7 TERRESTRIAL ECOLOGY

Chapter 7 provides a summary of the values, potential impacts and mitigation measures associated with the existing ecological values of areas within and in the vicinity of the pipeline corridors, within the Pipeline Component of the Queensland Curtis LNG (QCLNG) Project. Detailed reports are provided in *Appendix 4.2.*

7.1 PROJECT ENVIRONMENTAL OBJECTIVE

The Project's environmental objective for terrestrial ecology is to undertake Project activities such that impacts on the abundance and distribution of terrestrial flora, fauna and ecological communities are minimised.

7.2 METHODOLOGY

QGC has considered a number of alternative pipeline route alignments, described in *Volume 2* of this Environmental Impact Statement (EIS), in determining the impact of the proposed Pipeline Component on ecological values.

As discussed in *Volume 4, Chapter 1* two options have been investigated for the Export Pipeline corridor. These are referred to as Option 1 Export Pipeline and Option 2 Export Pipeline. Both pipelines areas have been assessed. However, as Option 2 Export Pipeline is the preferred alignment, all totals calculated are based on the Option 2 Export Pipeline (and are exclusive of Option 1 Export Pipeline areas).

Values for nature conservation have been assessed through initial field surveys of available sections of the Option 1 Export Pipeline and the Collection Header and desktop studies of all alignments including:

- reviews of relevant published literature for the wider area
- latest available Queensland Herbarium vegetation mapping
- review of maps and satellite imagery to identify habitat connectivity, particularly Environmental Protection Agency (EPA) Biodiversity Assessment and Methodology Mapping (BAMM) assessments
- reviews of databases (e.g. Queensland Herbarium Herbrecs, Department of Environment, Water, Heritage and the Arts (DEWHA), matters of National Environmental Significance (NES) online; Directory of Important Wetlands (Blackman et. al., 1999); the Queensland Environmental Protection Agency's (EPA) Biodiversity Planning Assessment (2008) which identifies ecological features and values of local, regional and state significance as recognised by the Department of Environment and Resource Management (DERM), Queensland Museum, Birds Australia, and WildNet
- reconnaissance of the area and groundtruthing by flora and fauna

ecologists in accessible sections of the Option 1 Export Pipeline and the Collection Header (184 sites investigated; 29 September to 3 December 2008)

- detailed fauna surveys of representative habitats in accessible sections of the Option 1 Export Pipeline (60 sites investigated 24th November – 3rd December and the 1st - 3rd of April 2009) and the Collection Header (248 sites investigated 27th October – 2nd November, 12th - 18th November and 3rd – 9th December, 2008). Surveys in the vicinity of the Collection Header employed standard fauna survey techniques including pit-fall trapping, spotlighting, bird transects, camera traps, bat trapping and bat ultrasonic recording, inspection of road kills and incidental observations
- detailed fauna surveys were conducted on Curtis Island for the LNG Component as part of a separate report and are described in Volume 5, Chapter 7. The findings were considered for the northernmost 4 km of the pipeline
- marine studies were also the subject of a separate report and the marine environment is described in Volume 5, Chapter 8
- detailed field surveys of all preferred alignments will be undertaken prior to alignment finalisation.

In addition to the ongoing above searches and field work, ecologists have consulted with:

- DERM staff
- Queensland Herbarium
- former DPI (Forestry)
- landholders.

7.3 *DESCRIPTION OF ENVIRONMENT*

7.3.1 *Flora*

Pipeline corridors are proposed to pass through cleared grazing and cropping lands, roadside and travelling stock reserves, council lands, state forests, resource reserves and freshwater and marine wetland areas.

The proposed pipeline corridors traverse predominantly cleared areas. Based on the Queensland Herbarium regional ecosystems (RE) mapping the approximate area of remnant vegetation within each pipeline corridor is as follows:

- 99 km of the 382 km Option 1 Export Pipeline
- 112 km of the 383 km Option 2 Export Pipeline
- 24 km of the 152 km Lateral Pipeline
- 78 km of the 191 km Collection Header.

Remnant vegetation within the proposed pipeline corridors, excluding the Option1 Export Pipeline, is estimated at 1,462 ha and consists of the following:

- 1,333 ha of Eucalypt woodlands
- 21 ha of Acacia woodlands
- 14 ha of Brigalow/Belah woodland
- 47 ha of Riparian Eucalypt woodland
- 28 ha of Shrubland Community
- 2 ha of Semi-evergreen Vine Thicket
- 1 ha of Freshwater Wetlands
- 15 ha of Estuarine Wetlands.

7.3.1.1 EPBC Listed-Threatened Ecological Communities

According to Herbarium mapping, the pipeline corridors (excluding Option 1 Export Pipeline) transect eight REs that fall within the description of a threatened ecological community under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (*EPBC Act)* (*Figure 4.7.1, Figure 4.7.2 and Figure 4.7.3*), as follows:

- six Brigalow woodland/open forest communities - REs 11.3.1, 11.4.3, 11.9.1, 11.9.5, 11.9.6, 11.12.21
- two Semi-evergreen Vine Thicket (SEVT) communities – RE 11.9.4 and 11.11.18.

An additional Threatened Ecological Community which may also be transected by the pipeline corridors is the Endangered Weeping Myall Open Woodland community. This community is not mapped by the Queensland Herbarium RE mapping nor was it detected by the initial field studies. However, it is described as occurring within the Brigalow South Bioregion, generally in small patches in alluvial soils within REs 11.3.2 and 11.3.28. As such, it may potentially occur in alluvial areas transected by the pipeline corridors.

The six Brigalow communities occur on fertile soil areas that have largely been cleared of their original ecological communities. The Brigalow remnants are more common in the southern pipeline corridors and are almost always small and narrow fragments which have been left along fence lines, creeks and roadsides. The field surveys confirmed that generally these small patches have been degraded by edge effects such as weed invasion and land uses including cattle grazing and logging.

The SEVT communities occur on deep red soils with clay subsoil. According to Queensland Herbarium mapping these SEVT remnants are generally found within small and/or subdominant communities along all of the Project's three pipeline corridors. Field surveys found these small patches to be degraded by edge effects including weed invasion and fire damage. The Option 1 Export Pipeline passes through an additional 0.7 ha of SEVT community.

Queensland Herbarium mapping indicates that the EPBC-listed Native Bluegrass Grassland Community occurs along the Option 1 Export Pipeline only. The use of the Option 2 Export Pipeline alignment should therefore avoid impacts on this community.

7.3.1.2 VM Act Listed Regional Ecosystems (REs)

The location of *Vegetation Management Act 1999* (Qld) (VMA) listed REs, as mapped by the Queensland Herbarium, is presented in *Figure 4.7.4, Figure 4.7.5* and *Figure 4.7.6 VMA.* Endangered REs transected by the pipelines are the same as the EPBC- listed Vegetation Communities above, with the exception of two additional Endangered REs which are not EPBC-listed. These are:

- RE 12.3.3 at the Export Pipeline's most north-eastern point (on Curtis Island)
- RE 11.12.17, on the Option 1 Export Pipeline.

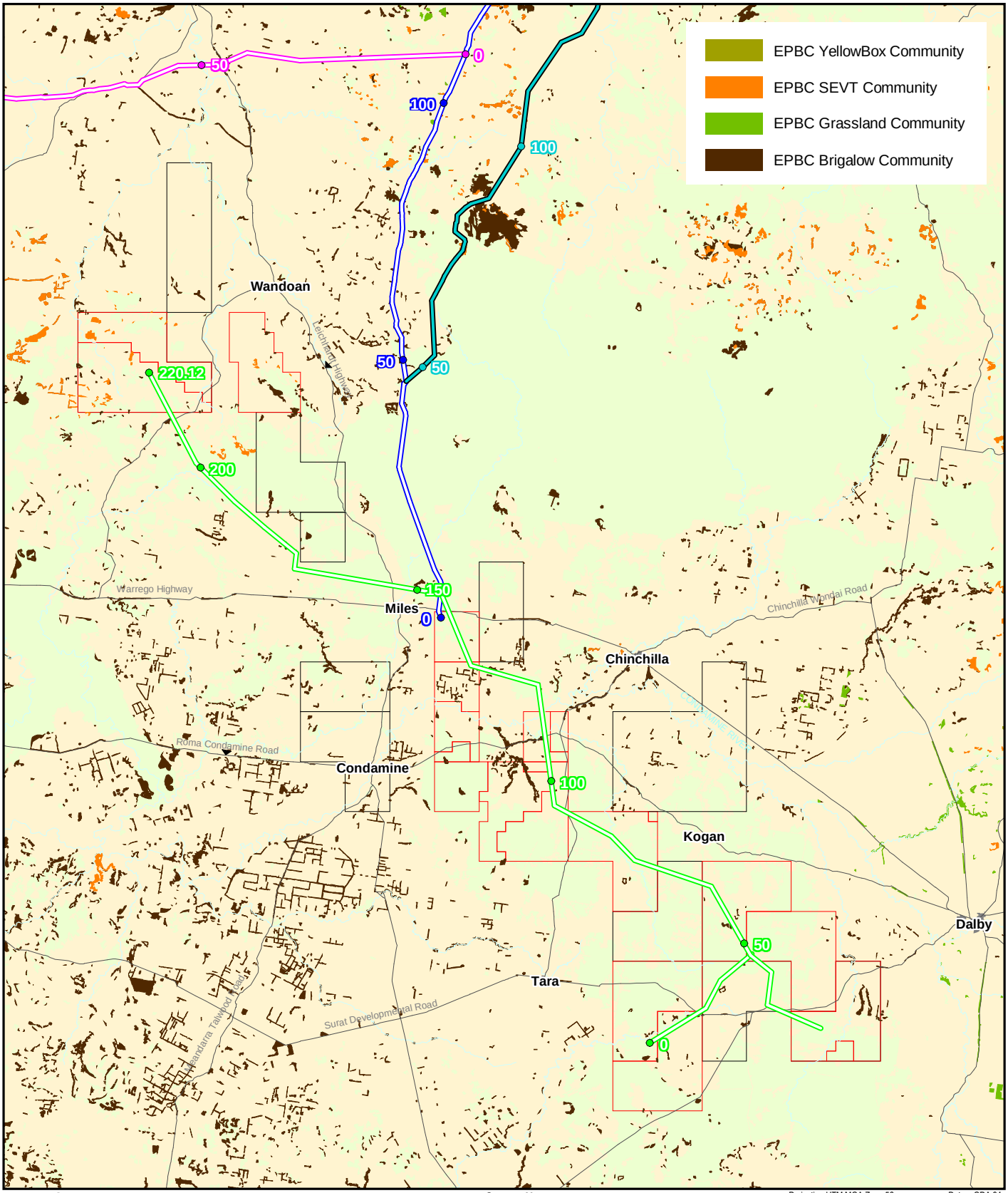
Nine Of Concern REs occur within at least one of the Project's three pipeline corridors. These include:

- eight Eucalypt woodland communities – REs 11.3.2, 11.3.3, 11.3.4, 11.3.17, 11.5.13, 11.9.7, 12.3.11 and 12.11.14
- one Acacia woodland community – RE 11.9.10.

