5 LAND USE AND INFRASTRUCTURE

This chapter identifies issues associated with the routes of the proposed pipelines within the Pipeline Component of the Queensland Curtis LNG (QCLNG) Project, particularly as they relate to existing and future use of land and any impacts on existing or proposed infrastructure.

The Pipeline Component of the QCLNG Project comprises an Export Pipeline; Lateral Pipeline and the Upstream Infrastructure Corridor (UIC), containing a Collection Header and other gas and water-gathering pipelines. Given this, the pipeline works will traverse areas hosting a broad range of land uses and may potentially impact on some public and private infrastructure.

5.1 PROJECT ENVIRONMENTAL OBJECTIVES AND VALUES

The Project environmental objectives for land use and infrastructure are to:

- minimise impacts on existing townships and infrastructure
- minimise impacts on agricultural or rural activities and potential long term uses of land.

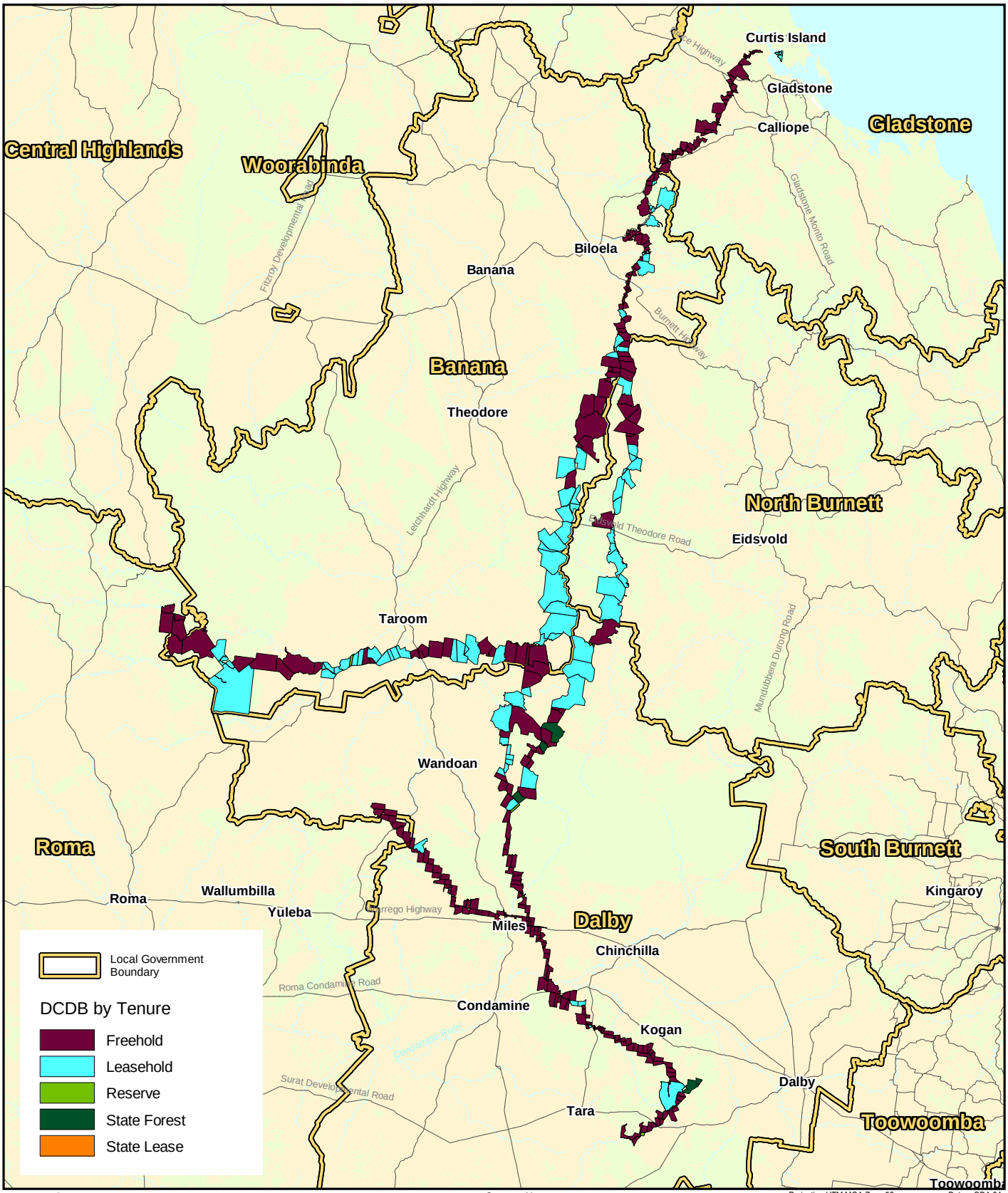
The following sections outline the existing environmental values relating to land and infrastructure.

