7 TERRESTRIAL ECOLOGY

7.1 INTRODUCTION

This chapter of the Queensland Curtis LNG (QCLNG) Project's supplementary environmental impact statement (sEIS) addresses all the ecology related submissions that were received in regards to the Gas Field Component of the Project. In addition to addressing submissions this chapter will also discuss the findings of additional studies and field assessments that have been conducted to supplement the terrestrial ecology information presented in the draft EIS and to assess potential impacts that may arise from the changes to the Project description. These changes including the significant increase in the amount of infrastructure to be sited in the Gas Fields are detailed in *Volume 2, Chapter 11* of the sEIS.

7.2 RESPONSES TO SUBMISSIONS

Table 3.7.1 provides a summary of the comments received on terrestrial ecology for the Gas Fields. The table indicates the relevant section of the draft EIS to which the submission pertains and the last column either outlines the response or indicates where in this chapter or in the sEIS, the comment is addressed.

Table 3.7.1 Summary of Terrestrial Ecology Submissions on the Draft EIS

Summary of Submission	Response	Submitter
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.	All disturbance to vegetation as a result of the QCLNG Project will be rehabilitated as soon as practicable. Rehabilitation measures are outlined in *Volume 3, Chapter 7, Section 7.6.3* of the draft EIS.	28
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 the companies who will carry out the various stages of the gas Pipeline development	Local Government Area Pest Management Plans have been sourced and will be used in finalising the Weed Management Plan prior to construction. It will be a contractual condition with construction and operations companies that their own weed management plans be prepared in accordance with company and local government requirements, and that construction and operations activities conform to these plans.	25, 28
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 1999* (Cth) (EPBC Act) as Extinct in the wild, Critically Endangered, Endangered, Vulnerable, and Conservation dependent and under the *Nature Conservation Act 1992 (Qld)* (NC Act) 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 development of management plans for EVR species that may be significantly impacted on by the proposed development. See *Volume 4, Chapter 7, Section 7.6* of the draft EIS.	32
The management of clearing activities should be discussed in regard to avoiding disturbance of intact remnants, fragmentation, edge effects and loss of habitat values.	Wherever possible, QGC will avoid clearing native vegetation as infrastructure will be preferentially placed within existing cleared areas and access tracks. Any linear and other infrastructure that are required to be built through vegetation will be subject to an environmental clearance which will identify the presence of EVR plant species and key habitat elements such as large mature trees with hollows. These key environmental values will be avoided wherever possible and clearance widths will be reduced to minimise fragmentation, barrier and edge effects and loss of habitat values. In many cases, linear infrastructure will use existing corridors which are numerous in the tenement areas. These take the form of roads and tracks, old seismic lines, cleared boundaries and internal fence lines. Pre-clearance surveys will be conducted prior to all clearing of native vegetation to further minimise fragmentation, edge effects and loss of habitat values. Key areas of intact remnant vegetation that are currently managed for conservation include those areas within State Forests. The draft EIS prescribes that where possible (e.g. central processing plants, construction camps, lay-down areas) infrastructure will be placed outside these areas. Where this is not possible (e.g. some well pads and connecting pipelines), such infrastructure will, where opportunity exists, be placed along or alongside existing cleared tracks and other already cleared corridors (e.g. powerlines and existing pipeline corridors). The Weed Management Plan for the Project will be finalised prior to construction and will include stringent weed management requirements. In order to prevent the spread and establishment of environmental weeds in areas where they currently do not occur. Such a weed strategy is supported by the mitigation measures identified in the draft EIS.	25, 32

Summary of Submission	Response	Submitter
The EIS should provide a revised discussion on clearing in or adjacent to watercourses to include alternative clearing methods such as lopping and hand-clearing to minimise the disturbance to the riparian soils and habitats.	The draft EIS recommends that infrastructure be located away from remnant vegetation wherever possible and special provisions are provided for the protection of watercourses and habitat trees that often occur along watercourses. It is also recommended that where linear infrastructure is required to cross watercourses, it does so at right angles to minimise clearing. Where any essential works are to be located near watercourses, the sites would first be subjected to an environmental inspection and important habitat and EVR flora would be marked for avoidance/retention. At that time, other recommendations will, where required, be made in relation to the way in which the site is developed, so as to minimise erosion, maintain biodiversity and facilitate future regeneration. Watercourses will only be crossed where unavoidable by linear infrastructure, namely access roads and pipelines. Both require vehicular access at least during construction and pipeline construction requires the removal and reapplication of topsoils to minimise erosion and facilitate rehabilitation. Topsoil management and vehicular access require the soil surface to be free of vegetation. As such, lopping and hand-clearing are generally not adequate to enable construction of pipelines or access roads and use of bulldozers and graders are generally the most appropriate method of construction. Environmental controls which will be implemented at watercourse crossings are detailed in *Volume 3, Chapters 7 and 8* of the draft EIS.	32
Commitments to minimising impacts to 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 previously, and will continue to put in place, measures to avoid or minimise disturbance to all native plant species, refer to *Volume 3, Chapter 7, Section 7.6.1* of the draft EIS. Pre-clearance surveys will be undertaken for all infrastructure to enable detection, recording and if necessary translocation of any Endangered, Vulnerable, Rare or Near-threatened (EVR) plant species that may occur. To minimise impacts on native fauna, fauna handlers will be present for, and as necessary relocate wildlife immediately prior to and during clearing activities. Qualified fauna spotters and handlers will survey the open trenches, record and remove any trapped fauna during open trench pipeline construction. QGC recognises that it may be required to obtain an approval 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 *Nature Conservation (NC) Act*. For further details please see *Section 7.7* and the QCLNG sEIS Project Draft Vegetation and Biodiversity Offset Strategy presented in *Appendix 2.3*.	32

