline through the Callide Infrastructure Corridor State Development Area (CICSDA)
- removal of the Fairview Lateral from the scope of the sEIS
- addition of the Woleebee Creek Pipeline to the Project description.

7.2 RESPONSE TO SUBMISSIONS

Table 4.7.1 provides a summary of the responses to the terrestrial ecology submissions received for the Pipeline Component of the Project. The last column of the table either outlines the response or indicates where in this chapter or elsewhere in the sEIS, the comment is addressed.

Table 4.7.1 Summary of Terrestrial Ecology Submissions on the Draft EIS

Summary of Submission	Response	Submitter
Concerns were raised in regards to the spread of weeds along the pipeline alignments. Vehicle wash downs were suggested at every property boundary. The proponent should develop strategies for regular monitoring and control of weeds during the operation phase of the pipeline. The management strategies should be weed species specific. The proponent should clarify the meaning of ''designated weed wash down area'' as council advises that all vehicles, equipment and portable infrastructure, will still be required to wash down at established shire facilities, by a trained weed inspector prior to arrival and leaving the shire. Council would also expect Weed Hygiene Declaration Certificates and Wash down Certificates to be utilised by the proponent. Council expects a full weed management plan to be developed especially for the construction and operational stages of the development and that this weed management plan be a condition of contract for constructors.	The environmental management plan (EMP) will form the basis of the environmental authority conditions and QGC is including conformity with this document and all conditions in its contracting strategy. The response is detailed in *Section 7.2.1*.	1, 28
Provide additional information on all offset areas as a result of the construction of the LNG Plant and Pipeline works. The proposed offsets should meet the requirements of the Queensland Government Environmental Offsets Policy (QGEOP) and all relevant specific issue offset policies.	Refer to the Submission on Vegetation and Biodiversity Offsets in *Appendix 2.3.*	23, 32 (4)
The council proposes a condition that areas where vegetation cover is reduced to less than 10 per cent are rapidly revegetated and stabilised to prevent loss of soil and ecosystem integrity. Furthermore, the council wishes to see rapid ecosystem establishment along the Pipeline to facilitate maximum opportunity for stabilising the terrestrial and aquatic ecosystems that may be disrupted during construction of the Pipeline.	As outlined in *Volume 4, Chapter 7, Section 7.4.1* of the draft EIS all disturbance to vegetation as a result of the Project will be rehabilitated as soon as practicable. Rehabilitation measures are outlined in *Volume 3, Chapter 7, Section 7.6.3* and *Volume 4, Chapter 7, Section 7.5.2* of the draft EIS.	25
The sEIS should address the impacts to fauna in both the development and operational phases of projects including potential for species composition changes due to fragmentation and edge effects, management of fauna mortality, loss of access and corridors, and use of fencing material.	Refer *Section 7.2.2*.	32 (17)

Summary of Submission	Response	Submitter
The final route of the Export Pipeline should be surveyed, to the extent that the route varies from what was assessed for the draft EIS.	The current Export Pipeline alignment has now been fully assessed. These surveys include a detailed walk-through flora and fauna habitat survey undertaken between KPs 0-300 and the assessment of watercourses and regrowth areas along the proposed extension of the Callide Gladstone Corridor (approx KPs 311 and 350 along the Export Pipeline). Note that if necessary, further flora and fauna surveys will be conducted within the CICSDA once the final route has been selected and supplied by the Department of Infrastructure and Planning (DIP). Ecologists will re-survey any future realignments from the surveyed route within native vegetation areas prior to commencement of construction.	32 (91)
Reference should be made to least concern, near threatened, rare, vulnerable, endangered wildlife and Department of Environment and Resources Management (DERM) Back on Track species prioritisation process.	Throughout the sEIS the term EVR has been used to describe all species listed under the *Environment Protection and Biodiversity Conservation Act* (*EPBC Act*) *1999* (Cth) as extinct in the wild, critically endangered, endangered, vulnerable, and conservation dependent and under the *Nature Conservation Act* (*NC Act*) *1992* (Qld) as extinct in the wild, endangered, vulnerable, rare, and near threatened. The DERM Back on Track species prioritisation framework has been referenced and will be used in the creation of management plans for any relevant species that may be impacted on by the proposed development. See *Section 7.6* of this chapter.	32 (16)
At least two reference sites should be developed from which to develop benchmarks, and to provide ongoing reference for environmental management and rehabilitation activities. The sites should be selected to represent the major natural ecosystems being significantly impacted on by the Project, and should be sufficiently removed from the Project to be unaffected by the Project's activities. The sites should be monitored at the same intervals and with the same methodology as that used for on-site monitoring.	Monitoring sites will be established within the major vegetation groups transacted by the pipelines, as benchmarks to be used in monitoring environmental management and the progress of revegetation and rehabilitation. Monitored development sites and reference sites will be chosen in similar habitats and monitored using the same methodology so as to control variables that may otherwise bias results and render the comparison invalid. In addition, habitats proposed as offsets will also be monitored in order to track their rehabilitation and biodiversity status. Detailed monitoring programs will be developed and form a separate Monitoring Plan for both the Gas Field and Pipeline Components of the Project.	32 (97)