According to existing RE mapping (confirmed by field surveys) the Of Concern communities transected by the pipeline corridors generally occur within small narrow remnants that remain along fencelines, roadsides and in creeklines. Exceptions to this were the larger patches of the mixed communities RE 11.3.26/11.3.4/11.11.15 (ratio of 70:20:10) present along both the Option 1 and Option 2 Export Pipeline (Kilometre Point (KP) 370.3 to 372) and RE 11.3.2/11.3.25/11.3.17 (ratio of 60:35:5) and RE 11.9.7 mapped in the close vicinity of the Collection Header corridor (KP 2 to 8.2).

Field surveys of these two larger Of Concern remnants communities located along the Collection Header found them to be in a good condition. The remaining Of Concern REs visited were generally found to be in an average condition due to edge effects which include weed invasion and cattle grazing.

Herbarium mapping and field surveys indicate that 35 REs listed as Not of Concern, under the *VM Act*, occur within the Project's three pipeline corridors (excluding Option 1 Export Pipeline). These consist of 28 Eucalypt woodland communities, one Shrubland community, one Acacia woodland community, one Freshwater Riparian woodland community, two Freshwater Wetland communities and two Estuarine Wetland communities.



Legend:

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- Export Pipeline Option 2 & Kilometre Point
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point
- Gas Fields - PL & PLA
- Gas Fields - ATP

Source Note:

1:250,000 Topographic vector copyright Geoscience Australia
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Projection UTM MGA Zone 56 Datum GDA 94

0 10 20 30 40

Kilometres

N

QUEENSLAND CURTIS LNG
A BG Group business

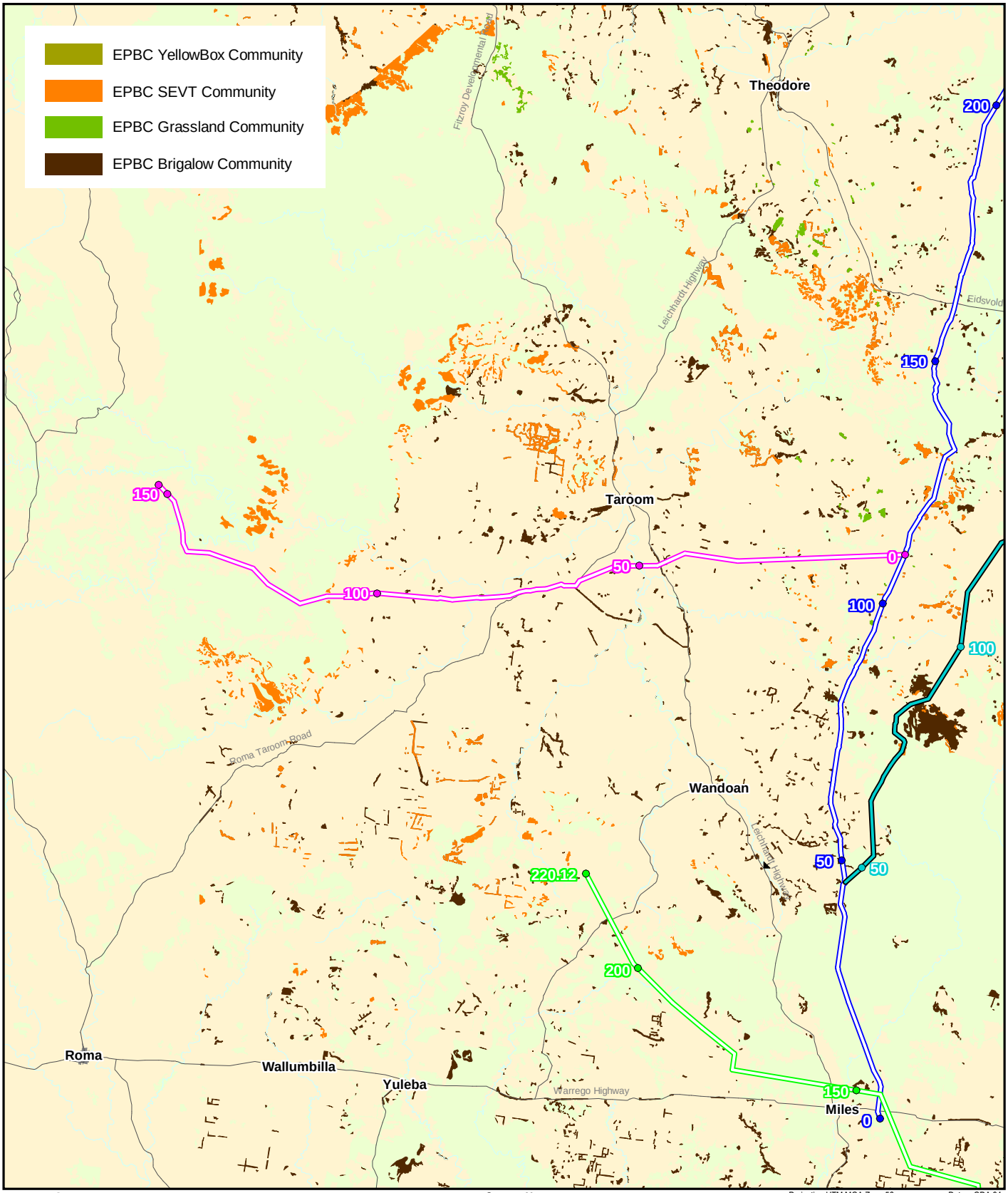
Project	Queensland Curtis LNG Project
Client	QGC - A BG Group business

Title **EPBC Communities - Southern Area**

Map 1 of 3

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	Mipela	**Volume** 4	**Figure** 4.7.1
Approved	CD	File No:	EO5-P-MA-96139
Date	13.03.09	Revision	A



Legend:

- Export Pipeline & Kilometre Point
- Export Pipeline Option 2 & Kilometre Point
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point

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0 10 20 30 40

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Project	Queensland Curtis LNG Project	Title	EPBC Communities - Central Area
Client	QGC - A BG Group business		Map 2 of 3
Drawn	Mipela	Volume 4	Figure 4.7.2
Approved	CD	File No:	EO5-P-MA-96140
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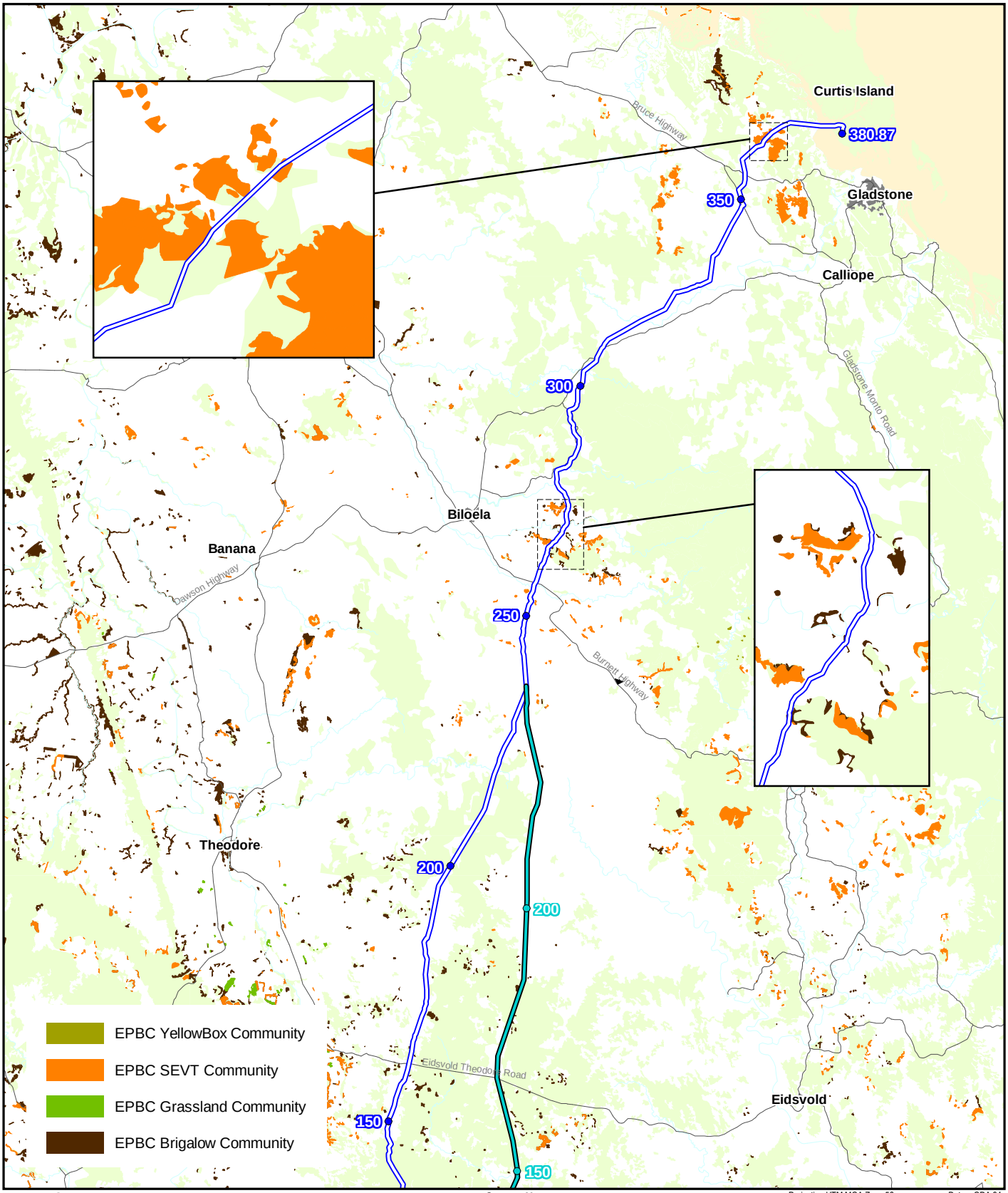

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- Export Pipeline Option 2 & Kilometre Point
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point

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0 10 20 30 40

Kilometres

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QUEENSLAND CURTIS LNG
A BG Group business