Summary of Submission	Response	Submitter
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 ESAs should be mapped and the management of each type addressed	The draft EIS considered all Category A and B Environmentally Sensitive Areas as prescribed in s25 and 26 of the Environmental Protection Regulations 2008 and the Category C Areas as identified by DERM's online Environmentally Sensitive Area 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 draft 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 as not being codified in legislation or available through DERM's online mapping service or provided in the issued Terms of Reference for the Project were not addressed. Thus, the approach that was taken in the draft EIS is also used in the sEIS. 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 are discussed within *Sections 7.4 and 7.5* of this volume.	32
The extent of clearing of all vegetation associated with the Project should be defined. If the regional ecosystem mapping is incorrect on the Project area then it can be amended by applying for a property map of assessable vegetation (PMAV) with the department or obtaining a map modification with the Queensland Herbarium	Native vegetation which will be impacted on by the Project includes vegetation which is recognised on the Queensland Government's existing RE mapping as well as unmapped areas (such as road reserve and regrowth vegetation). As the footprint of the Gas Field infrastructure is largely unknown at this stage, it is not possible to specify the footprint locations or quantify actual clearing requirements on native vegetation. *Section 7.4.1* of this chapter identifies that clearing could be required for up to 6 per cent of mapped remnant vegetation of the Gas Field area. The likely impact on non-mapped vegetation is likely to be less due to the ability of infrastructure to preferentially avoid small and narrow remnants and isolated trees. The pre-clearance survey procedure which helps minimise impact on unmapped native vegetation is described in *Volume 3, Chapter 7, Section 7.6.1* of the draft EIS. The state's moratorium high-value regrowth vegetation dataset was not available at the time of the draft EIS and was therefore not used. This data which has now been incorporated into the State Vegetation Mapping will be used in the Project's desktop planning to facilitate locating infrastructure so that impacts on high-value regrowth and other mapped vegetation can be minimised. Prior to finalising infrastructure locations pre-clearance surveys will be used to identify and where possible avoid unmapped vegetation.	32
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 onsite monitoring.	*Volume 3 Chapter 7, Section 7.5* of the draft EIS proposes a series of management zones with varying levels of development constraints, depending upon the perceived conservation value of each zone. As part of the development, monitoring sites will be established in each of these zones 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

Summary of Submission	Response	Submitter
Provide additional information to show how adverse impacts have been avoided and why impacts were unavoidable.	Wherever possible, Gas Field infrastructure will be located to avoid adverse impacts on areas of native vegetation, particularly those of high ecological significance (e.g. Endangered REs, wetland areas, State Forests etc). The ecological constraints mapping described in *Volume 3, Chapter 7* of the EIS, designates these areas as High Ecological Constraints Zones. These areas will generally be excluded from development. The location of Gas Field infrastructure follows a constraints analysis process as described in *Volume 3 Chapter 19* In a small number of instances it will be unavoidable that linear infrastructure (e.g. collection lines, Pipeline and access tracks) will be required to transect vegetation remnants and watercourses of ecological value. In these cases, linear infrastructure will, wherever possible, be aligned through previously disturbed and/or cleared areas. The Pipeline corridors have been and will continue to be refined to avoid disturbance to areas of high ecological value. Note that due to engineering and social constraints it is not possible to avoid all areas of ecological value. Mitigation measures to avoid any significant impact on ecological values as a result of Pipeline construction is presented in *Volume 4, Chapter 7, Section 7.5.2* of the draft EIS.	32
An offset proposal that meets the requirements of the Queensland Government Environmental Offsets Policy (QGEOP) and specific issue offset policies should be provided.	More detailed information about the proposed offsets for the Project is provided for in the Project Draft Vegetation and Biodiversity Offset Strategy in *Appendix 2.3* of the sEIS. As described in that information, individual offset proposals will commence in 2010.	32
Clearing areas of contiguous assessable vegetation within the landscape should be avoided wherever possible in order to ensure connectivity is maintained.	Clearing remnant vegetation, especially contiguous vegetation (which has high ecological function values) will be minimised as much as possible. Where existing cleared areas are adjacent to contiguous vegetation, infrastructure placement will be within the existing cleared areas wherever possible. Large areas of contiguous remnant vegetation mostly occur in State Forests and these areas are subject to a very high level of protection. In these areas, it is recommended that infrastructure be placed along or immediately adjacent to existing tracks and cleared corridors where possible. In all areas the placement of infrastructure will be guided by pre-clearance surveys to ensure fragmentation is avoided or minimised. Where possible, proposed infrastructure sites will be moved in order to avoid fragmentation.	32
Table 3.7.5 in *Volume 3, Chapter 7, Section 7.5.1* sets out the worst case clearing loss that may result from the Gas Field development. This table should be revised to show the worst case clearing areas of all vegetated communities, including those for which offsets are proposed.	QGC recognises that offsets should only be used as a last resort measure and, as illustrated in *Volume 3, Chapter 7, Section 7.6*, the Project has put in place a number of clearance strategies and mitigation measures to minimise clearing of remnant vegetation. The data provided in *Table 3.7.5* provide a very worst case of vegetation loss that may occur if no mitigation measures were put in place. The worst case clearing areas of all vegetation communities which may arise from the Gas Field component of the Project are provided for in *Section 7.4* of this volume. Note that these areas have been revised to take into account results from field surveys and all changes to the Project design that have occurred since the release of the draft EIS.	25 & 32