Summary of Submission	Response	Submitter
Details should be provided in relation to the proposed strategy and methodologies to be employed on rehabilitation works. This detail should include an indication of specific performance measures, thresholds and monitoring for determining the success of proposed rehabilitation works.	Rehabilitation measures are discussed in *Volume 4, Chapter 7, Section 7.5.2* of the draft EIS. A detailed Monitoring Plan will be developed prior to construction and implemented in order to monitor the success of rehabilitation and help identify where rehabilitation procedures require modification. Monitoring sites will be established in disturbed and adjacent undisturbed sites to allow comparisons to be made, while controlling for variables relating to factors other than the Project activities. Monitoring sites will also provide data on changes occurring in disturbed areas over time. Monitoring of disturbed areas will continue until success thresholds are achieved or cessation of monitoring is otherwise justified (e.g. effective soil stabilisation achieved). The Project's revegetation performance objective is to achieve 50 per cent of native and/or exotic pasture ground covers of adjoining areas within two years.	32 (106)
DERM environmentally sensitive areas to be included for assessment should reflect those identified in *Section 25* and *26* of the *Environmental Protection Regulation 2008*, and the attached list of category C sensitive areas. The presence of all ESA's should be mapped and the management of each type addressed.	The QCLNG draft EIS considered all Category A and B environmentally sensitive areas (ESAs) as prescribed in s25 and 26 of the *Environmental Protection Regulations* (*EP Regs*) *2008* (Qld) and the category C Areas as identified by DERM ESA mapping. The draft EIS identified all of these ESAs within proximity to the Project and discussed the management of these areas (See *Section 7.11*, *Appendix 4.2* of the EIS). QGC recognises that some of the Category C areas that were identified in the list supplied by DERM in response to the draft EIS were not addressed. These were the areas not codified in legislation or available through DERM's online mapping service or provided in the Project's Terms of Reference. The same approach that was taken in the draft EIS will also be used in the sEIS with respect to Category C areas. Any additional impacts on ESAs that may arise due to a change in Project design since the release of the draft EIS have been identified and discussed in *Section 7.3.4* of this chapter.	32 (35)

Summary of Submission	Response	Submitter
Commitments to minimising impacts on native flora and fauna and application for the clearing of native plants are required to be consistent with the requirements of the *Nature Conservation Act 1992*. If necessary, an offset proposal for the clearing of endangered, vulnerable, rare and near threatened plant species should be provided.	QGC has (for its existing operations) and will continue to put in place mitigation measures to minimise impacts on native plants. As was provided in *Volume 3*, *Chapter 7*, *Section 7.6.1* of the draft EIS, pre-clearance surveys will be undertaken for every proposed road, well pad and pipeline to enable detection and avoidance of significant flora and fauna values. For the Pipeline, areas of remnant vegetation impacted on by the Pipeline construction corridor will be minimised wherever practicable. Pre-clearance surveys have been and will continue to be undertaken to detect, record and, if necessary, translocate any EVR plant species that may occur along the final pipeline alignment (see *Volume 4*, *Chapter 7*, *Section 7.5.2* of the EIS). To minimise impacts on native fauna, fauna handlers will be present and as necessary, relocate wildlife immediately prior to and during clearing activities. During Pipeline construction qualified fauna spotters and handlers will survey the open trench, record and remove any trapped fauna species. Such surveillance will occur along the entire length of the trench (See *Volume 3*, *Chapter 7*, *Section 7.6.1* and *Volume 4*, *Chapter 7*, *Section 7.5.2* of the draft EIS). QGC recognises that it may be required to obtain approvals under the *Nature Conservation Act 1992* prior to clearing any native plant species. QGC has commenced and will continue negotiations with DERM on this matter. QGC proposes a suitable offset for all potential impacts on endangered, vulnerable, rare or near threatened species as listed under the *NC Act*. For further details please see the Submission on Vegetation and Biodiversity Offsets presented in *Appendix 2.3.*	32 (14)
Large habitat trees must be left wherever possible, in particular along watercourses.	Where native vegetation (including riparian vegetation) is required to be cleared, large trees that provide habitat for a number of fauna species will be avoided and retained wherever possible.	34

7.3 WEED IDENTIFICATION AND MANAGEMENT

Weed surveys will be carried out prior to the commencement of construction activities (this has already occurred for the majority of the Export Pipeline) to ensure that the various species of concern have been identified and their locations mapped. This mapping will be completed once the alignment for the Queensland Government's proposed common infrastructure corridor (CICSDA) is confirmed. The finalised mapping will be taken into consideration in the overall Weed Management Plan.

The weed survey will also assist in planning pre-spraying programs to minimise the likely presence of weed species along the RoW and any access tracks. QGC will be carrying out a full review of weed wash down requirements for the entire Project. Where local facilities are available and have the capacity to handle the size and volume of equipment used by the Project these will be utilised. Where required, temporary wash down facilities will also be constructed at strategic locations (e.g. camp sites) along the Pipeline route based on the direction and flow of construction.

Normally large plant and equipment that can take several days to clean down correctly are cleaned at entry to the Pipeline RoW. In pipeline construction it is not possible to do full wash downs at every property boundary as some of the plant and equipment may take up to four days to clean down completely. This plant and equipment would not normally be washed down again until the end of construction but would travel along the cleared RoW where it would not encounter any viable weed material.

In addition, a pre-spraying program would be undertaken along the RoW to assist in weed hygiene management.

Weed inspections will continue on a regular basis as part of the overall Pipeline operations and maintenance program. A Weed Management Plan will be developed prior to construction and will include the use of licensed weed control contractors. Weed hygiene certification would be required as part of the Weed Management Plan.

Landholder requirements in relation to the movement of pipe trucks, plant, equipment and other vehicles will be agreed as part of the land access negotiation agreements.

Local Government Area Pest Management Plans have been sourced and will be used in finalising the Weed Management Plan. It will be a contractual condition with construction and operations companies that their own weed mnagement plans be prepared, in accordance with company and local government requirements, and conformed with.

7.4 FAUNA PROTECTION AND IMPACT MITIGATION

The construction of the Pipeline and Gas Field infrastructure will require some clearing of vegetation which will result in habitat fragmentation for some fauna species. One of the effects of such clearing is the potential change in the fauna composition. Some bird species (e.g. noisy miner, *Manorina malanocephala*) are found preferably in heavily disturbed and degraded patches of forest where the understorey has been grazed (e.g. Grey *et al*. 1997, 1998). In fragmented remnants these more adaptable birds also display very aggressive behaviour and actively exclude other smaller bird species (Grey *et al*. 1997, 1998, Maron, 2009). As a result, the species composition of avifauna and other fauna groups subject to clearing can potentially be altered.