Project: Queensland Curtis LNG Project

Client: QGC - A BG Group business

Title: **EPBC Communities - Northern Area**

Map 3 of 3

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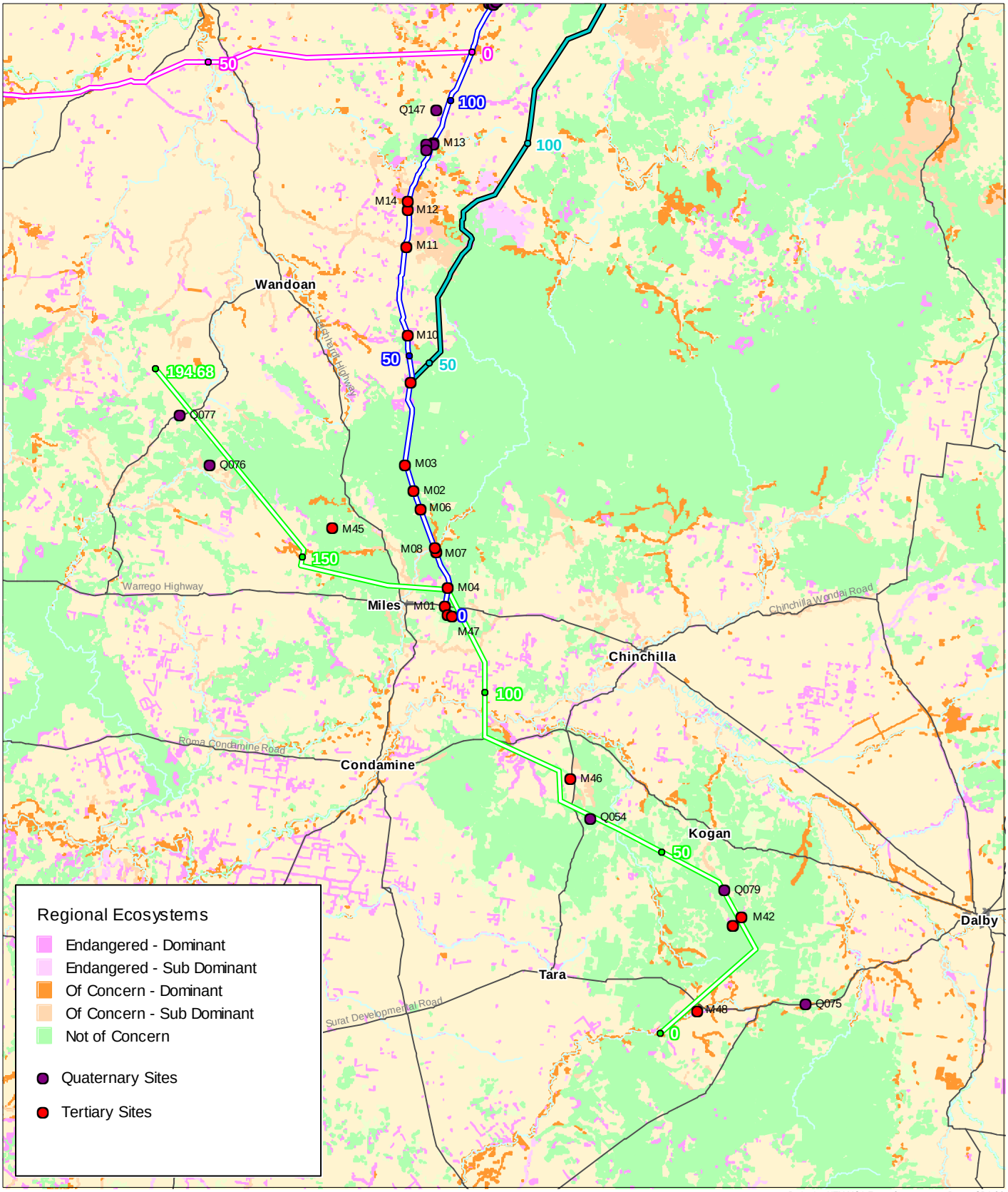
Drawn	Mipela	Volume 4	Figure 4.7.3
Approved	CD	File No:	EO5-P-MA-96141
Date	20.05.09	Revision	A



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- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point

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Quaternary and Tertiary Sites data captured and documented by Ann Moran

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0 10 20 30 40

Kilometres

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QGC

Project **Queensland Curtis LNG Project**

Client **QGC - A BG Group business**

Title **Flora Survey Sites and Mapped Regional Ecosystems**

Map 1 of 3

ERM
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Approved	CD	File No:	EO5-P-MA-96136
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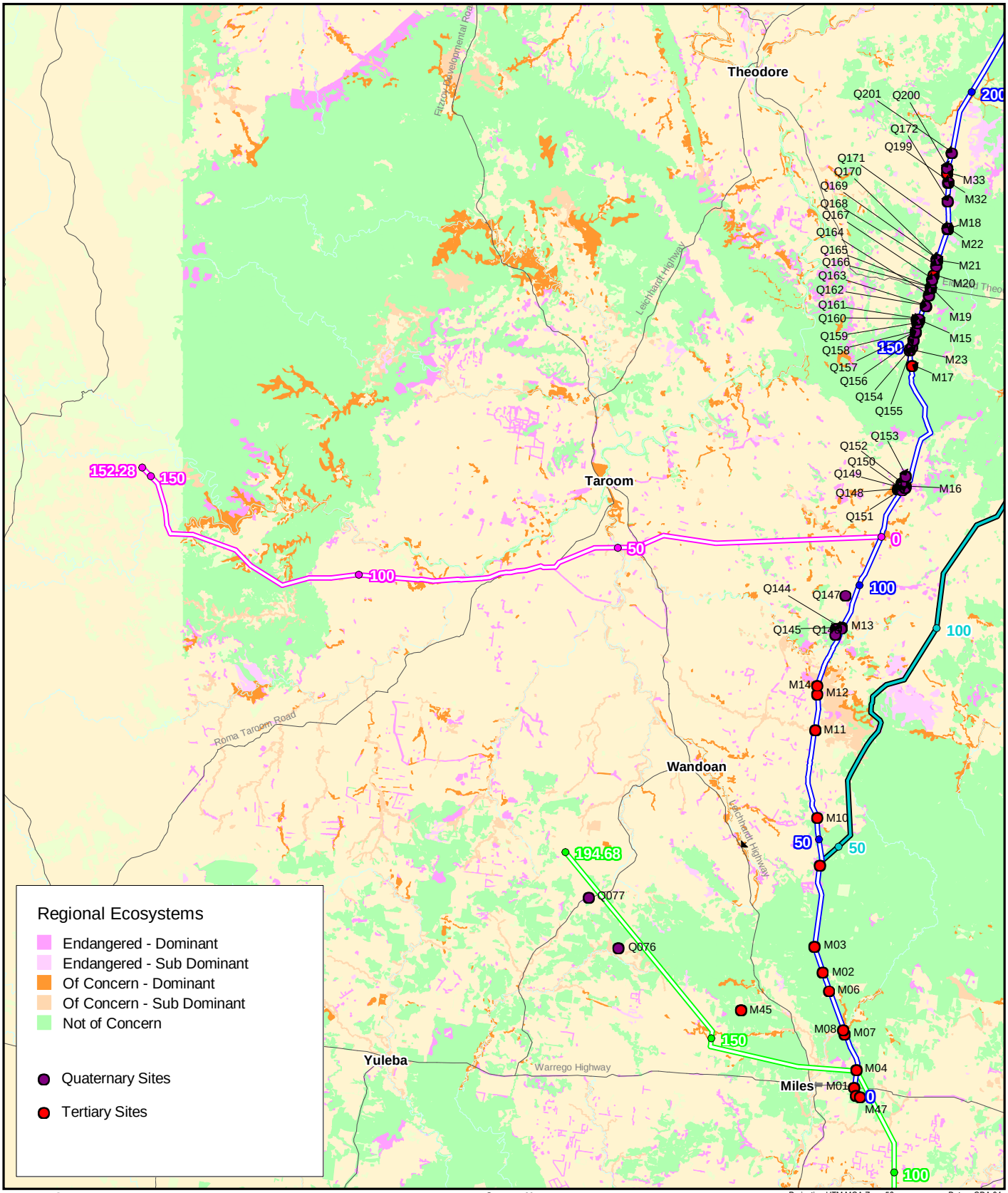

Legend:

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- Export Pipeline Option 2 & Kilometre Point
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point

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0 10 20 30 40

Kilometres

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QGC A BG Group business

Project: Queensland Curtis LNG Project

Client: QGC - A BG Group business

Title: **Flora Survey Sites and Mapped Regional Ecosystems**

Map 2 of 3

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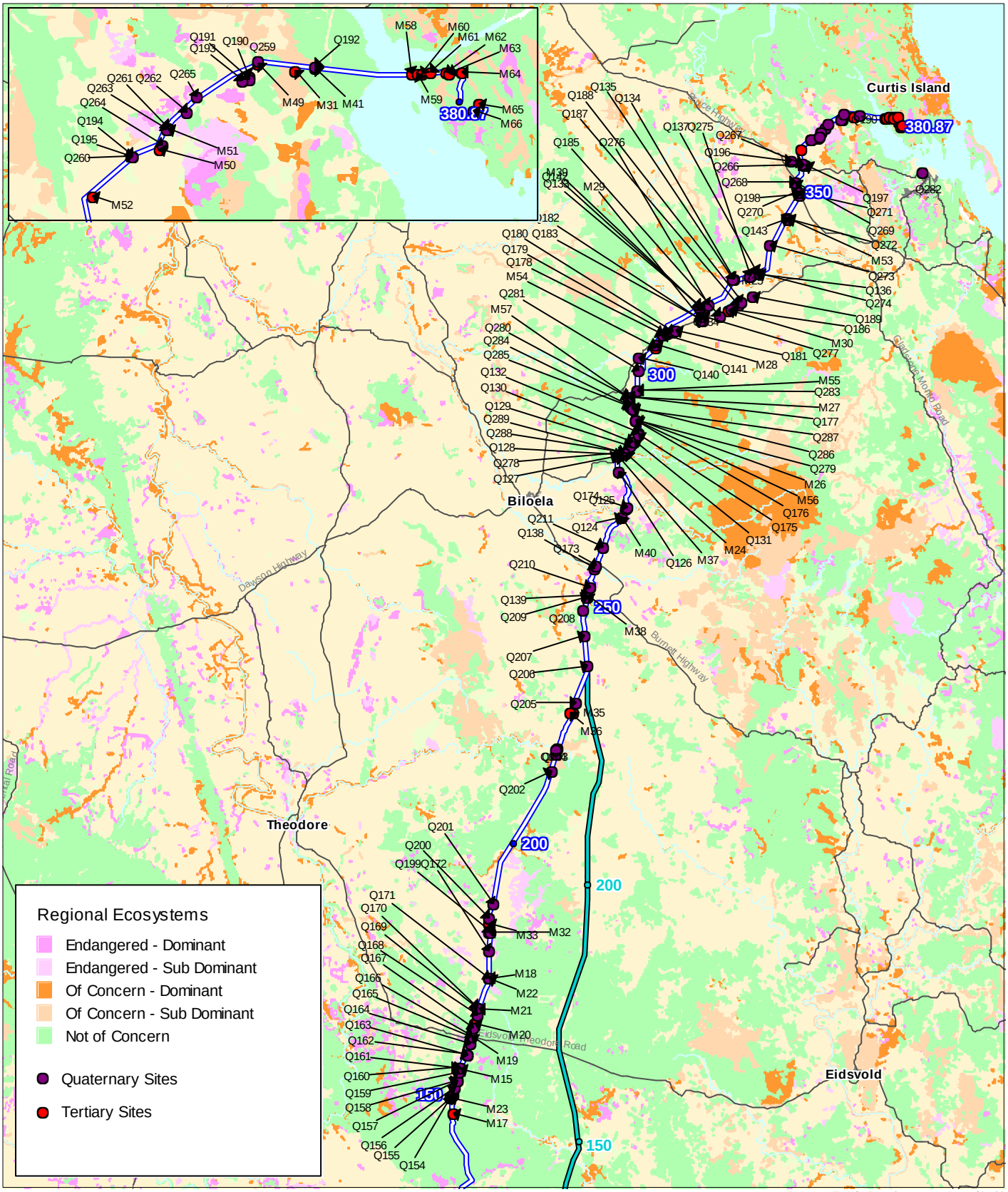