Summary of Submission	Response	Submitter
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 7.2.1*.	32
Giant Rat's Tail Grass should be considered in weed management plans, despite the fact that it was not identified in surveys. Adopt appropriate weed hygiene measures for operations (particularly with drill rigs) to prevent spread of Declared and weeds of national significance (WONS) pests such as Giant Rat's Tail Grass.	*Section 7.2.10* of *Appendix 3.2* of the draft EIS describes the potential impacts associated with environmental and declared weeds (these were developed with consideration of potentially undetected species likely to occur in the area). *Section 8* of *Appendix 3.2* of the draft EIS discusses the mitigation guidelines in relation to weeds. These include: • monitoring and control of weeds during construction and operational phases of the project • the development of a Weed Management Plan that provides more detailed assessment of the potential for weed introductions and describes appropriate weed hygiene practices to prevent the introduction and spread of weeds. The Weed Management Plant will consider and be applicable to all operational aspects of the project including drill rigs. Declared weeds and WONS known as well as those not yet known but with potential to establish in the area will be considered in the Weed Management Plan. This includes Giant Rat's Tail Grass.	25
Environment Protection and Biodiversity Conservation Act (EPBC)-listed Endangered and Of Concern vegetation communities should not be cleared	The draft EIS recognises the importance of remnant vegetation, in particular endangered and of concern regional ecosystems. The proposed mitigation measures described in the draft EIS include avoidance of these REs wherever possible. However, in some rare instances, the linear nature of the remnants may make it impossible to place linear infrastructure without traversing small sections of them. In these cases, clearing will be kept to a minimum and construction features such as turnaround areas and spoil stockpiles will be located elsewhere. Pre-clearance surveys will be carried out to identify and protect any key features such as habitat trees. Where endangered or of concern vegetation communities are unavoidable, the clearing will be offset as described in *Section 7.7* of this volume and the Project Draft Vegetation and Biodiversity Offset Strategy provided in *Appendix 2.3* of the supplementary EIS.	25
More detailed vegetation or ecosystem maps (at least 1:100,000) should be provided in the EIS that identify the vegetation proposed for clearance in the Gas Fields. Endangered, Of Concern and EPBC-listed ecosystems should be identified on these maps.	To view maps of a larger scale please refer to Figures 2a-l in *Appendix 4.2* of the draft EIS.	25
Amend methodology for determination of Impact Significance (as described in our comments on *Volume 1, Chapter 3, 3.2.4.2 Evaluation of Significance)* and reassess the Impact Significance	Please refer to *Volume 1, Chapter 3*	25

Summary of Submission	Response	Submitter
Request that QGC adopt additional rehabilitation procedures for well pads and associated roads located within the Gas Fields. These include: • all landholders to be negotiated in terms of how they wish the area to be rehabilitated • that the unused portion of the well pad is either rehabilitated with native vegetation or pasture species, depending on the wishes of the landholder • that the well pads are fenced off for two years to allow for the rehabilitation of native species or pasture grasses • landholders to be consulted to determine whether roads (associated with well establishment/operation maintenance) could be utilised and whether they wish them to remain, before they are removed and re-graded.	Rehabilitation will be negotiated with each landholder, including options for rehabilitation, revegetation or re-seeding of unused portions of well pads and other infrastructure sites. Where well pads are located on cattle grazing properties, every effort will be made to establish pasture species that are located in the surrounding area, to prevent selective grazing and ''patch grazing'' by cattle. Subject to landholder, operational and safety requirements fencing of well pads for a period of least two years will be considered. Before access roads are removed or re-graded, landholders will be consulted to determine whether the roads could be utilised and whether they wish them to remain.	25
Large habitat trees must be left wherever possible, in particular along watercourses.	In all areas but particularly riparian areas where vegetation is required to be cleared, large trees that provide habitat for fauna will be avoided and retained wherever possible. The pre-clearance survey requirements specified in the *Volume 3, Chapter 7* of the draft EIS are designed to facilitate retention of large habitat trees.	34
There is a very important area of remnant vine shrub on RR 661 Parish of Conoli and Gurulmundi State Forest containing Ooline and Strangler figs that is close to upstream infrastructure corridor (UIC). This area would be ideal for an offset and our branch would be willing to be involved in a creation of an offset plan.	This submission has been duly noted and this potential offset site will be considered if this vegetation type is required to compensate for an unavoidable impact. It so, QGC will liaise with the submitter in relation to potential involvement.	34
Request that QGC make a contribution to wash down facilities to be located at Wandoan, Miles, Chinchilla and Dalby for all vehicles and heavy plant and equipment entering or exiting the region	In the assessment of the QCLNG Project logistics, QGC is developing the locations most suited for vehicle wash down to minimise impact on local government authority assets. QGC will liaise with Western Downs Regional Council (WDRC) on the temporary or short-term use of council facilities.	36
It will be essential that the proponent reference the latest WDRC Pest Management Plan to ensure a co-ordinated approach is maintained in the fight against this impact on biodiversity in the region.	A detailed Weed Management Plan will be developed to include the construction and operational phases of the Project and will include reference to all applicable Local Government Area Pest Management Plans for the Project	1, 36

7.2.1 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 in areas 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. These species will be monitored as part of the Project's ongoing environmental evaluation, but 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 and 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. 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.

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.

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 3, Chapter 7, Section 7.6.3 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 bi-annually for a further two years.