However, the clearing footprint for the Pipelines is relatively small compared with the effects of grazing and inappropriate fire regimes which have already substantially altered most of the vegetation communities within the study area. As such, the changes to species composition due to construction of the Pipelines is most likely negligible.

Birds such as Noisy Miners, Crows, Magpies are already established in abundance in all areas visited during the fauna surveys including State Forest areas and it is not expected that any increase in the distribution of abundance of these species will be attributable to the Project.

The creation of further access roads in the proposed Project area may increase the risk of animal mortalities (livestock or native fauna) due to increased vehicle movements during both construction and operational phases.

Road kills will be monitored, being recorded by construction and operations personnel who will be instructed to report fauna/vehicular impact, and mitigations will be implemented where required. Mitigations will include reduced speed limits, signage and restriction of traffic to daylight hours where possible.

There are no locations where the concentration of wildlife movement and traffic loads would justify provision of underpasses, overpasses or glider poles. However, glider poles or special walkways for koalas to safely negotiate roads and fences could be implemented if a specific location is found by the monitoring to have a significant road mortality risk.

Any clearing of vegetation has the potential to create a barrier to wildlife movement. Some small mammals and birds may be deterred from crossing cleared zones and also suffer greater predation. Small ground-dwelling animals, which are generally less mobile, such as burrowing reptiles and amphibians can be more sensitive to barrier effects, while highly mobile species (e.g. birds and bats) are less likely to be affected.

In almost all cases, the relatively narrow clearances required for roads and pipelines will create only minor barriers. In some cases however, where site clearances identify the potential for more serious impacts (for example, where

EVR species or habitat trees are identified), special measures will be adopted to manage these. Measures will include:

- minimal clearance of vegetation
- re-routing to avoid critical areas (e.g. EVR plant species)
- replacement of litter and mulched vegetation as cover, along roadside verges and across pipelines.

It is highly unlikely that the dispersed nature of the development will create significant barriers to the movement of species such as gliders or koalas. However, glider poles or special walkways for koalas to safely negotiate roads and fences could be implemented if a specific location is found by the monitoring to have a significant road mortality risk.

Where fencing is required within the Project area, the use of barbed wire fences will be negotiated with the landholder and avoided if possible. QGC will use only non-barbed wire in areas where species such as gliders and larger bats are likely to occur (i.e. Yellow-bellied Gliders in tall Spotted Gum forests (i.e. *Corymbia citriodora*), near identified sap feeding trees).

The only exception may be where a landholder requires barbed-wire fencing to replace existing barbed-wire fencing.

Volume 4, Chapter 7, Section 7.5.2 of the draft EIS describes the mitigation measures to be implemented during the Project's life. These include measures for minimising and offsetting impacts to fauna through revegetation, weed management, fire management and reduced infrastructure placement in areas of high conservation value.

Rehabilitation activities after the cessation of Project activity, aimed at restoring habitat values, include the following:

- the breaking up of hardened surfaces and restoration of natural surfaces and contours unless the landholder wishes the road to remain
- re-seeding with local native flora, where appropriate
- the re-spreading of vegetative material over cleared areas
- regular monitoring of regeneration on a monthly basis for six months and then biannually for a further two years.

7.5 ADDITIONAL STUDIES AND FIELD ASSESSMENTS

Additional terrestrial ecology studies and field assessments that have been undertaken since the release of the draft EIS include:

- a detailed flora and fauna habitat walk through survey of the Export Pipeline alignment
- field surveys of all vegetated creek crossings traversed by the CICSDA

- desktop analysis of environmental values present along the Woleebee Creek Pipeline corridor.

For a full description of the methodology and findings of these studies refer to *Appendix 4.1* of this sEIS.

7.6 EXPORT PIPELINE FIELD ASSESSMENT

A flora and fauna habitat walk-through survey between approximate KPs 0 and 300 of the Export Pipeline was undertaken over a total of 15 days in September-November 2009.

This field survey involved the walk through of all vegetated areas along the alignment to detect the presence of any EVR flora species and significant habitat features. Co-ordinates of all observed EVR flora species were recorded and the alignment was modified where possible to avoid significant habitat features.

This survey confirmed that the majority of the areas that are to be traversed by the proposed Export Pipeline alignment are cleared grazing properties.