5.1.1 Land Tenure

The routes for pipelines proposed as part of the Pipeline Component of the QCLNG Project traverse predominantly freehold lots. However, several leasehold areas and reserves are located along the proposed routes. These are summarised in *Figure 4.5.1* and *Table 4.5.1.* This may be subject to some variations during the route finalisation process. Proposed routes have been selected to avoid major mining leases (ML) or mining lease applications (MLA).

The route crosses a number of small power lines, telephone cables and major power transmission lines from time to time (20 in total). Major power transmission line locations in relation to the proposed pipeline route are shown on *Figure 4.5.2.*

While individual access and entry protocols will be agreed and documented for all landholders, it is expected that stringent and specific requirements will need to be agreed on for some properties such as state forests.



Legend:

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

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Projection UTM MGA Zone 56 Datum GDA 94

0 20 40 60 80
Kilometres

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QUEENSLAND CURTIS LNG A BG Group business	Project	Queensland Curtis LNG Project	Title **Land Tenure - Overview**
	Client	QGC - A BG Group business	
ERM Environmental Resources Management Australia Pty Ltd	Drawn Mipela	Volume 4 Figure 4.5.1	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 EO5-P-MA-96147	
	Date 17.06.09	Revision A	

Table 4.5.1 Land Tenure

Type of Tenure	Number of Properties		
	Export Pipeline	Collection Header	Lateral
Freehold	134	169	28
Leasehold	38	0	22
Reserves	5	2	1
State Forest	3	3	0
State Land	1	0	0

5.1.2 Land Use

Satellite imagery, topographic maps and database searches have been used to identify the land uses, local authorities, townships, industrial areas, infrastructure and topography that will be traversed or have the potential to be influenced by the proposed pipeline alignments.

The proposed pipeline routes traverse five local government areas:

- Western Downs Regional Council
- Roma Regional Council
- Banana Shire Council
- North Burnett Regional Council
- Gladstone Regional Council.

The routes cover a mix of land uses including:

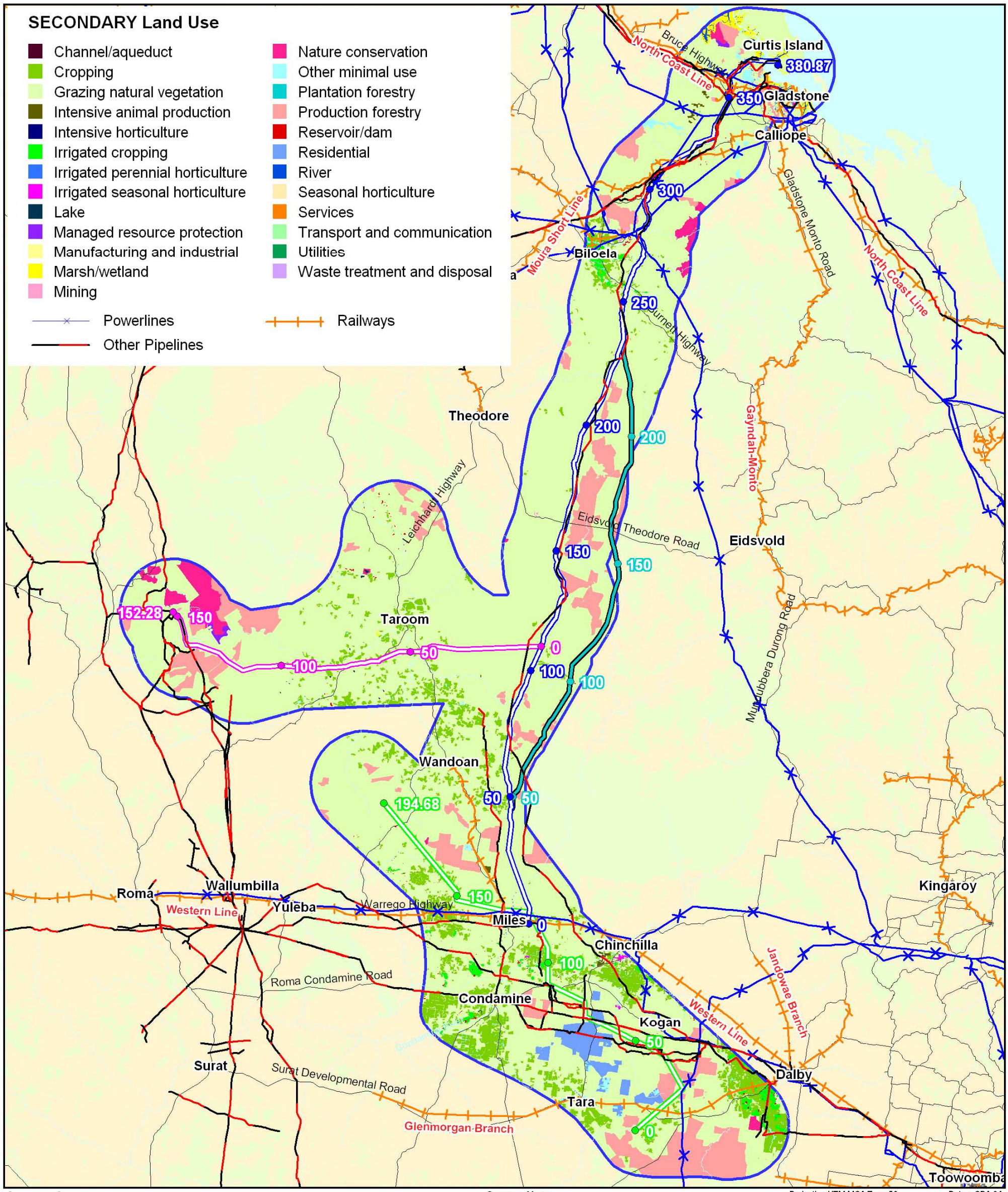
- land that has previously been cleared for grazing and cropping
- sections of intensive agriculture
- patches of regrowth (mostly Brigalow regrowth)
- remnant forest
- wetlands
- grassland vegetation
- stock routes
- road and rail reserves
- several major roads (including state-controlled roads)
- major rivers
- mountainous areas