7.3 AMENDMENTS TO THE TERRESTRIAL ECOLOGY BASELINE

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

- detailed flora and fauna field surveys of QGC tenements ATP768 and PL171
- rapid field assessment of proposed Central Processing Plant (CPP) sites
- identification of an undescribed land snail (*Adclarkia* sp. A)
- review of DERM Environmentally Sensitive Area Mapping for the Gas Field Component of the Project.

7.3.1 Field Assessment of QGC Tenements ATP768 and PL171

The gas tenements ATP768 and PL171 were included in the Project design after the field work for the draft EIS was complete. As such, the flora and fauna assessment of these tenements presented in the draft EIS was limited to a desktop assessment. Detailed surveys of these areas have taken place since the release of the draft EIS.

The flora field survey was conducted between 16-19 September 2009 by an experienced botanist. This included the detailed assessment of 16 sites within areas mapped as Endangered and Of Concern by the Queensland Herbarium Regional Ecosystem (RE) Mapping.

Simultaneously detailed fauna assessments were undertaken in the same area by an experienced ecologist. This survey involved 24 hours of daytime observational transects, eight hours of night spotlighting and three hours of ultrasonic recording for bats. Incidental fauna sightings were also recorded.

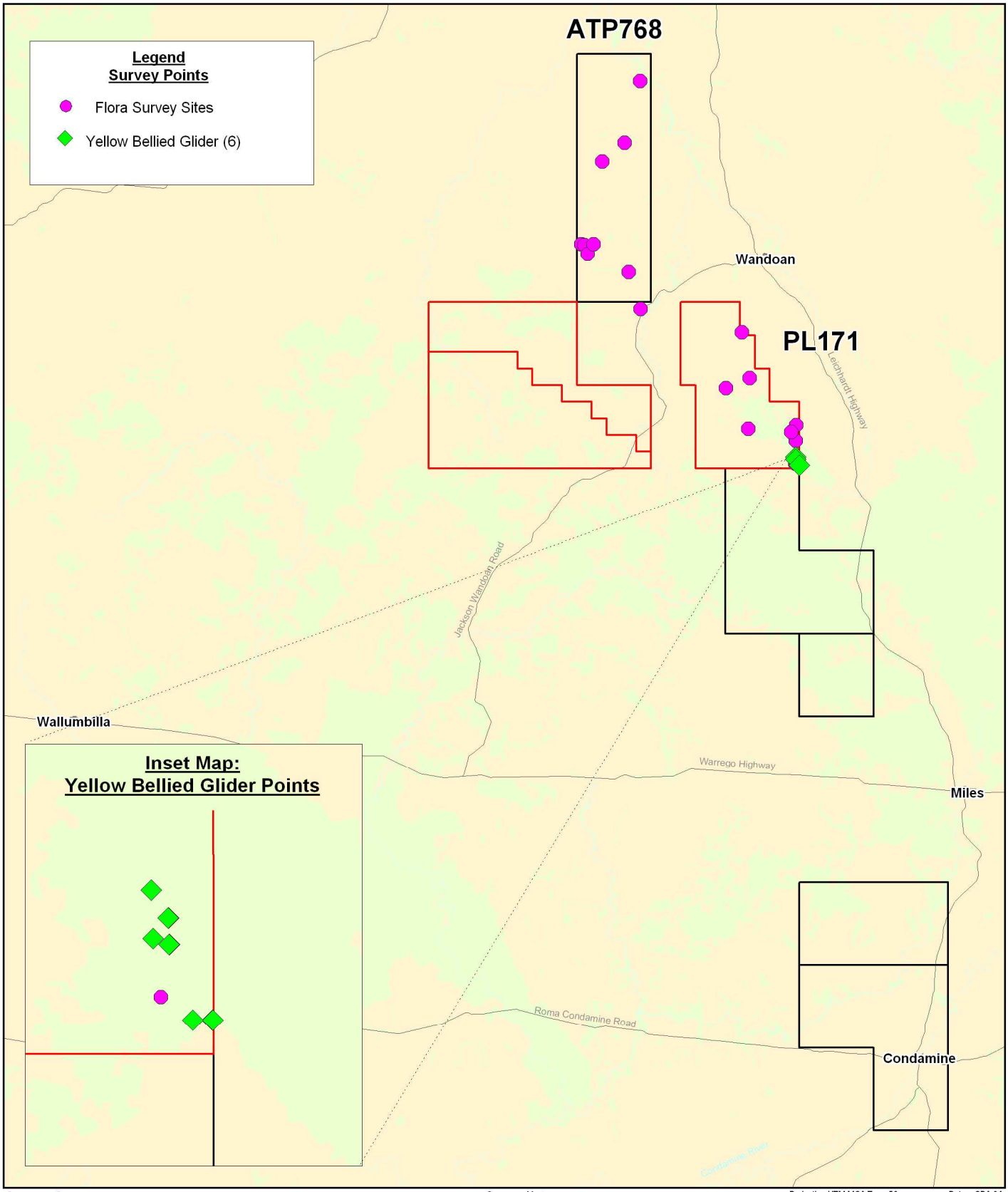
Field survey site locations within ATP768 and PL171 are shown on *Figure 3.7.1.*

7.3.1.1 Flora Field Survey

The flora field assessment verified the occurrence of threatened Brigalow communities RE 11.9.5 and RE 11.9.6. These studies also groundtruthed all mapped occurrences of semi-evergreen vine thicket (SEVT) communities RE 11.8.3 and RE 11.9.4. These two communities are listed as endangered under both the EPBC Act and are represented by four REs listed as endangered under the *Vegetation Management Act 1999 (Qld)* (VM Act) and are shown on *Figure 3.7.2*.