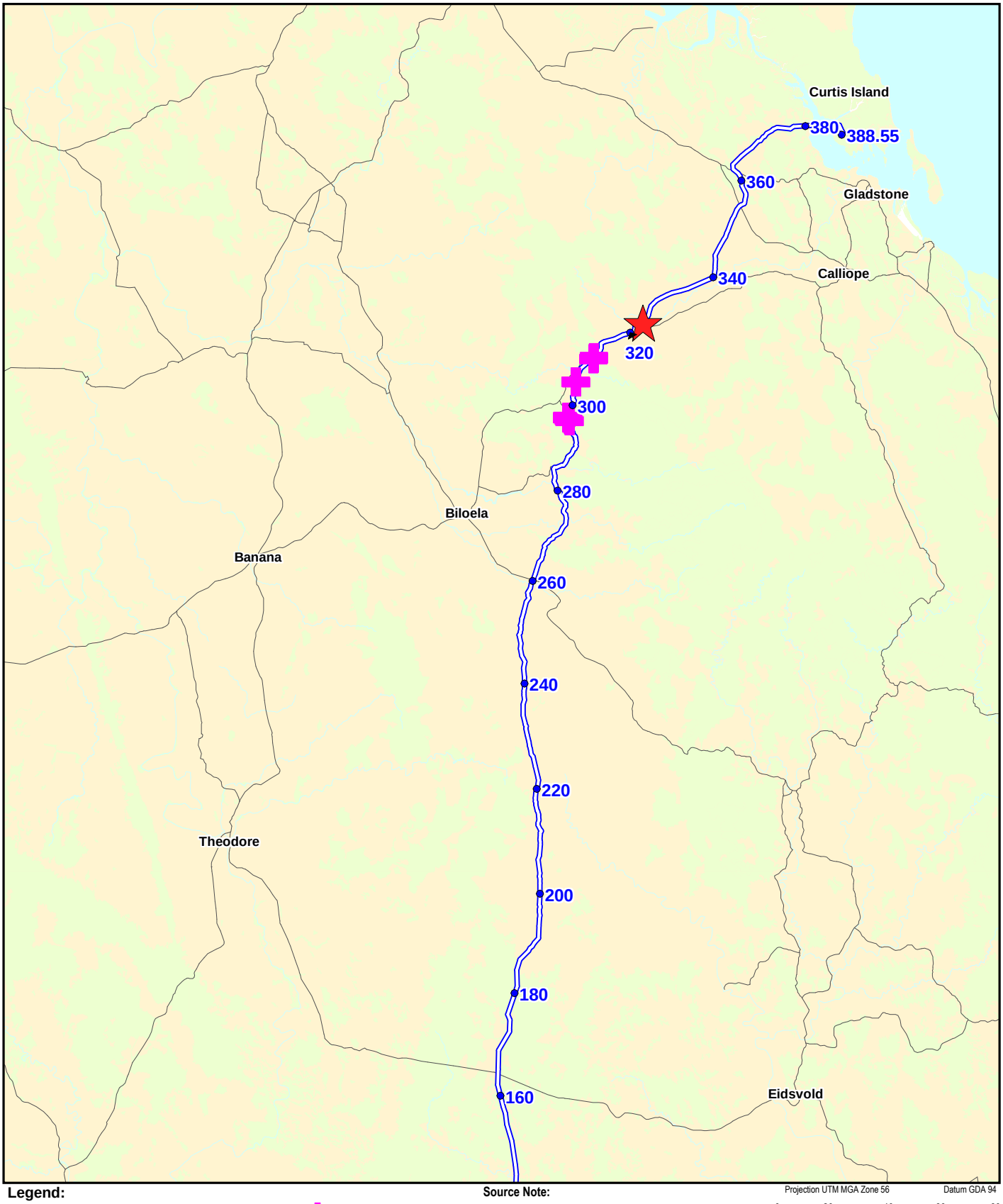
The flora species *Cycas megacarpa* (Large-fruited Zamia) was the only EVR species recorded along the Export Pipeline corridor. This species is listed as endangered under both the EPBC Act and the NC Act. Approximately 150 individuals of this species were recorded within the Export Pipeline corridor across three locations. The approximate locations of these populations are KP 297, 305, and 310 (*Figure 4.7.1*). GIS co-ordinates have been recorded for all individuals/groups within the corridor footprint.

No other EVR or regionally significant species were observed along the Export Pipeline.

7.7 CICSDA FIELD ASSESSMENT

As discussed in *Volume 2, Chapter 12, Section 12.3,* QGC has been in negotiation with the Department of Infrastructure and Planning (DIP) in relation to the co-location of infrastructure within the CICSDA. There has also been some consideration and preliminary investigations to extending the joint corridor as far south as to the Callide Range. As part of these preliminary investigations QGC along with other interested proponents, undertook a flora and fauna survey along the proposed extension of the CICSDA.

This survey was conducted between approximate KPs 311-350 of the Export Pipeline on the 7-8 September 2009. The purpose of this survey was to assess the condition and flora/fauna of vegetated areas (which are restricted to watercourses) to be traversed by the proposed extension of the CGC. This survey also confirmed the presence and condition of some areas mapped as



Legend:

- Export Pipeline & 20 Kilometre Point
- Woleebee Creek Route & 20 Kilometre Point
- Upsteram Infrastructure Corridor & 20Km Point
- Cycads survey points
- Squatter Pigeon location

Source Note:
1:250,000 Topographic vector copyright Geoscience Australia

Projection UTM MGA Zone 56 Datum GDA 94

0 20 40 60 80

Kilometres

N

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Project	Queensland Curtis LNG Project
Client	QGC - A BG Group business
Drawn	Mipela
Approved	CDP
Date	02.12.09
sEIS Volume 4 Figure	S4.7.1
File No	EO5-P-MA-96227
Revision	Supplementary

Title **Cycads points overview and Squatter Pigeon location.**

significant regrowth under the Queensland *Vegetation Management Act 1999 (Qld)* (VM Act). The locations of the field survey sites that were assessed within the corridor are shown in *Figure 3, Appendix 4.1* of the sEIS.

The areas surveyed were generally found to be heavily grazed with few patches of remnant vegetation remaining. Several weed species such as *Camara lantana* (Lantana) and *Cryptostegia grandiflora* (Rubber Vine) were observed.

The remnant vegetation observed was generally restricted to ephemeral watercourses and consisted mostly of eucalypt-dominated canopy with *Callistemon viminalis* common in the shrub layer. Several large eucalypt trees with hollows and logs and branches on the ground were recorded. These trees and vegetation debris could provide habitat for a number of fauna species. Overall, the condition of the vegetation that was observed was average.

The EVR fauna species *Geophaps scripta scripta* (Squatter Pigeon) was recorded at approximate KP 322 along a dry watercourse (See *Figure 4.7.1*). This species is listed as vulnerable under both the *EPBC Act* and the *Nature Conservation Act.*

7.8 WOLEEBEE CREEK PIPELINE ASSESSMENT

As a result of land access constraints and continual refinements to the Woleebee Creek Pipeline alignment, to date the assessment of this proposed pipeline has been limited to a desktop assessment. A detailed survey of this alignment will take place prior to alignment finalisation and commencement of the Project.