Legend:

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- Export Pipeline Option 2 & Kilometre Point
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point

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0 10 20 30 40

Kilometres

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QGC A BG Group business	Project: Queensland Curtis LNG Project	Title: Flora Survey Sites and Mapped Regional Ecosystems	Map 3 of 3
	Client: QGC - A BG Group business		
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	Date: 20.05.09	Revision: A	

7.3.1.3 *EVR Species*

Review of the Queensland Herbarium HERBRECS, Wildnet and the *EPBC Act* Protected Matters databases for the study area, identified 119 EVR plant species that are known to occur within or in the broad vicinity of the pipeline corridors (*Figure 4.7.7, Figure 4.7.8 and Figure 4.7.9*). These include:

- 111 species listed under the provisions of the Nature Conservation Act 1992 (Qld) (NC Act), including 14 Endangered, 42 Vulnerable, and 55 Rare species
- 48 species listed under the provisions of the EPBC Act including nine Endangered, and 39 Vulnerable species.

Based on available ecological information, 83 of these 119 EVR flora species have potential habitat within the pipeline alignments. These species and their preferred habitats were targeted during initial field survey work and will be targeted during the planned detailed surveys prior to alignment finalisation.

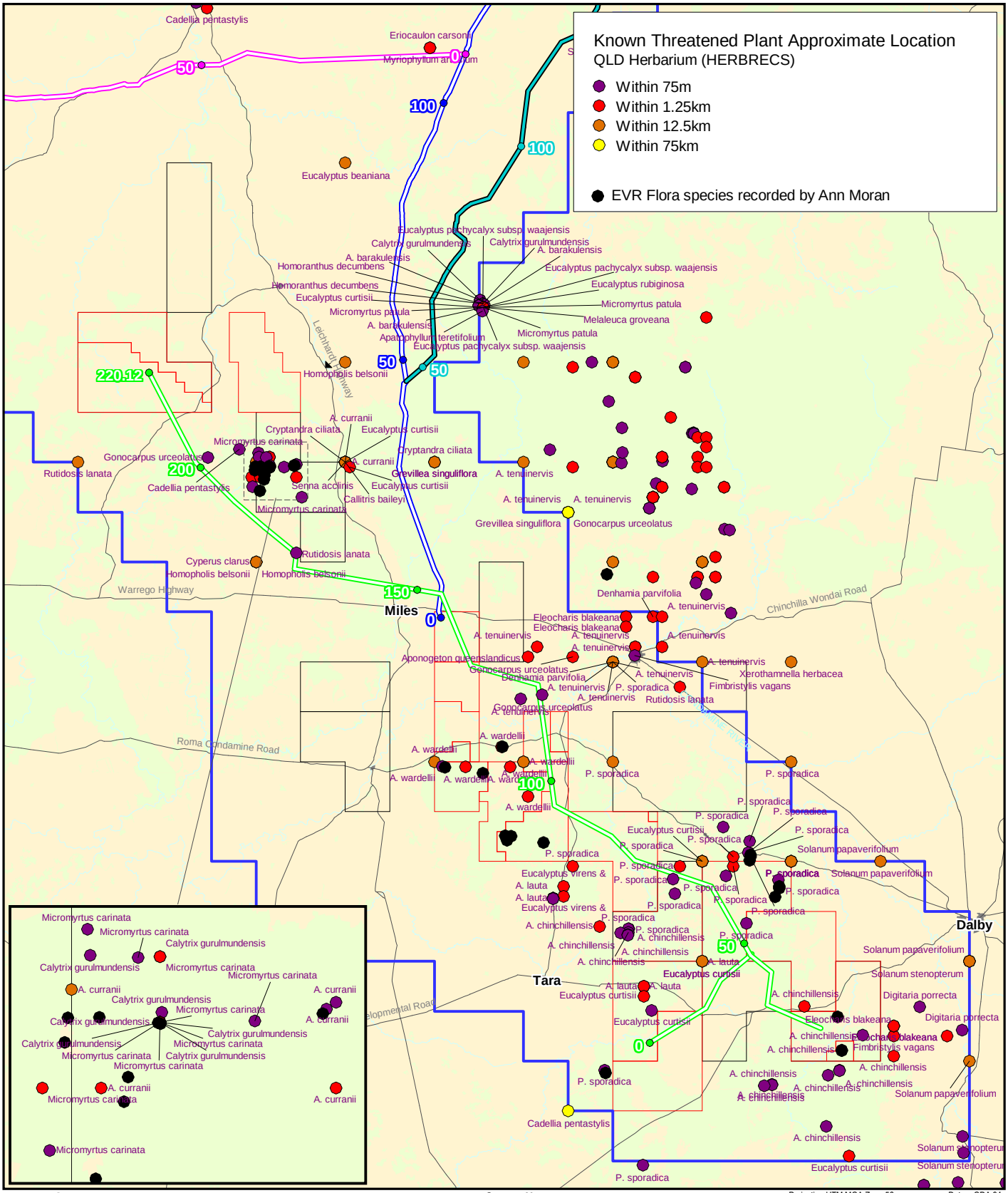
The field surveys observed two EVR species within or in the close proximity of the Export Pipeline alignments. These include:

- Cadellia pentastylis (Ooline) at approximate KP 227 (Site M36) along the Option 1 Export Pipeline
- a small population of Cycas megacarpa (Large-fruited Zamia) between KPs 296.5 and 298.5 (Sites M56 and M57) and two additional plants at approximate KP 301 and 305 along the Option 1 and Option 2 Export Pipeline corridors.

Field surveys conducted as part of the Gas Field study recorded five EVR species within the vicinity. These are:

- Acacia curranii
- Acacia wardellii
- Calytrix gurulmundensis
- Micromyrtus carinata
- Philotheca sporadica.

Note that as it was not yet possible to undertake detailed flora surveys of the entire length of the pipeline corridors, it is anticipated that additional EVR flora species will be found during the planned detailed alignment surveys prior to alignment finalisation.



QUEENSLAND CURTIS LNG A BG Group business	Project: Queensland Curtis LNG Project		Title: **Known EVR Locations**
	Client: QGC - A BG Group business		Map 1 of 3
ERM Environmental Resources Management Australia Pty Ltd	Drawn: Mipela	Volume: 4 Figure: 4.7.7	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.
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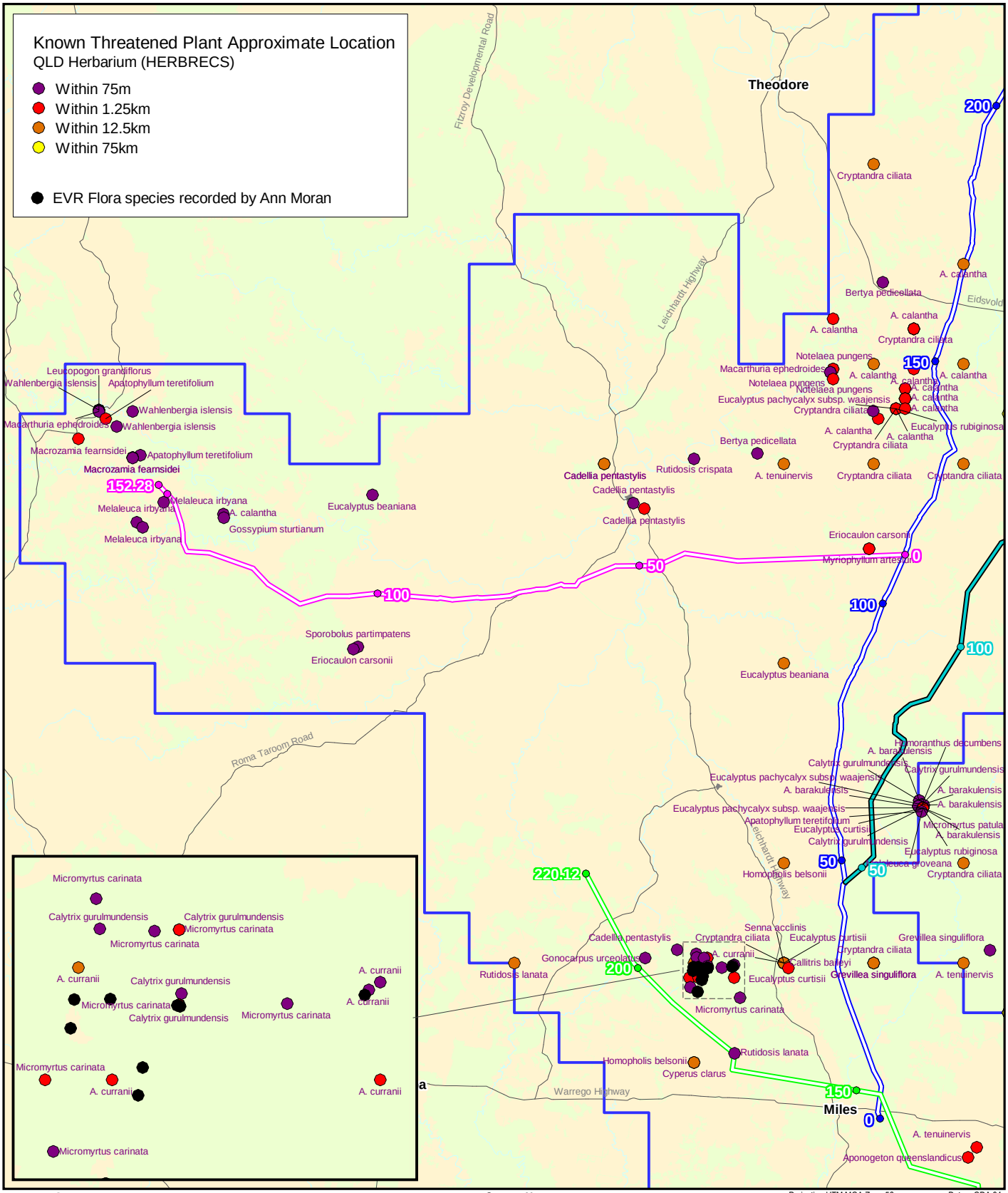
	Date: 17.06.09	Revision: A	



Legend:

- Export Pipeline & Kilometre Point
- Export Pipeline Option 2 & Kilometre Point
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point

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Projection UTM MGA Zone 56 Datum GDA 94

0 10 20 30 40
Kilometres

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QUEENSLAND CURTIS LNG
A BG Group business

Project	Queensland Curtis LNG Project
Client	QGC - A BG Group business
Title	**Known EVR Locations**
	Map 2 of 3

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Drawn	Mipela	**Volume** 4	**Figure** 4.7.8
Approved	CDP	File No:	EO5-P-MA-96174
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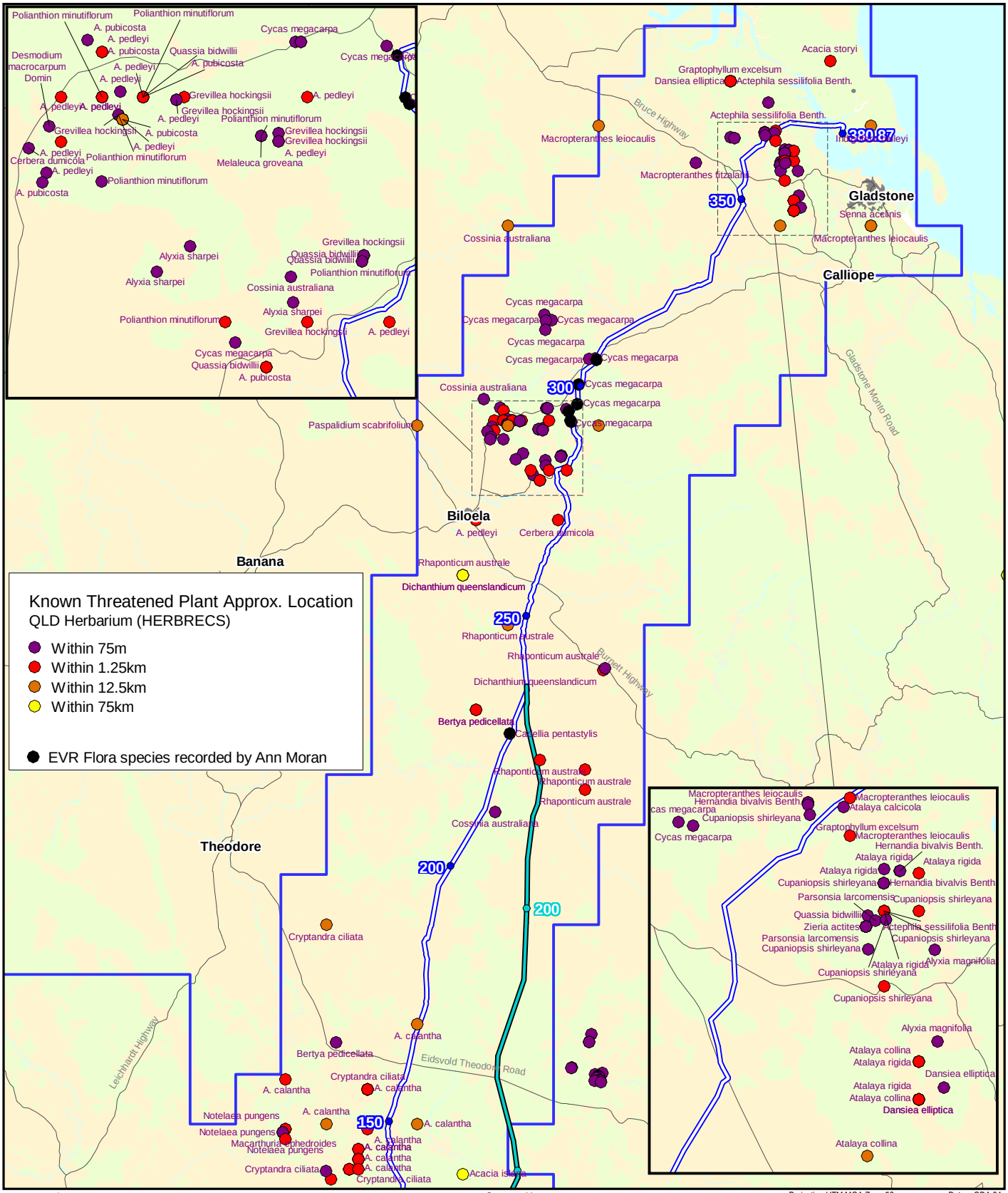

Legend:

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- Upstream Infrastructure Corridor & Kilometre Point

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0 10 20 30 40

Kilometres

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

Title **Known EVR Locations**

Map 3 of 3

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Drawn	Mipela	Volume 4	Figure 4.7.9
Approved	CDP	File No:	EO5-P-MA-96175
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7.3.1.4 *Regionally Significant Flora*

In addition to the EVR flora species, nine Regionally Significant flora species are known to occur within or in the vicinity of the pipeline corridors. These species have not been listed as being EVR under the *EPBC Act* (Cth) or *NC Act*, but have been identified by the former Environmental Protection Agency (EPA 2008) as non-EVR priority taxa for the Brigalow Belt Bioregion. These are:

- Acacia sp. Gaynder – According to BAMM records presence of this narrow endemic taxa is recorded between KPs 2.7 and 4.2 along the Option 1 and Option 2 Export Pipeline corridor
- Acacia aprepta (Miles Mulga) – occurs as a dominant in patches with scattered distribution in vegetation transected by the Lateral corridor between KP 145 and KP 157
- Acacia melvillei – was recorded by field surveys in small populations in areas between Kogan, Brigalow and Dalby (20 km north of the Lateral at KP 60)
- Acacia omalophylla – Field surveys recorded this species in the Wambo Creek area approximately 10 km north of the Lateral at approximate KP 80
- Acacia shirleyi – scattered distribution, widespread and common in areas within the vicinity of the Lateral. Also detected at three locations along the Export Pipeline at approximate KPs 1, 5 and 45 (M1, M4 and M9).
- Boronia sp. Aranbanga Creek – According to BAMM records presence of this narrow endemic taxa is recorded beteen KPs 2.7 and 4.2 along the Option 1 and Option 2 Export Pipeline corridor
- Corymbia bloxsomei – occasionally along edges of RE 11.7.5 approximately 10 km north of the Lateral at KP 180 and at KP 29 along the Export Pipeline (M3)
- Dodonea biloba – field surveys recorded its presence in Barakula SF and in areas north of Chinchilla (e.g. Auburn Rd). It was also recorded in the Dogwood Creek area approximately 10 km west of the Export Pipeline corridor at KP 30
- Dodonaea macrossanii – widespread and common in the vicinity of the Collection Header at approximate KP 100 particularly in RE 11.5.1. Occurs often along roadsides and is often heavily grazed by kangaroos and wallabies down to stump level.

7.3.1.5 *Declared and Environmental Weeds*

The field survey detected the following declared weeds within or in the vicinity of the pipeline corridors:

- Mother of Millions (Bryophyllum delagoense)
- Rubber Vine (Cryptostegia grandiflora)
- Prickly Pear (Opuntia spp.)

- Parthenium Weed (Parthenium hysterophorus)
- Sicklepod (Senna obtusifolia)
- Cats Claw Creeper (Macfadyena unguis-cati)
- Lantana (Lantana camara)
- Creeping Lantana (Lantana montevidensis).

Numerous environment weeds were also recorded during field surveys. Species that may impede rehabilitation works following construction include:

- Castor Oil Plant (Ricinus communis)
- Mexican Poppy (Argemone ochroleuca)
- Mimosa Bush (Acacia farnesiana)
- Exotic pasture grasses, such as:
  - Buffel grass (Cenchrus ciliaris)
  - Guinea Grass (Megathyrsus maximus - syn. Panicum maximum)
  - Thatch Grass (Hyparrhenia rufa)
  - Sabi Grass (Urochloa mosambicensis).

Many REs have been substantially degraded by Buffel Grass and Green Panic Grass, both of which have the capacity to displace native ground storey species and alter fire regimes irrevocably. Buffel Grass is now recognised as an emerging environmental weed of considerable importance (Best 1998; Clarke et al. 2005; Greenfield 2007). It is also widely used in the region as a pasture grass.

7.3.2 Fauna

7.3.2.1 EVR Species

Database searches identified 42 fauna species listed as EVR under the *EPBC Act* and/or the *NC Act* as previously recorded from the pipeline corridors (two fish, one mollusc, one insect, one frog, 12 reptiles, 17 birds and eight mammals). Of these species, nine are listed under both the *EPBC Act* and *NC Act*, while 22 are listed under the *EPBC Act* only, and 12 are listed under the *NC Act* only.

Based on desktop and field assessment of available habitat, 38 of these listed EVR species could potentially utilise habitats within the 10 km-wide study area of the pipeline alignments.

Field surveys conducted as part of the Gas Field study identified eight EVR fauna species within the vicinity of the proposed Collection Header corridor:

- Imperial Hairstreak Butterfly (Jalmenus evagoras eubulus) – Vulnerable under the NC Act
- Golden-tailed Gecko (Strophurus taenicauda) – Rare under NC Act
- Glossy Black cockatoo (Calyptorhynchus lathami) – Vulnerable under the

NC Act

- Little Pied Bat (Chalinolobus picatus) – Rare under the NC Act
- Eastern Long-eared Bat (Nyctophilus timoriensis) – Vulnerable under the EPBC Act and the NC Act
- White-throated Needletail (Hirundapus caudacutus) – Migratory species
- Fork-tailed Swift (Apus pacificus) – Migratory and Marine species
- Large-eared Pied Bat (Chalinolobus dwyeri) – Vulnerable under the EPBC Act and the NC Act (Tentative Record at Gurulmundi State Forest).

One EVR fauna species, the Glossy Black cockatoo, was recorded during the initial survey of the Option 1 Export Pipeline.

7.3.2.2 Regionally Significant Fauna

In addition, nine Priority Species listed in the BAMM for the Brigalow Belt South (Criteria H) were identified during detailed field surveys in the Gas Field in the general vicinity of the Collection Header. These species are presented in *Table 4.7.1.*

Table 4.7.1 Regionally Significant Fauna in Vicinity of Collection Header

Common Name	Scientific Name
Salmon-striped Frog	*Lymnodynastes salmini*
Speckled Warbler	*Chthonicola sagittata*
Brown Treecreeper	*Climacteris picumnus*
Barking Owl	*Ninox connivens*
Koala	*Phascolarctos cinereus*
Yellow-bellied Glider	*Petaurus australis*
Narrow-nosed Planigale	*Planigale tenuirostris*
Common Brushtail Possum	*Trichosurus vulpecula*
Eastern Pebblemound Mouse	*Pseudomys patrius*

7.3.2.3 Introduced Fauna

Ten introduced species have been recorded within the wider study area of the Project's three pipeline corridors these include one amphibian, two birds and seven mammals. These introduced fauna species are set out in *Table 4.7.2.*

7.3.3 Wetlands

The Collection Header traverses the Condamine River and several nationally significant wetlands occur downstream, including the Ramsar-listed Narran Lake Nature Reserve which is approximately 450 km to the south-west. The Export Pipeline and Lateral Pipeline traverse a number of significant watercourse catchments including the Auburn, Dawson, Nogoa and Calliope.