The surveyed SEVT and Brigalow communities, which occur on the edge of the Cherwondah State Forest, in the south-eastern corner of PL171 were found to be in a good condition. This was attributed to these remnants adjoining a State Forest Area which restricts cattle access.

The remaining Brigalow remnants within ATP768 and PL171 were generally long narrow roadside remnants. These remnants were found to be heavily grazed with weed species present. Overall, the condition of these remnants was considered to be average.



Legend:

- Gas Fields - Petroleum Lease/Petroleum Lease Application
- Gas Fields - Authority to Prospect

Source Note:

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Projection UTM MGA Zone 56 Datum GDA 94

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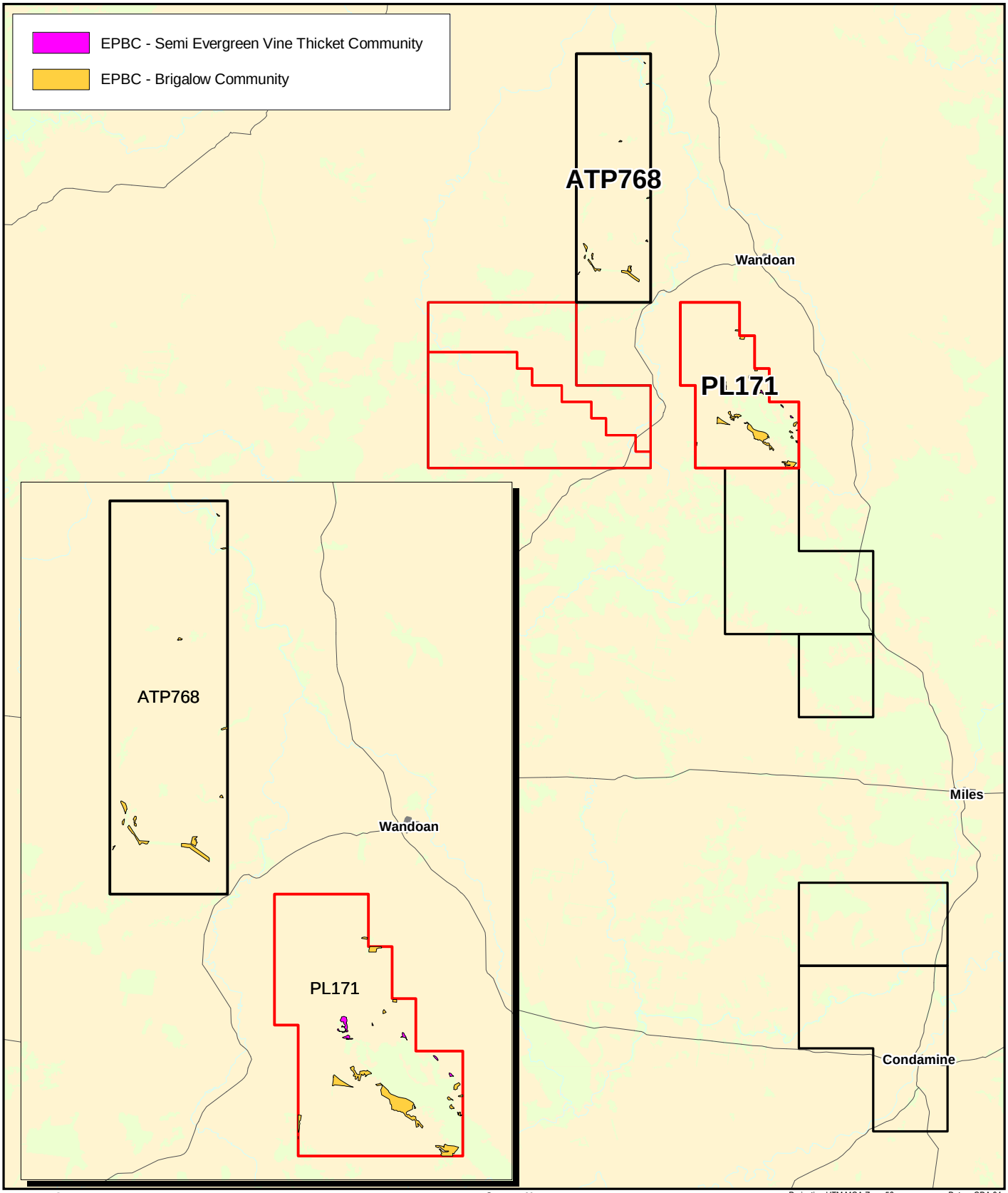
QUEENSLAND CURTIS LNG
A BG Group business

Environmental Resources Management Australia Pty Ltd

Project	Queensland Curtis LNG Project
Client	QGC - A BG Group business
Drawn	Mipela
Approved	CDP
Date	02.12.09
sEIS Volume	3
Figure	S3.7.1
File No:	QC02-T-MA-00132
Revision	Supplementary

Title **Tenements ATP768 and PL171 flora and fauna surveys.**



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QUEENSLAND CURTIS LNG
A BG Group business

Project: Queensland Curtis LNG Project

Client: QGC - A BG Group business

Title: **SEVT and Brigalow communities within tenements ATP768 and PL171**

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	Mipela	sEIS Volume 3 Figure	S3.7.2
Approved	CDP	File No:	QC02-T-MA-00134
Date	11.01.10	Revision	Supplementary

7.3.1.2 Fauna Field Survey

At least 55 fauna records were obtained from the fauna studies that were undertaken within these tenements. This included records of the Yellow-bellied Glider which is listed as a regionally significant species according to DERM's Biodiversity Assessment for the Brigalow Belt Bioregion (Criteria H species). These gliders were observed within tall *Corymbia citriodora* forests (*Figure 3.7.1*).