7.8.1.1 Desktop Analysis

The Woleebee Creek pipeline traverses mostly cleared, grazing country but also a few remnant vegetation communities dominated by eucalypt species.

A review of the Queensland Herbarium mapping identified nine regional ecosystems as transected by the Woleebee Creek Pipeline route (*Figure 4.7.2*).

The proposed Pipeline alignment has been designed so as to minimise impacts on areas mapped as remnant vegetation, in particular any areas threatened under the *EPBC Act* and/or endangered or of concern under the *Vegetation Management Act*. The majority of the remnants that cannot be avoided occur on the eastern portion of the alignment between KPs 44.5 and 50, and KPs 53.8 and 54.6 and are listed as not of concern under the *VM Act*.

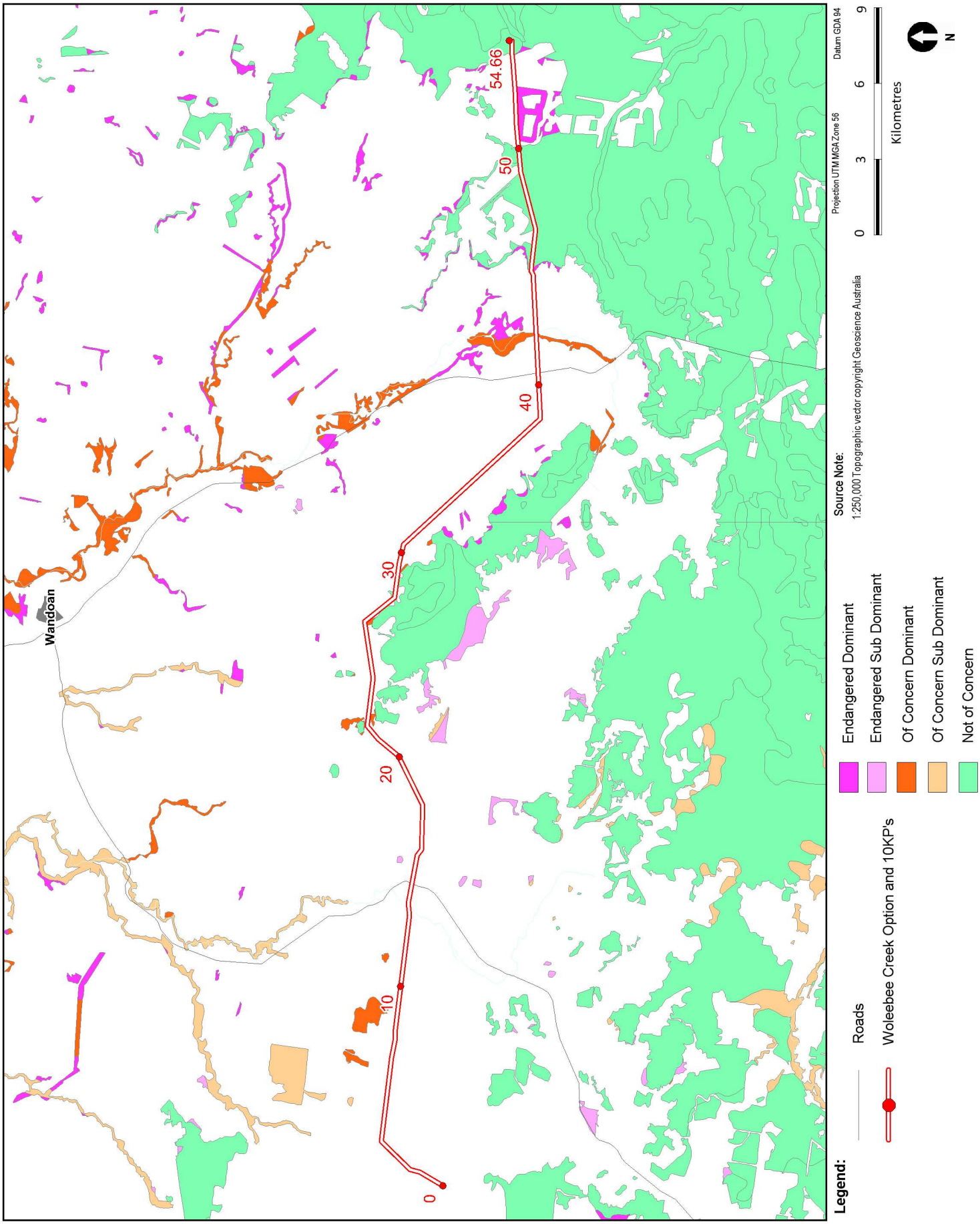
The proposed Pipeline crosses one thin linear strip of RE 11.3.2 (of concern classification) at KP 42.1.

A full list of all regional ecosystems that occur along the proposed Woleebee Creek pipeline route is provided in *Table 4.7.2* below.

Table 4.7.2 REs mapped along the Woleebee Creek Pipeline route

RE	Description	VM Act status	EPBC Act status	Area (Ha)
11.3.2	*Eucalyptus populnea* woodland on alluvial plains.	OC	-	0.41
11.3.25	*Eucaluptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.	NOC	-	0.07
11.5.1	*Eucalyptus crebra*, *Callitris glaucophylla*, *Angophora luehmannii* woodland on Cainozoic sand plains/remnant surfaces.	NOC	-	1.20
11.5.4	*Eucalyptus cerbra*, *Callitris glaucophylla*, *C. endlicheri*, *E. chloroclada*, *Angophora leiocarpa* on Cainozoic sand plains/remnant surfaces. Deep sands.	NOC	-	4.92
11.5.21	*Corymbia bloxsomei* +/- *Callitris glaucophylla* +/- *Eucalyptus cerbra* +/- *Angophora leiocarpa* woodland on Cainozoic sand plains/remnant surfaces.	NOC	-	9.83
11.7.2	*Acacia* spp. Woodland on Cainozoic lateritic duricrust. Scrap retreat zone.	NOC	-	2.65
11.7.4	*Eucalyptus decorticans* and/or *Eucalyptus* spp., *Corymbia* spp., *Acacia* spp., *Lysicarpus angustifolius* on Cainozoic lateritic duricrust.	NOC	-	9.83
11.7.6	*Corymbia citriodera* or *Eucalyptus crebra* woodland on Cainozoic lateritic duricrust.	NOC	-	0.51
11.7.7	*Eucalyptus fibrosa* subsp. *Nubila* +/- *Corymbia* spp. +/- *Eucalyptus* spp. On Cainozoic lateritic duricrust.	NOC	-	2.37