Table 4.7.2 Introduced Fauna

Common Name	Scientific Name
Cane Toad	*Rhinella marina*
House Sparrow	*Passer domesticus*
Common Starling	*Sturnus vulgaris*
European Fox	*Vulpes vulpes*
Feral Pig	*Sus scrofa*
Domestic Dog	*Canis familiaris*
Feral Cat	*Feils catus*
European Rabbit	*Oryctolagus cuniculus*
House Mouse	*Mus musculus*
Feral Goat	*Capra hircus*

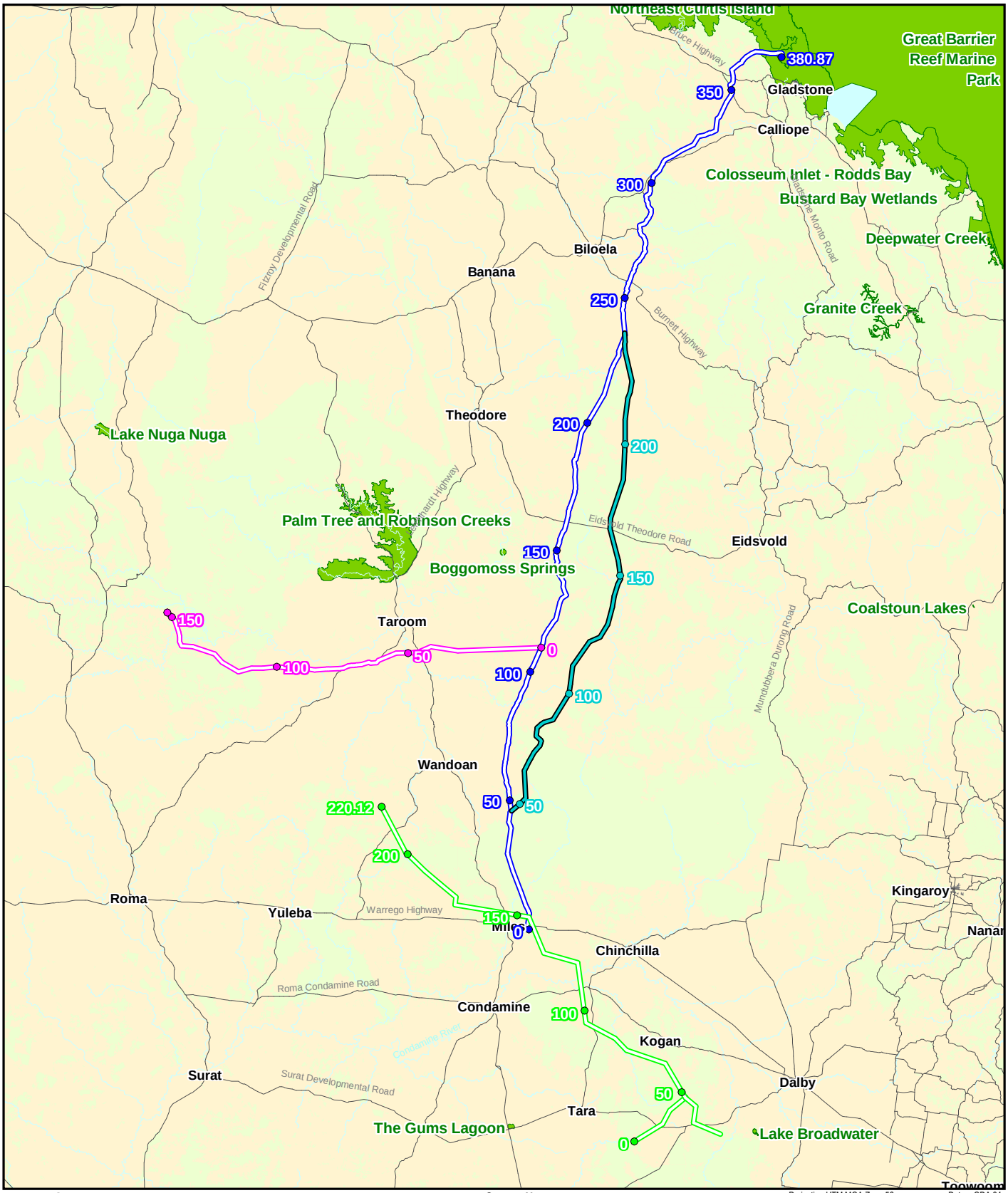
A search of the Directory of Important Wetlands in Australia (Figure 4.7.10) indicates that the only important wetland transected by the proposed pipeline corridors is the Narrows, located in close proximity to the marine crossing to Curtis Island. According to this directory, approximately 15 ha of this wetland are traversed by both Option 1 and Option 2 Export Pipeline corridors between KPs 372 and 375. Other important wetlands mapped as occurring in the broad vicinity of the pipeline corridors are:

- Palm Tree and Robinson Creek – approximately 25 km north of the Lateral Pipeline at KP 50
- Boggomoss Springs- approximately 40 km west of the Export Pipeline at KP 150
- Gums Lagoon – 26 km south-west of Tara and approximately 45 km south of the Collection Header
- Lake Broadwater – 25 km south-west of Kogan and approximately 10 km west of KP 24 of the Collection Header.

None of the pipeline corridors are located within the catchment areas of any of these important wetlands.

The pipeline corridors also transect a couple of small areas mapped by the Queensland Herbarium as wetlands. A small area (1 ha) of freshwater wetland RE 11.3.27 is mapped as occurring along the Export Pipeline corridor between KPs 12 and 13. As a result of land access constraints, it was not possible to visit this area. However, it is expected that these areas will be groundtruthed prior to construction to confirm the location and avoidability of any wetlands in this location.

Marine wetlands RE 11.1.2 (*Samphire forbland* on marine clay plains) and RE 11.1.4 (mangrove woodland on marine clay plains) are mapped between KPs 373.2 and 374.4 along the Export Pipeline corridor just before the marine crossing to Curtis Island. Due to access restrictions (waterlogging and cultural heritage issues) these areas could not be surveyed in the field and are therefore assumed to be in good condition.



Legend:

- Export Pipeline & Kilometre Point
- Export Pipeline Option 2 & Kilometre Point
- Lateral Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point
- Important Wetlands

Source Note:

1:250,000 Topographic Vector copyright Geoscience Australia
Important Wetlands copyright Department of Primary Industries
Coastal Wetland Vegetation

Projection UTM MGA Zone 56 Datum GDA 94

0 20 40 60 80

Kilometres

N

QUEENSLAND CURTIS LNG
A BG Group business

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

Title **Important Wetland Areas - Overview**

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	GH	Volume 4	Figure 4.7.10
Approved	CDP	File No	EO5-P-MA-96161
Date	20.05.09	Revision	A

7.4 POTENTIAL IMPACTS AND MITIGATION MEASURES

7.4.1 Potential Impacts on Flora

It is important to note that the pipeline corridors are likely to be decommissioned within several decades. Subject to the exception that landholders may, at that future time, choose to manage their properties in a manner that inhibits natural regrowth, the impacts associated with clearing for construction and maintenance of the pipeline are considered to be reversible within all REs in the long term.

The key impact on flora as a result of Pipeline Component construction activities will be the clearing of the Right-of-Ways (RoW). While it is anticipated that a 40 m cleared width will be required for the Export Pipeline and the Lateral Pipeline and 80 m for the Collection Header (refer *Volume 2, Chapter 12*) the flora assessment has adopted an average 50 m and 100m clearing width respectively for calculating impacts. This allows for any additional clearing that may be required along the RoW (e.g. work areas).

Approximately 310 km of remnant vegetation is transected by the pipeline corridors which have a total length of approximately 730 km.

The majority of the area to be cleared consists of Eucalypt woodlands and forests. Very minor clearing will also be required to cross fragmented stands of Brigalow which often occur on roadside verges or as wind breaks along the margins of pasture or cropping paddocks. Mostly, this will involve transecting relatively narrow, linear corridors.

The Queensland Herbarium mapping also indicates a small number of locations where the alignments may impinge on SEVT, Native Bluegrass Grassland and Freshwater Wetland communities. The detailed field assessment will confirm the extent and locality of these features and it is considered likely that these will be largely, if not totally, avoidable.

In order to place the potential impacts of the Project within a Project area and bioregional perspective, the following estimates have been made:

- the total known area of EPBC-listed ecological communities that occur along the Project's three pipeline corridors and the estimated extent of area, and percentage of area that may be impacted. This estimate coincides with (and is not additional to) the areas estimated for Endangered, Of Concern and Not of Concern REs under the VM Act
- the total area of VM Act Endangered REs within the pipeline routes and the estimated extent of area, and percentage of area that may be impacted
- the total area of Of Concern REs within the pipeline routes and their estimated extent of area, and percentage of area that may be impacted
- the total area of Not of Concern REs within the pipeline routes and its estimated extent and percentage of area that may be impacted
- comparisons are also made with the overall extent of these RE categories

within the Bioregion.

These estimates are set out in *Table 4.7.3.*

Table 4.7.3 Estimated Clearing Extent by Conservation Status

RE Status	Clearing extents (Ha)	Extent within 5 km (Ha)	% of that within 5 km to be cleared (Ha)	Extent in Bioregion	% of that within Bioregion to be cleared
EPBC Listed*	17	6,843	0.15	428,884	<0.01
Endangered	18	7,200	0.25	475,891	<0.01
Of Concern	105	14,746	0.71	1,435,429	<0.01
Not of Concern	1,339	240,519	0.56	8,294,793	0.02
TOTAL	1,462	262,465	0.56	10,206,113	0.01

* 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 (100 m for the Collection Header) used in these calculations
- disturbance of remnant vegetation adjacent to The Narrows may be avoided by the use of trenchless techniques where alternative crossing techniques do not represent a lower impact.

7.4.1.1 Other Impacts

Other potential impacts include:

- the movement of machinery and vehicles between areas, which has the potential to spread weeds including a number of environmental and declared noxious species, such as Parthenium weed, Giant Rat's-tail grass and Buffel grass
- introduction or proliferation of pest animals
- release of contaminants and/or silt into watercourses, mangrove and wetland areas
- altered hydrological and sedimentation regimes due to construction of the pipeline across the mainland marine wetland areas
- changes to fire regimes, in particular increased fire regimes due to higher weed biomass along cleared easements.

7.4.1.2 Potential Impacts on EPBC-Listed Communities

The Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) provides administrative guidelines to assist in determining whether the impact of an action on any Matter of National Environmental Significance

(MNES) is likely to be significant.