Figures showing the location of sites for all threatened and regionally significant fauna species that occur within tenements ATP768 and PL171 recorded within the additional surveys are shown in *Figure 3* of *Appendix 3.1*.

7.3.2 Field Assessment of Proposed Central Processing Plant

The proposed sites of two Central Processing Plants (CPPs) were inspected on the 11-12 November 2009 by an experienced ecologist. These two sites were located in the vicinity of Woleebee Creek and Kumbarilla Park.

The field surveys found these two sites to be clear of vegetation.

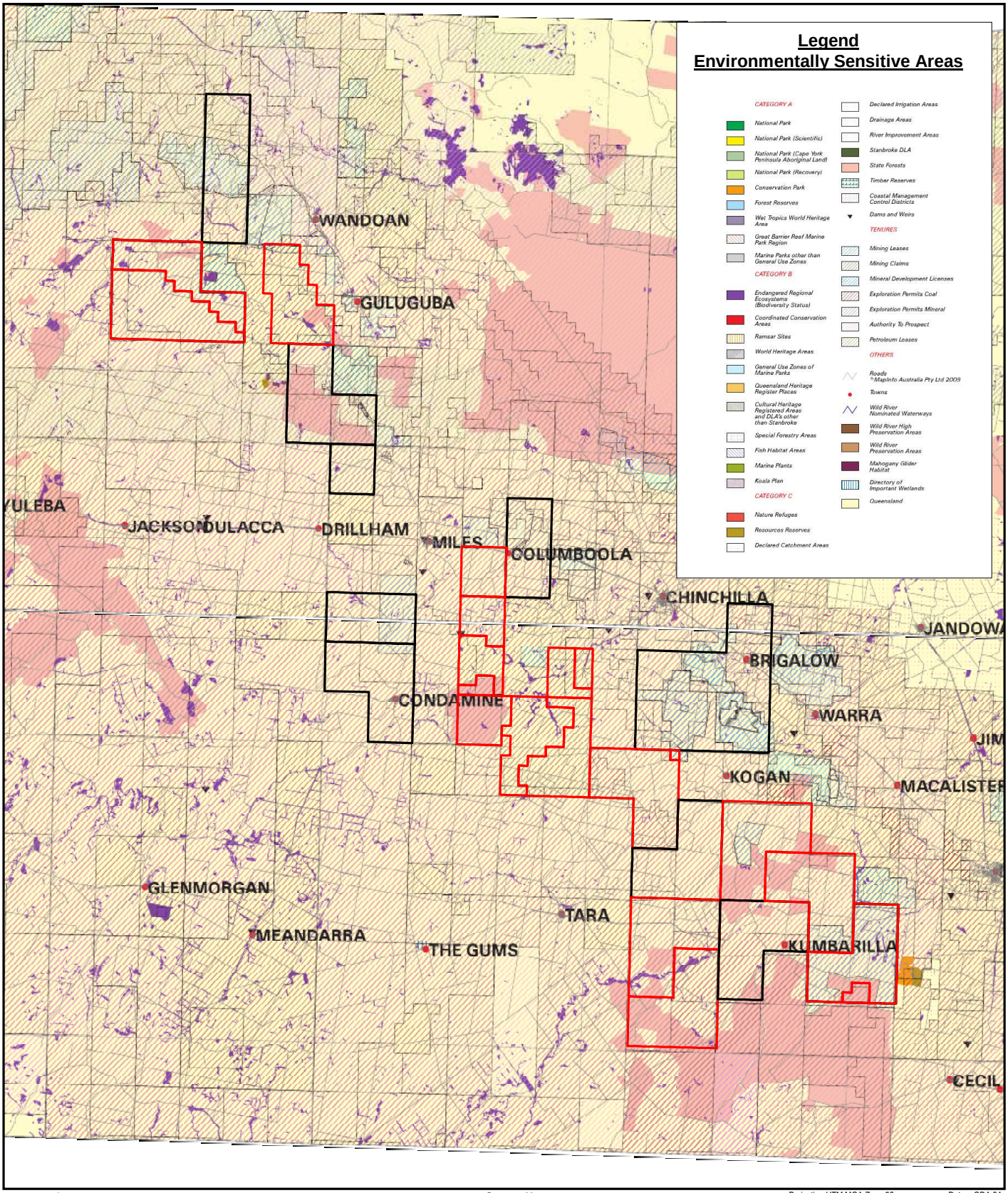
No threatened flora or fauna species were observed within or in the vicinity of these sites.

7.3.3 Environmentally Sensitive Areas

All ESAs within or in proximity to the Gas Fields were identified using DERM Environmentally Sensitive Area online mapping (refer to *Figure 3.7.3*). These include:

- Category B Endangered Regional Ecosystems (Biodiversity Status)
- Category C State Forests
- Category C River Improvement Area

Nine REs listed as endangered under the DERM Biodiversity Status have been identified within the Gas Fields. These REs, their description and status is presented in *Table 3.7.2*.