- industrial (planned) areas
- power line easements.

A description of general land use within the local government areas that the pipelines traverse is provided in *Table 4.5.2* and summarised in *Figure 4.5.2.*

Table 4.5.2 General Land Use With Respect to Local Authority

Local Government	Section Approx Kilometre Point (KP)	General Land Use
Western Downs Regional Council	Export Pipeline 0 – 115 Collection Header 0 - 200	A mix of large-scale grazing, cropping, and mining activity. Well-vegetated areas, small and large holdings are dominant features of the landscape. The closest townships are Miles, Chinchilla and Wandoan which provide the main services for primary production activities in the area, a range of government and community facilities and accommodation options.
Banana Shire Council	Export Pipeline: 120 – 150 200 – 310 Lateral 0 - 140	A mosaic of large-scale grazing properties with small areas of intensive cropping. The proposed route crosses several local roads and the Burnett Highway. Cracow, Theodore Thangool and Biloela are the closest townships to the proposed alignment, servicing grazing properties, local mining activity and in the case of Biloela servicing the Callide Power Station and associated mine.
North Burnett Regional Council	Export Pipeline 150 – 200	The proposed route (Option 2) of the Export Pipeline intersects the old shire areas of Monto and Eidsvold. These areas also support large-scale grazing. The proposed route crosses the Eidsvold-Theodore Road as well as a number of local roads. Eidsvold and Monto are the closest townships to the proposed alignment.
Gladstone Regional Council	Export Pipeline 310 – 380	Generally large holdings used for grazing from the Shire boundary to the Bruce Highway where the Gladstone State Development Area (GSDA) commences. Precincts within the GSDA that the proposed route intersects include Aldoga and Targinnie. Other infrastructure includes power lines, the North Coast Railway Line, local roads and the Dawson and Bruce Highways.
Roma Regional Council	Lateral 140-150	The final 10 km of the Lateral Pipeline intersects this Council area. In this location the activities are predominantly grazing. Taroom-Injune Road is the main access route for this section of the pipeline. Taroom, in the Banana Shire Council area, is the closest township.



Legend:

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

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0 20 40 60 80
Kilometres

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QUEENSLAND CURTIS LNG
A BG Group business

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Project	Queensland Curtis LNG Project	Title	Land Use - Overview
Client	QGC - A BG Group business		
Drawn	Mipela	Volume 4	Figure 4.5.2
Approved	CDiP	File No	EO5-P-MA-96151
Date	08.07.09	Revision	A

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5.1.3 *Native Title*

Native title claimant areas associated with the pipeline routes are shown in *Figure 4.5.3*.

QGC has entered into negotiations to develop Indigenous Land Use Agreements (ILUA) with native title interests across the entire Project area, including the Gas Field, Pipeline and LNG Facility site.