Criteria provided for endangered ecological communities are:

"*An action has, will have, or is likely to have a significant impact on an endangered ecological community if it does, will, or is likely to*:

- *lead to a long-term adverse effect on an ecological community*
- *reduce the extent of a community*
- *fragment an occurrence of the community*
- *adversely affect habitat critical to the survival of an ecological community*
- *modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for the community's survival*
- *result in invasive species that are harmful to the critically endangered or endangered community becoming established in an occurrence of the community*
- *interfere with the recovery of an ecological community.*"

Because of the small and fragmented nature of all EPBC-listed vegetation communities transected by the pipeline corridors, and the degree of flexibility to move these alignments to avoid these areas (subject to constructability constraints), the impacts associated with these proposed pipelines corridors are predicted to be low.

It is also important to note the significantly smaller area of EPBC-listed communities that occur along the Option 2 Export Pipeline alignment. The area of these communities located within the two respective Export Pipeline options is set out in *Table 4.7.4* (see also *Volume 13*).

Table 4.7.4 Estimated Clearing Extent by Conservation Status of Option 1 and Option 2 Export Pipeline

EPBC-Listed Ecological Community	Total clearing footprint using Option 1 (ha)*	Total clearing footprint using Option 2 (ha)*
Brigalow	22	14.
SEVT	3	3
Grassland	2	0
Weeping Myall	0	0
Total	27	17

* Potential Impacts on VM Act Listed Communities

The areas of *VM Act* (Qld) Endangered REs transected by the pipelines are the same as the EPBC-listed Ecological Communities above, with the exception of the two additional Endangered REs which are not EPBC-listed.

Areas which would be required to be cleared within these REs are estimated to be:

- for RE 12.3.3, approximately 0.3 ha to be cleared for proposed Export

Pipeline corridor (either option) at its most north-eastern point (on Curtis Island)

- for RE 11.12.17, approximately 0.2 ha if the Option 1 Export Pipeline is used (If the Option 2 Export Pipeline is used it would require no clearing within this RE).

Based on use of the Option 2 Export Pipeline a total of, approximately:

- 18 ha of VM Act Endangered REs
- 105 ha of Of Concern REs
- 1,339 ha of Not of Concern REs may be required to be cleared.

7.4.1.3 Comparison of Option 1 and Option 2 Export Pipeline

According to existing Queensland Herbarium mapping the area of remnant vegetation that would require clearing by each Export Pipeline option is estimated to be:

- 1,382 ha for the Option 1 Export Pipeline
- 1,462 ha for the Option 2 Export Pipeline.

Although Option 2 Export Pipeline passes through more remnant vegetation according to existing mapping the Option 2 Export Pipeline alignment transects a significantly smaller area of EPBC-listed Ecological Communities and *VM Act* Endangered and Of Concern REs.

7.4.1.4 EVR Flora

It is anticipated that Endangered, Vulnerable and Rare (EVR) flora species recorded during the detailed alignment survey will generally be avoided by alignment refinement and narrowing for short lengths. There may however be some populations which are unavoidable. Generally this would relate to species with restricted habitat niches from which a pipeline may not be able to deviate. For example, the rare Large-fruited Zamia (*Cycas megacarpa*) populations occur on range spurs within the vicinity of KP 292 to 294.5 and KP 301 to 305, which the Export Pipeline will need to follow for constructability purposes.

The analysis identifies that in the absence of appropriate mitigation measures there is a moderate-to-high potential to impact on all likely EVR flora species. The high potential for impacts relates to species which are known to have restricted distributions and spatial extents. Assuming the successful implementation of appropriate mitigation measures, the potential to impact all EVR flora species is low with the exception of:

- Large-fruited Zamia (Cycas megacarpa)
- Micromyrtus patula
- Philotheca sporadica.

For each of these species, which have populations which could potentially be dense within constrained alignment locations, the potential for impacts

associated with clearing for construction may be moderate due to, potentially, the inability to avoid certain areas. In such circumstances, an EVR species conservation plan would be developed and approval sought from both DEWHA (for EPBC-listed species) and the DERM (for *NC Act* EVRs) prior to finalisation and development of the alignment.

No significant direct or indirect impacts on any freshwater aquatic flora are considered likely from the construction or operation of the pipeline corridors provided that appropriate mitigation measures are employed.

7.4.1.5 Potential Impacts to Regionally Significant Flora

Of the four Regionally Significant flora species known to occur within the pipeline corridors (i.e. Miles Mulga, Lancewood, *Dodonaea macrossanii* and *Corymbia bloxsomei*), the first three are relatively widespread and common in the area. As such the proposed clearing is unlikely to have any significant effect on local or regional populations of these species.

Corymbia bloxsomei was observed in smaller numbers fringing the ecotone around RE 11.7.5 in the vicinity of Gurulmundi State Forest. Without adequate mitigation measures (e.g. pre-clearance survey and realignment to avoid) there would be some potential for clearing within this area to have a significant impact on this species.

7.4.2 Potential Impacts on Fauna

The pipeline alignments have been selected to avoid as many large and connected areas of vegetation habitat as possible. However, with pipeline corridors of such length it is not possible to avoid all areas of fauna habitat. With successful implementation of appropriate environmental management controls, any potential impacts on fauna species are likely to be limited to direct impacts associated with construction of the proposed pipeline. The pipeline construction will require some clearing of vegetation and this generally equates to a loss of fauna habitat.

In relation to common fauna species, this is unlikely to result in a significant long-term impact, as similar habitats are available in areas adjacent to the proposed pipeline route and common species would utilise these habitats.

7.4.2.1 Potential Impacts on EVR Fauna

Potential impacts on EVR and common fauna include the following:

- removal of habitat such as mature vegetation, hollow-bearing trees and fallen logs, and therefore loss of nesting, shelter and foraging resources
- fragmentation of habitat due to pipeline construction. These features may act as movement barriers, particularly to fossorial[1] species, and alter movement patterns. They may also limit access to dry-season fauna

1 burrowing

refuges associated with riverine environments

- disturbance to fauna movement corridors and dry-season fauna refuges (predominantly associated with rivers and creeks)
- the establishment of environmental weeds, particularly Buffel grass, has the potential to fundamentally destroy natural fauna habitats through altered fire regimes and removal of fauna food resources
- noise and increased human activity, particularly during site development may restrict species movements, limit access to food or other resources
- potential for trenchfall in which fauna species fall into and become trapped in the open pipeline trench during construction
- the elevated risk of wildfires as a result of construction activities including welding and machinery emissions.

A number of the EVR fauna species identified as potentially occurring within the proposed pipeline route are nomadic, highly mobile or occupy very large home ranges. These include the Red Goshawk (*Erythrotriorchis radiates*), Squatter Pigeon (*Geophaps scripta scripta*), Glossy Black cockatoo (*Calyptorhynchus lathami*), Cotton Pygmy-goose (*Nettapus coromandelianus*), Grey Falcon (*Falco hypoleucos*), Black-necked Stork (*Ephippiorhynchus asiaticus*) and Black-chinned Honeyeater (*Melithreptus gularis)*.

Given the small amount of remnant habitat to be cleared by construction of the pipeline corridors, compared to the area over which individuals of these species range, no significant impact on these species is likely.

Several other EVR fauna species have the potential to be directly impacted if they are present along the pipeline route in woodland and brigalow habitats, but also have preferred habitat types that are well represented in the immediate vicinity of the alignment. These include Imperial Hairstreak (*Jalmenus evagoras eubulus*), Brigalow Scaly-foot (*Paradelma orientalis*), Yakka Skink (*Egernia rugosa*), Golden-tailed Gecko (*Strophurus taenicauda*), Northern Quoll (*Dasyurus hallucatus*) and Little Pied Bat (*Chalinolobus picatus*).

Although there is potential for some direct impact on these species, the small amount of habitat to be cleared combined with the implementation of appropriate mitigation recommendations will result in minimal potential for the proposed pipeline construction to significantly impact on these EVR fauna species.

A number of EVR species potentially present may be susceptible to entrapment in the open pipeline trench, comprising one frog, seven reptiles and one mammal. These are Tusked Frog (*Adelotus brevis*), Collared Delma (*Delma torquata*), Brigalow Scaly-foot (*Paradelma orientalis*), Yakka Skink (*Egernia rugosa*), Short-Necked Worm-Skink (*Anomalopus brevicollis*), Ornamental Snake (*Denisonia maculata*), Dunmall's Snake (*Furina dunmalli*), Grey Snake (*Hemiaspis damelii*), Yellow-naped Snake (*Furina barnardi*) and Northern Quoll (*Dasyurus hallucatus*).

The detailed distributions of several of the EVR fauna species identified are poorly known, as they are particularly secretive or cryptic in their habits. As such, the likely presence of these species is difficult to assess. These include Yellow-naped Snake, Dunmall's Snake, Ornamental Snake and Grey Snake. In the absence of adequate data the precautionary principle will apply, and it will be assumed that these reptile species are present, particularly in remnant Woodland and Brigalow habitats on cracking clay soils.

These habitats were only recorded in several small areas along the alignment, so significant impacts on these species are unlikely, provided appropriate mitigation measures are implemented.

7.4.3 Potential Impacts to Wetlands

The Collection Header traverses the Condamine River and several nationally significant wetlands occur downstream, including the Ramsar-listed Narran Lake Nature Reserve approximately 450 km to the south-west. Because of that distance from the pipeline, there is low potential for the proposed activities to impact upon this wetland.

The only Important Wetland transected by the Export Pipeline corridor is The Narrows located in close proximity to the marine crossing to Curtis Island (Figure 4.7.10). According to this directory, approximately 15 ha of this wetland is traversed by the Export Pipeline corridor between KPs 372 and 375. Potential impacts on this wetland have been assessed in a separate study and are presented in *Volume 5, Chapter 8* of the EIS. No other important wetland occurs in close proximity or within the catchment areas of the pipeline corridors and therefore no impacts are anticipated on these wetland areas.

The total area of estuarine wetland communities that are mapped as occurring within the Export Pipeline corridors is approximately 15 ha. This area is the same regardless of which Export Pipeline option is used.

These wetland communities are sensitive to potential impacts associated with construction and operation of the pipeline, in particular:

- release of contaminants, nutrients and/or silt
- altered hydrological and sedimentation regimes due to construction of the pipeline across the mainland marine wetland areas.

One small area (1 ha) of freshwater wetland is mapped by the Queensland Herbarium (RE 11.3.27) as occurring along the Export Pipeline corridor between KPs 12 and 13. As a result of land access constraints it was not possible to visit this area. However, it is expected that these areas will be groundtruthed prior to alignment finalisation to confirm the location of any wetlands and whether they may be avoided.

Due to their sensitivity, areas mapped as ephemeral wetlands within the broader pipeline area could potentially be impacted through sedimentation, eutrophication and accidental release of contaminants. However, no

significant direct or indirect impacts to freshwater wetlands are considered likely provided that the recommended mitigation measures outlined in *Section 7.5* are followed.