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QUEENSLAND CURTIS LNG A BG Group business	Project: Queensland Curtis LNG Project		Title: DERM Environmentally Sensitive Areas.
	Client: QGC - A BG Group business		
ERM Environmental Resources Management Australia Pty Ltd	Drawn: Mipela	sEIS Volume 3 Figure S3.7.3	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: QC02-T-MA-00133	
	Date: 01.12.09	Revision: Supplementary	

Table 3.7.2 Category B Regional Ecosystems (Biodiversity) Present within the Gas Fields

Regional Ecosystem/ Ecological Community	Description	EPBC Act Status	VM Act Status	Biodiversity Status
RE 11.3.1	*Acacia Harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	-	E	E
RE 11.4.3	*Acacia harpophylla* and/or *Casuarina cristata* shrubby open forest on Cainozoic clay plains	-	E	E
RE 11.4.7	*Eucalyptus populnea* with *Acacia harpophylla* and/or *Casuarina cristata* open forest to woodland on Cainozoic clay plains	-	E	E
RE 11.4.10	*Eucalyptus populnea* or *E. pilligaensis*, *Acacia harpophylla*, *Casuarina cristata* open forest to woodland on margins of Cainozoic clay plains	-	E	E
RE 11.4.12	*Eucalyptus populnea* woodland on Cainozoic clay plains	-	E	E
RE 11.9.4	Semi-evergreen vine thicket or *Acacia harpophylla* with a SEVT understorey on fine grained sedimentary rocks	E	OC	E
RE 11.9.5	*Acacia harpophylla* and/or *Casuarina cristata* open forest on fine-grained sedimentary rocks	E	E	E
RE 11.9.6	*Acacia melvillei* +/- *A. harpophylla* open forest on fine-grained sedimentary rocks	E	E	E
RE 11.9.10	*Eucalyptus populnea*, *Acacia harphophylla* open forest on fine-grained sedimentary rocks	-	OC	E

Ten State Forests have been identified within the Gas Fields. These State Forests and the areas of each forest that fall within the Gas Fields are presented in *Table 3.7.3.*

Table 3.7.3 Category C State Forest Areas Present within the Gas Fields

State Forests	Hectares
Mount Organ	44
Hinchley	1,059
Cherwondah	1,699
Gurulmundi	11,358
Condamine	9,496
Braemar	12,852
Daandine	1,042
Weranga	580
Vickery	2,159
Kumbarilla	16,699

One Category B River Improvement Area is also mapped as occurring across five tenements (i.e. PL279, PL275, PL273, ATP676, and ATP648).

This River Improvement Area falls within the jurisdiction of the Wambo River Improvement Trust. This trust has the primary role to plan, design, finance, undertake and maintain stream improvement works for the benefit of the community within its river improvement area. Measures that will be adopted to meet the function of this trust have been provided for in *Section 7.4.3*.

7.4 UPDATE OF TERRESTRIAL ECOLOGY IMPACTS

The following section identifies and discusses any additional potential impacts that may arise from any changes to the design of the Gas Fields and/or has become apparent from the information that has been obtained since the release of the draft EIS.

7.4.1 Flora Values

7.4.1.1 Clearing of Regional Ecosystems/Ecological Communities

As a result of the increase in the amount of gas infrastructure that is to be placed within the Gas Fields the estimated worst case clearing of remnant vegetation that may be cleared has increased. The data presented in *Table 3.7.4* provides a comparison of the worst case clearing areas presented in the draft EIS with the estimate of worst case clearing areas based on the changes to the Project footprint since the draft EIS.

Table 3.7.4 Comparison of the Draft EIS and Supplementary EIS Worst Case Vegetation Loss Areas

RE/Ecological Community Status	Clearing extent draft EIS (ha)	Clearing extent sEIS (ha)
EPBC listed[1]	117	73
Endangered	128	108
Of Concern	215	308
Not of Concern	4,624	9,088
TOTAL	4,966	9,577

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

There is a notable decline in the clearing extent of *EPBC Act* and *Vegetation Management Act*-endangered vegetation communities/REs presented in the draft EIS in comparison to the current clearing areas. This is primarily due to improved analysis of the ability to avoid the endangered remnants within the Gas Field (i.e. many endangered remnants are not expansive and can be avoided by all field infrastructure) as well as some improvements in planned infrastructure locations from the perspective of impacts on endangered remnants.

In order to place the potential impacts of the Gas Field infrastructure footprint within a local and bioregional perspective, for each conservation status the following data is presented in *Table 3.7.5*:

- estimated extent of impact
- total area within the tenements
- total area within the bioregion
- percentage of area that may be impacted on.

Table 3.7.5 Worst Case Vegetation Clearing Areas

RE/Ecological Community Status	Estimate extent within Gas Fields (Ha)	Estimated vegetation loss (Ha)	Estimated Extent Remaining (Ha)	Estimated % Cleared in the QGC Field	Estimated % cleared in the Bioregion
EPBC listed[1]	4039	73	3,966	1.7	0.018
Endangered	4,415	108	4,307	1.8	0.026
Of Concern	7,403	308	7,095	4.2	0.025
Not of Concern	159,434	9,088	150,346	5.5	0.207
TOTAL	175,291	9,577	165,714	5.5	0.148

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

Due to the small shape of the SEVT and Brigalow fragments that occur within the south-eastern section of PL171 it is expected that Gas Field infrastructure will be able to avoid these areas. Thus no clearing is anticipated to occur within these remnants.

The remaining Brigalow communities within ATP768 and PL171 are generally linear in shape and extend along fencelines or occur within road reserves. The field surveys indicated that the majority of these remnants suffer from edge effects and have been invaded by Buffel Grass and other environmental weeds which compromise their integrity as native habitats. In some cases, these linear remnants may be unavoidable, and pipelines and associated infrastructure may need to transect them for short distances.