No essential habitat areas or environmentally sensitive areas are mapped as occurring within or in close proximity to the proposed Woleebee Creek Pipeline route.



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Project	Queensland Curtis LNG Project	Title	**Woleebee Creek- Regional Ecosystems**
Client	QGC - A BG Group business		
Drawn	Mipela	**sEIS Volume 4** **Figure** **S4.7.2**	Disclaimer: Maps and Figures contained in this Report may be based on Third Party Data, may not be to scale and are intended as Guides only. ERM does not warrant the accuracy of any such Maps and Figures.
Approved	CDP	File No: E05-P-MA-96226	
Date	02.12.2009	Revision Supplementary	

7.9 REVIEW OF DERM ENVIRONMENTALLY SENSITIVE AREA MAPPING

Environmentally sensitive areas (as mapped by DERM ESA online mapping) that occur within or in the vicinity of the Pipeline corridors generally remain the same as that described in the draft EIS (*Figure 4.7.3*). Note that the only changes arise from:

- alignment of the Export Pipeline through the CICSDA which traverses the Targinie State Forest between KPs 376 and 376.6
- the proposed widening of the Collection Header corridor through Braemar State Forest.

Since the release of the draft EIS the width of the Collection Header corridor has increased in some sections and decreased in others. The section of the Collection Header that passes through the Category C ESA Braemar State Forest (KP 0-5.5) has increased from a width of 80 m to 125 m. This increase in clearing width is a result of refinements to the pipeline corridors which have led to the co-location of gas compression and water treatment infrastructure within this corridor (see *Volume 2, Chapter 12*). For the purpose of conservatively determining clearing impacts the corridors are taken to have a width of 90 m and 135 m respectively.

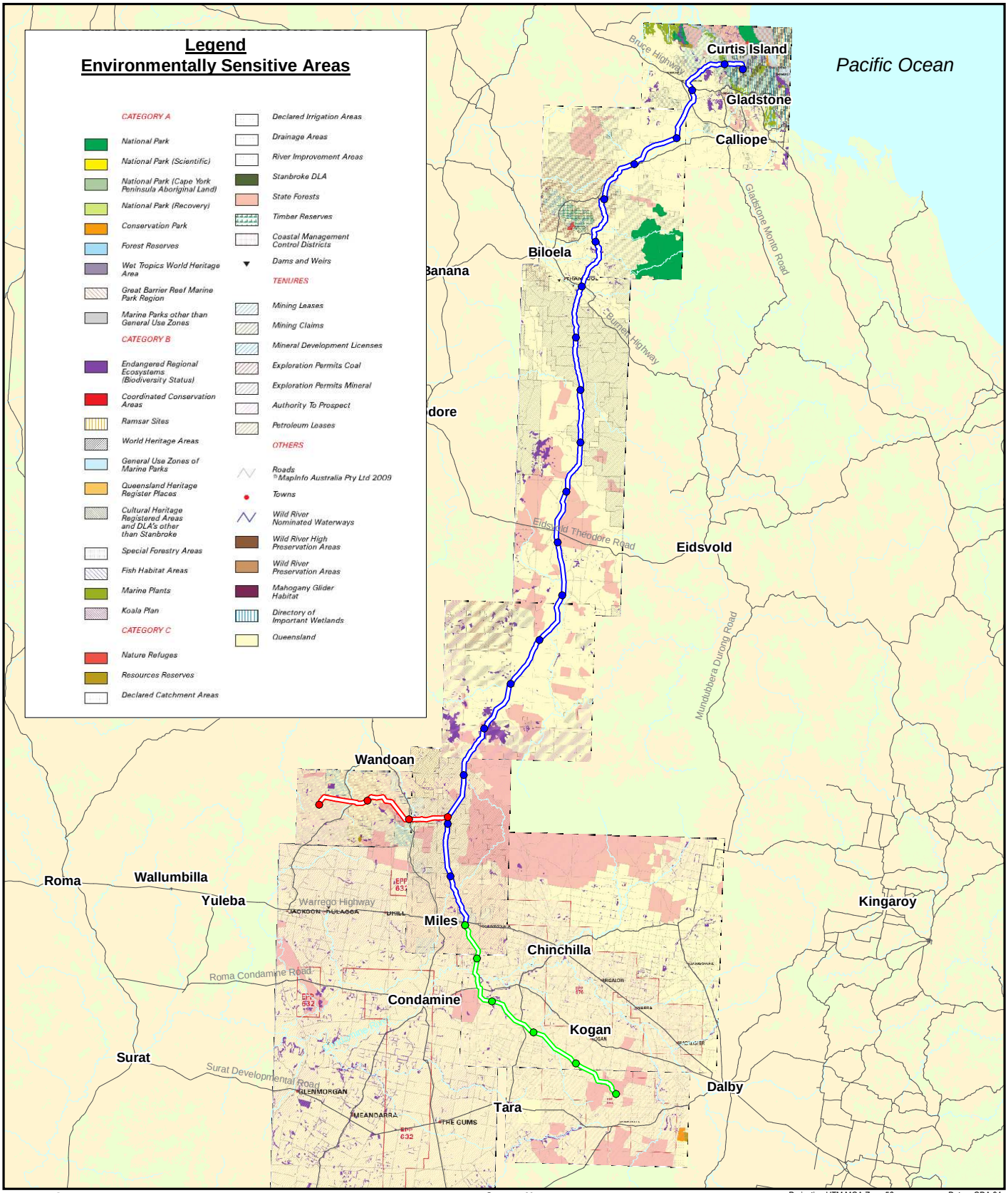
7.10 UPDATE OF TERRESTRIAL ECOLOGY IMPACTS