7.5 MITIGATION AND REHABILITATION

7.5.1 Alignment Specific Recommendations

From an ecological perspective, the more desirable option of the two Export Pipeline alignments is considered to be Option 2. This is due to the significantly smaller areas of Threatened Ecological Communities/REs that fall within the Option 2 Export Pipeline corridor (as detailed in *Section 7.4.1.3*). The main negative impact of the Option 2 alignment is that it transects larger remnants of Not of Concern vegetation communities. However, this is considered to have a lesser ecological impact.

Note that refinements are ongoing as constructability, cultural, environmental and landholder preferences are incorporated into the preferred alignment. A number of minor realignment recommendations identified during the initial field inspection are shown in *Table 4.7.5.* Additional ecological preferences will be identified during the detailed survey prior to alignment finalisation and ecological review will be undertaken for any subsequent alignment refinements.

Table 4.7.5 Alignment Specific Recommendations

KP	Reason	Alignment	Ecological Desirability
Option 1 and Option 2 Export Pipeline Alignments			
4.5-5	Runs along the edge RE 11.4.3 remnant listed as Endangered under both the EPBC and VM Act.	To move the corridor 200m to the east	High
12.4-12.8	Runs along the edge of freshwater wetland community RE 11.3.27	Move the alignment approximately 100 m to the west of this remnant	High
292.7-262.9 and 263.5	Transects two small remnants of the mixed community of RE 11.9.5/11.9.7. RE 11.9.5 is listed as Endangered under the EPBC and VM Act and RE 11.9.7 is listed as Of Concern under the VM Act.	Move the alignment 200 m to the east	High
280.2-280.6	Transects a remnant of VM Act mixed Of Concern community RE 11.3.4/11.3.25/11.3.6	Move the alignment 650 m to the east at KP 280 in order to minimise the area crossed	Moderate
280.2-280.5, 281.8-282.2 and 282.8-284	Transects a remnant of VM Act mixed Of Concern community RE 11.3.4/11.3.25/11.3.6	Move the alignment 600 m to the north at KP 281 and 150 m north at KP 283.5 in order to follow corridor of non-remnant vegetation	Moderate

KP	Reason	Alignment	Ecological Desirability
307	Route edges an area of State habitat for EVR species	Move the alignment 200 m to the east	
379	Transects a fragment of VM Act Endangered RE 12.3.3	Move the alignment 100 m south	High
Option 2 Export Pipeline			
216-221	Transects a large unfragmented patch of Not of Concern remnant vegetation	Move the alignment 500 m east at KP 216	Moderate
Option 1 Export Pipeline			
130	Passes through a small mixed community of 11.9.4b/11.9.5 listed as Endangered under both the EPBC and VM Act	Move the alignment 700 m east	High
177	Passes through a small roadside remnant of RE 11.12.21 listed as Endangered under both the EPBC and VM Act	Move the alignment 200 m to the west	High
Lateral Pipeline			
43.9	Passes through a small fragment of the EPBC and VM Act Endangered community RE 11.9.5	Move alignment 150 m to the north	High
113.1	Transect small remnant of VM Act Of Concern community RE 11.3.2	Move the alignment 200 m to the south	Moderate
123.5	Transects two fragments of the VM Act Of Concern community RE 11.3.2	Move the alignment 300 m north west in order to minimise the area crossed	Moderate
147.4-147.6	Transects a community of 11.9.4 listed as Endangered under both the EPBC and VM Act	Move the alignment 200 m to the east	High
Collection Header			
2-8.2	Runs along the edge of a mixed community of Of Concern communities RE 11.3.2 and RE 11.3.18 and riparian woodlands RE 11.3.25	Move the alignment south of this area	High
146-146.5	Transects 4.14 ha of Endangered Brigalow Community RE 11.4.3	Move the alignment 500 m south	High

7.5.2 Mitigation and Rehabilitation Recommendations for Flora and Fauna

The following mitigation measures will be implemented to help ensure that significant impacts on flora and fauna are avoided:

- detailed field investigations will be undertaken of the preferred alignments prior to finalisation
- refer to *Volume 5, Chapter 7* for measures to mitigate impacts to fauna and flora in the vicinity of The Narrows
- the corridor impacted for pipeline construction within all areas of remnant vegetation will be minimised wherever practicable. It is recognised that clearing widths will be unlikely to be less than 40 m.

- wherever possible clearing widths will be minimised in beds and banks of watercourses and in areas with Endangered and Of Concern vegetation
- clearing of remnant vegetation areas will be avoided for the purposes of siting construction camps and where possible, vehicle access tracks
- existing roads and tracks will be utilised for access where practicable
- clearing boundaries within remnant vegetation areas will be clearly marked in the field
- vegetated creek lines, fence lines and road reserves will be crossed at 90 degrees whenever possible and at locations to limit the extent of clearing required
- the Draft EMP will include appropriate requirements in relation to management of waste and potential contaminants
- a fire extinguisher and personnel trained in fire fighting will be on hand during welding operations to minimise damage caused by accidental fires
- topsoil will be removed and re-spread across rehabilitation areas as soon as possible following disturbance (preferably within 12 months)
- care will be taken to ensure hydrological characteristics are not altered and appropriate soil and erosion management is implemented in and adjacent to riparian areas
- drainage will be reinstated at watercourse crossings immediately following completion of construction
- no permanent barriers to fish movement will be created at any stage of the Project
- effective erosion and sediment control structures will be designed, installed and maintained prior to and during construction and operation (especially near wetlands, watercourses, steep areas and areas of erodible/dispersive soils)
- the treatment and disposal of hydro-test water will be in accordance with the recommendations made in the CSIRO Manufacturing and Infrastructure Technology report (2005)
- monitoring of weed infestations within disturbed areas will occur at least monthly during construction and then quarterly for a period of two years following construction. Appropriate weed control measures will be applied. Following the two-year period, the frequency of monitoring will be reconsidered dependent on the success of control measures and the level of infestations
- a Weed Management Plan that addresses the construction, rehabilitation and operation phases of the project will be prepared prior to construction. This Plan will include hygiene protocols to minimise the likelihood of introduction and spread of environmental, agricultural and declared weeds
- all vehicles and plant will have certification that they are weed-free prior to their initial commencement of works and when moving from weed-infested to weed-free sections of the pipeline route

- all vehicles will remain on designated access roads and tracks and within defined pipeline construction area and associated work/campsites
- fauna handlers will be present to survey for, and as necessary relocate, wildlife immediately prior to and during clearing activities
- trenching will occur progressively to minimise the period of time the trench is open and the length of open trench. The length of open trench at any one time will be the minimum practicable. Ramps and trench plugs with slopes of no greater than 50 per cent (APIA, 2005) will be located at least every 500 m to assist escape for some species. Where possible, trench plugs will coincide with stock and wildlife trails. Some form of cool insulated cover will be provided. Branches, ramped gangplanks or similar will also be used to create ''ladders'' at regular intervals to assist small fauna to exit the trench (APIA, 2005)
- qualified fauna spotters and handlers will be employed to survey the open trench, record and remove any trapped fauna species. Such surveillance will occur along the entire length of the trench and not merely those areas described as fauna habitats or sensitive areas, as trench fall can entrap significant numbers of fauna along any part of the trench
- fauna spotters and handlers will be qualified or appropriately trained to assess and handle any injuries to native fauna that may occur due to trenchfall. Qualified veterinary staff should be accessible to provide advice, assess and treat or euthanise (as necessary) any native vertebrates
- consideration will be given to the use of temporary fencing to exclude access to the trench by livestock and larger native wildlife (APIA, 2005). Fauna searches will be conducted at least daily
- vegetative waste as a result of clearing will be mulched or distributed across adjacent areas where it may provide refuge for terrestrial species. It will not be burnt
- vegetative wastes resulting from clearing will, where practicable, be re-spread over the easement following construction. This will further encourage regrowth and minimise weed infestations
- subject to easement requirements and landholder preferences, trees and shrubs will be allowed to naturally regenerate on those parts of the cleared pipeline corridor that are not required to be kept tree-free for pipeline protection and maintenance access purposes
- linear features such as roads and pipelines will be built to a standard sufficient to allow for their intended purpose but will be allowed to revegetate as much as possible so as to minimise their impact on terrestrial fauna movements
- whilst construction will be year round where construction occurs outside of the coolest and driest months (e.g. April to September), when reptiles and amphibians are least active and when conditions are most favourable for minimising mortality in the trench, additional surveillance of trenches will be undertaken

- vehicle movements will be restricted at night as far as practicable
- vehicles will travel along the RoW at appropriate speeds that minimise environmental risks as far as practicable
- a seeding plan will be developed. The plan will be implemented using native groundcover species (or in existing pasture areas the dominant pasture species) at completion or reinstatement of each section of the pipeline
- areas where initial seeding and natural regeneration is not successful (i.e. has not achieved 50 per cent of the desirable species cover on adjoining undisturbed areas within 24 months) the area will be reseeded with native groundcover species (or in existing pasture areas with dominant pasture species)
- rehabilitation of lands will be negotiated with landholders where applicable. Unless infrastructure is to be retained for other use (roads), areas will be ripped and allowed to naturally revegetate where appropriate. Hardened road surfaces will be removed or regraded to restore the original land surface as much as possible
- vehicle tracks will be minimised and defined on alignment sheets following the rehabilitation of the corridor post-construction
- where possible, native shrubs will be allowed to regenerate to reduce the barrier to fauna movement, especially for small ground-dwelling fauna
- offsets will be established where impacts to native vegetation and fauna habitats are unavoidable. These areas will be managed with a strong conservation focus and aim to provide vital protection for flora and fauna in this region where other protected areas (Conservation Parks and National Parks) are absent. It is proposed that such areas should have conservation plans developed for them and active conservation management should be undertaken. This would include flora and fauna monitoring to assess the efficacy of conservation practices and to feed back into the development of improved future practices.

7.5.3 Environmental Offsets

As detailed in *Volume 3, Chapter 7* of an environmental offsets strategy will be developed prior to the commencement of the Project. In summary, environmental offset activities will be established where clearing within the following areas is unavoidable:

- endangered and Of Concern REs
- areas of essential habitat
- significant wetlands or natural wetlands
- vegetation associated with watercourses (i.e. riparian vegetation)
- areas that are at risk of becoming an Of Concern or Endangered RE according to the relevant regional management code.

7.6 CONCLUSION

Provided that the recommended mitigation and rehabilitation measures are adopted and successfully implemented, the development and operation of the pipeline corridors required for the Pipeline Component of the Queensland Curtis LNG (QCLNG) Project are likely to have a negligible impact on the ecological features and values described in this section.

A summary of the impacts outlined in this chapter is provided in *Table 4.7.6.*

Table 4.7.6 Summary of Impacts for Terrestrial Ecology

Impact assessment criteria	Assessment outcome
Impact assessment	Negative
Impact type	Direct
Impact duration	Long term due to time for full rehabilitation to be achieved
Impact extent	Local
Impact likelihood	High

Overall assessment of impact significance: moderate in the short term to minor in the long term, based on the initial loss of mature vegetation and small areas of endangered regional ecosystems which will be compensated for through offsets.