Overall, total worse case remnant vegetation clearing within the Gas Field is projected to increase from 4,966 to 9,577 ha. It should be noted however, that this is a worse case scenario and with the implementation of mitigation measures the actual amount of vegetation clearing is likely to be less than this. In accordance with the original guidelines presented in the draft EIS, remnant vegetation, in particularly EPBC-listed, endangered and of concern REs will be avoided wherever possible. Pre-clearing ground surveys will be undertaken in all areas of remnant vegetation to identify these REs as well as EVR species and significant fauna habitat values. With the implementation of the mitigation measures described here and in *Volume 3, Chapter 7, Section 7.6* of the draft EIS, the risk of significant impacts on flora and fauna are projected to be minimal.

7.4.1.2 Threatened Flora Species

No threatened flora species were observed within the Gas Fields during the additional surveys.

7.4.2 Fauna Values

7.4.2.1 Threatened Fauna Species

No threatened fauna species listed under either the EPBC Act or the NC Act were identified within the Gas Fields during additional fauna survey work.

The only species of significance that was observed is the Yellow-bellied Glider. This species is listed as a regionally significant species according to DERM's Biodiversity Assessment for the Brigalow Belt Bioregion (Criteria H species). As with the populations previously recorded for the draft EIS, these records were obtained in mature *Corymbia citriodora* forest. This species was found to occur sporadically across the tenement area in this forest type and was generally confined to State Forests. They are known to sap feed on specific ''feed trees'' at certain times of the year, although none were found feeding in this manner during any of the surveys and no feed trees were found in areas where the records were obtained. The impacts of clearing *Corymbia citriodora* forest would be significant for this species, although the habitats in which they occur are assigned the highest priority for conservation in the zoning scheme and relatively little clearing is anticipated in these areas. It is thus anticipated that impacts will be minimal and if pre-clearance surveys detect the presence of the glider or feed trees, appropriate measures will be taken to conserve these areas.

7.4.2.2 Fauna Habitat Values

Surveys in the northern tenement areas identified the escarpments and plateaux in Cherwondah State Forest as significant fauna habitats and refuge areas. The area has been assigned a numerical value and has been classified as a ''very high'' ecological constraint zone.

Other areas within these additional tenements were largely cleared and heavily grazed. Thus conservation values were minimal.

In summary, impacts on fauna habitat that occurs in the Field may increase as a result of the larger area of vegetation to be cleared. However, due to the environmental condition of much of the area as it now exists (e.g. Buffel Grass, inappropriate fire regimes, detailed in *Volume 3 Chapter 7* of the draft EIS) and also considering the constraints placed upon development in areas of high conservation value through the constraints mapping approach (described in *Section 7.6.2*), it is expected that the risk of significant impacts on habitat values that occur within the Gas Fields will remain minimal.

7.4.3 DERM Environmentally Sensitive Areas

Due to the progressive nature of the development of gas infrastructure within the Gas Fields it is not possible to definitely state the location of all infrastructure, or the area of Category B Regional Ecosystems (Biodiversity Status) that will be impacted on by the Project.

However, the ecological constraints mapping presented in the draft EIS dictates that all non-linear infrastructure will be excluded from all Category B areas. Note that in some circumstances it may be impossible for linear infrastructure, such as access tracks and gathering lines, to avoid crossing long narrow strips of these remnant areas. In these instances linear infrastructure will, wherever practicable, be aligned to cross the narrowest areas and/or follow existing tracks. Unavoidable clearing will be offset in accordance with agency requirements as detailed in *Section 7.7* of this chapter and *Appendix 2.3*.

All infrastructure to be placed within State Forest areas will only occur after extensive negotiations with the relevant government agencies.

The Project will liaise with the agencies and the Wambo River Improvement Trust in confirm requirements in relation to activities within the River Improvement Area. The Project will conform with the function of the Trust with respect to erosion control and flood mitigation by putting in place stringent mitigation measures to minimise impacts on all wetland and riverine systems located within this River Improvement Area.

All wetlands and watercourses have been classified as a very high ecological constraints area (see *Volume 3, Chapter 7, Section 7.6.*2 of the draft EIS). This constraint mapping will help minimise clearance in riparian areas and recommends complete exclusion from wetlands. In some small number of instances, it may be impossible for linear infrastructure to avoid crossing watercourses. Provided that unavoidable impacts are minimised, combined with the fact that most disturbances are likely to be temporary, potential impacts that may result from these watercourses crossings are projected to be minor. A full list of mitigation guidelines are provided for in *Volume 3, Chapter 8, Section 8.4.*

7.5 CUMULATIVE IMPACTS

The only project that was not considered in the EIS, and which information was publicly available is the Surat to Gladstone Project Pipeline. The cumulative impacts of this proposed pipeline, which runs through the tenements has been discussed in *Volume 4, Chapter 7, Section 7.5* of the sEIS.

7.6 MITIGATION

Since the publication of the draft EIS, additional surveys of the northern tenements have identified the conservation values of Cherwondah State Forest. This area has been now been classified as ‘‘very high’’ ecological constraints zone in the ecological constraints mapping (described in *Volume 3, Chapter 7, Section 7.6.2* of the draft EIS). This area comprises an elongated plateau with rocky scree slopes and protected environments in sheltered gullies with areas of SEVT. This has been the only change made to the ecological constraints mapping since the release of the draft EIS.

7.7 OFFSETS

Appendix 2.3 provides the extent and type of vegetation and biodiversity offsets proposed by QGC. 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.