The following section identifies and discusses the additional potential impacts that could potentially arise from the changes to the design of the Pipeline Component of the Project (described in *Volume 2, Chapter 12)* and/or as a result of cumulative impacts associated with the neighbouring Surat Gladstone Pipeline.

7.10.1.1 Flora Values

7.10.1.2 Clearing of Regional Ecosystems/Ecological Ecosystems

As a result of the addition, removal and refinement of the various pipeline alignments the estimated area of remnant vegetation to be cleared has decreased. The reason for this decrease is a combination of the refinement of the Export Pipeline alignment and the decrease in the corridor width of the northern section of the Collection Header.



Legend:

- Export Pipeline & 20 Kilometre Point
- Woleebee Creek Route & 20 Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point

Source Note:

1:250,000 Topographic vector copyright Geoscience Australia

Environmentally Sensitive Areas raster - EPA

Projection UTM MGA Zone 56 Datum GDA 94

0 20 40 60 80

Kilometres

N

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

Title **Pipelines Overview - Environmentally Sensitive Areas**

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Drawn	Mipela	sEIS Volume 4 Figure	S4.7.3
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Date	02.12.09	Revision	Supplementary

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The figures presented in Table 4.*7.3* provide a comparison of the worst case clearing areas presented in the draft EIS to the current situation (since refinement of the Project design) predicted in the sEIS.

Table 4.7.3 Comparison of the draft EIS and sEIS worst case vegetation loss areas

RE/Ecological community status	Clearing extent Draft EIS (ha)	Clearing extent sEIS (ha)
EPBC listed[1]	17	21
Endangered	18	16
Of concern	105	30
Not of concern	1,339	1,092
TOTAL	**1,462**	**1,159**

Table 4.7.4 provides the potential impacts of the Project on vegetation within a Project area and bioregional perspective.

Table 4.7.4 Worst case vegetation clearing areas along the Pipeline alignments

RE/Ecological community status	Clearing extents (Ha)	Extent within 5km (Ha)	% of that within 5km to be cleared	Extent in bioregion	% of that within bioregion to be cleared
EPBC listed[1]	12	4,642	0.26	389,100	0.003
Endangered	13	4,581	0.28	377,147	0.003
Of concern	24	8,949	0.27	1,450,717	0.002
Not of concern	918	211,937	0.43	6,952,193	0.013
TOTAL	**967**	**230,110**	**0.42**	**9,169,158**	**0.011**

1. EPBC listed communities are overlapping (and not additional to) VM Act REs

The actual area of clearing for the proposed Pipeline is likely to be lower than this estimate, as:

- the RoW may be able to utilise existing cleared infrastructure corridors through remnant vegetation (at least in part)
- Pipeline construction will not require clearing of the full 50 m clearance width (50 m, 90 m and 135 m for the Collection Header) used in these calculations.

1 EPBC listed communities are overlapping (and not additional to) VM Act REs

7.10.1.3 EVR Flora Species

Since the release of the draft EIS the proposed Export Pipeline alignment has been refined to avoid, wherever practicable, all EVR flora species that were identified during the detailed flora surveys. Note that the Export Pipeline alignment may not be able to avoid some impacts on the endangered flora species, the cycad *Cycas megacarpa* (Large-fruited Zamia) which was observed at approximate locations KP 297, 305, and 310 along the Export Pipeline alignment. Approximately 150 Zamia plants were observed within the Pipeline corridor and some thousands of individual plants occur spread along the slopes on either side of the proposed alignment. Due to this species' restricted habitat niche being along the ranges that the Pipeline will have to cross, clearing/disturbance of up to approximately 150 Zamia plants is likely to be required.

In 2007 the Queensland Herbarium found that the total number of adult *Cycas megacarpum* within Queensland was greater than 372,900 individuals. In comparison to this number and the numbers of Zamia plants immediately adjacent to the proposed corridor the total individuals to be affected by the Project are unlikely to lead to a long-term decrease in population size and/or fragment an existing population into two or more populations. It is therefore considered that the proposed action will not have a significant impact on this species. Regardless, a Threatened Species Management Plan will be developed in accordance with the guidelines proposed by the Draft Cycad Recovery Plan (Forster & Holland 2005).

For a full discussion of the potential cumulative impacts and the measures that will be implemented to mitigate impacts on this species see *Section 7.5* and *Section 7.6.*

7.11 FAUNA VALUES

7.11.1.1 EVR Fauna Species

The only EVR fauna species that was observed within the study area since the release of the draft EIS is the Squatter Pigeon (*Geophaps scripta scripta*). This species, listed as vulnerable under both the *EPBC Act* and *NC Act*, was observed at approximate KP 322 along the CGC.

This bird species is nomadic, highly mobile and occupies a very large home range. Given the small amount of remnant vegetation to be cleared by construction of the Pipeline corridors compared to the actual distribution range of that species, no significant impact is considered to be likely.

7.11.1.2 Habitat Values

The shared CICSDA traverses cleared pasture lands with native vegetation occurring in the creeklines as described in *Section 7.3.2*. Within the creeklines, the understorey is heavily grazed, however, there are fallen trees which may provide habitat for some fauna species. Callistemons and eucalypts in these creeklines appear to provide nectar sources for birds and at the time of the survey many species were seen to be feeding along the creeks. As these creeks contain linear vegetation in an otherwise cleared landscape, they do provide some local wildlife movement corridor values.

Overall however, due to the small and relatively fragmented nature of these creek habitats, fauna habitat values are considered to be medium to low.

7.12 ENVIRONMENTALLY SENSITIVE AREAS

All potential impacts to any ESAs (as mapped by DERM ESA online mapping) that occur within or in the vicinity of the Projects pipeline corridors are generally the same as those which were presented in *Appendix 4.2* of the draft EIS. Note that the only changes to this position arise from the location of Common User Infrastructure Corridor and the refinement of the Collection Header route.

The Common User Infrastructure Corridor traverses Targinie State Forest at KP 376 for approximately 600 m. RE mapping indicates that this area is generally made up of *Corymbia citriodora* and *Eucalyptus crebra* woodlands (RE 11.11.3) which are listed as not of concern. Impacts in this area are likely to be fragmentation of the northern section of the State Forest and loss of woodland habitats. The area was not visited during the ground survey conducted along the CICSDA and will be surveyed once the final location is confirmed by the State Government.

The co-location of infrastructure within the Collection Header will result in an increase to the corridor width and therefore may increase clearing within Braemar State Forest. The majority of clearing would occur in the not of concern mixed community RE 11.7.6/11.5.4 (*Corymbia citriodora* and *Eucalyptus crebra* woodland). No EVR flora is known within this area and impacts to fauna would be similar to those already described in the draft EIS (i.e. loss of habitat and fragmentation effects). Detailed (walk-through) ecological surveys will be completed prior to final alignment selection.

Some sections of the proposed corridor follow an existing cleared corridor to minimise the impacts from this additional clearing in these areas.

From an ecological perspective, the width of clearing through the Braemer State Forest, or the creation of separate easements would increase the extent of habitat fragmentation, increase edge effects such as weed infestation and would facilitate predator access across a wider area of the State Forest.

The widening of the Collection Header corridor within the Braemer State Forest whilst this is not a desirable ecological outcome, is not expected to significantly alter the findings presented in the draft EIS in relation to the overall significance of potential impacts of the QCLNG Pipeline on ESAs.

7.13 CUMULATIVE IMPACTS

Since the release of the draft EIS, an additional project located in close proximity to the pipelines proposed for the QCLNG Project has lodged its EIS with DIP. The Surat Gladstone Pipeline Project originates in the Surat Basin and runs approximately parallel to the southern portion of the Collection Header and the Export Pipeline before it crosses The Narrows to Curtis Island.

Any cumulative impacts that may result from the Surat Gladstone Pipeline Project and the QCLNG Pipelines will depend upon the final alignments selected and the nature of the vegetation traversed. However, according to information provided in the Surat Gladstone Pipeline Project EIS, the proposed alignment passes through similar vegetation and topography to the QCLNG Export Pipeline. The long-term cumulative impacts from both projects are likely to be similar to those proposed for each individual projects, that is some loss of vegetation/habitat and fragmentation within contiguous expanses of remnant vegetation generally through a largely pre-disturbed landscape.

Overall the combined clearing extent of endangered and of concern regional ecosystems common to both projects does not significantly increase the total clearing extent for the QCLNG Pipeline Project alone.

There are cumulative impacts on *Cycas megacarpa*, an *EPBC Act*-listed endangered plant species found on the spurs and ridges of the Calliope Range (*Table 4.7.5*). Indeed, the combined loss for this species equates to 300 individuals, however, this represents only 0.08 per cent of the total *Cycas megacarpa* population and some thousands of individuals will still be retained in the vicinity of the impacted Zamias.

Table 4.7.5 Cumulative impacts on Cycas megacarpa

	Surat to Gladstone Pipeline Project	QCLNG Pipeline Project	Total
Cycas megacarpa loss	150	150	300
% of total population (370,000)	0.04	0.04	0.08

Provided that both projects develop mitigation measures to minimise impacts on remnant vegetation and key fauna habitats as well as providing offsets for unavoidable impacts, cumulative impacts are projected to be minor. Additionally, the co-location of pipeline infrastructure within the CICSDA will reduce the cumulative impacts of multiple pipeline projects between the Callide Range and Gladstone.

Mitigation measures that QGC will put in place to minimise impacts on *Cycas megacarpa* are provided in *Section 7.6*.

7.14 MITIGATION

Mitigation measures proposed in the draft EIS are believed to be adequate to flora and fauna values identified to date. Where avoidance is not possible, offsets will be proposed. The submission for vegetation and biodiversity offsets (refer below and *Appendix 2.3* provides additional information on the QCLNG proposed offsetting program.

The flora species *Cycas megacarpa* will require additional consideration and management measures to minimise impacts on this species. Wherever practicable, the proposed Export Pipeline has been aligned so as to minimise impacts upon this species. Where avoidance is not possible a Threatened Species Management Plan that proposes specific remedial actions will be developed.

This management plan will be developed in accordance with the guidelines proposed by the Draft Cycad Recovery Plan (Forster and Holland 2005). The plan will identify overall goals, such as no net loss of viable populations and experts will be consulted throughout the development of appropriate remedial measures.

Offsets will be proposed for all unavoidable impacts on the Large-fruited Zamia in accordance with agency requirements and the submission for vegetation and biodiversity offsets (refer to *Appendix 2.3*).

7.15 OFFSETS

The Project Draft Vegetation and Biodiversity Offset Strategy in *Appendix 2.3* discusses the extent and type of vegetation and biodiversity offsets proposed by QGC. *Section 7.7* of *Volume 3* provides an introduction to the submission.

It should be noted that offsets will only ever be considered as a last resort mitigation measure. Avoidance and/or onsite mitigation measures for any disturbance to native vegetation will always be preferred.