ILUA negotiations are being undertaken in areas covered by the following Registered Native Title Claims:

- Wulli Wulli/Djaku-nde Jangerie Jangerie
- Gangulu
- Wakka Wakka
- Port Curtis Coral Coast
- Iman.

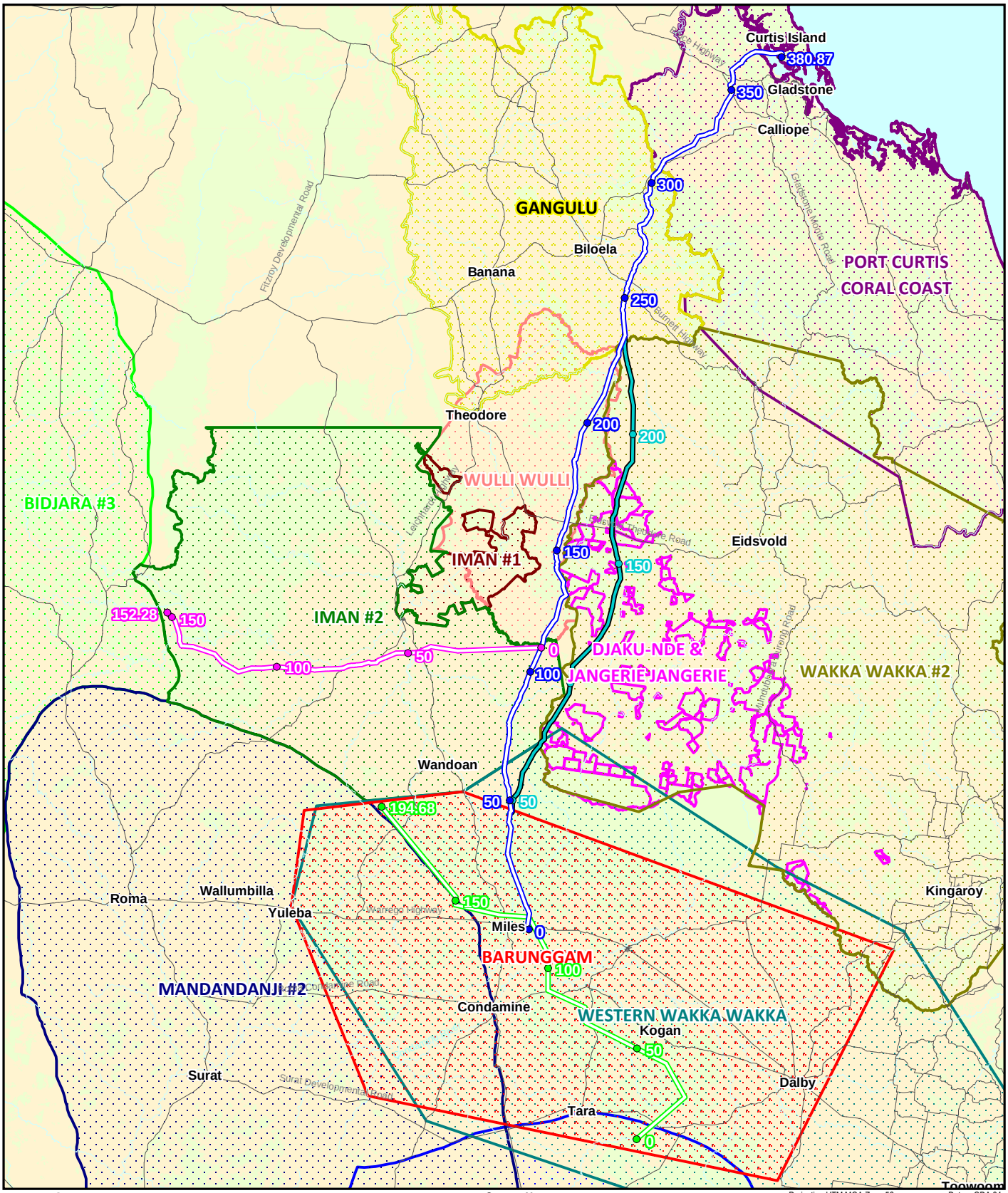
QGC is also discussing the Project with other parties who have expressed native title interests or previously held native title over the Gas Field and pipeline routes for the purposes of developing an ILUA. These interests include:

- Mandandanji
- Western Wakka Wakka
- Barunggam
- Jarowair
- Bigambul.

QGC intends to consult with all groups, consistent with the open and frank approach it takes to the conduct of its operations in Queensland. This is also consistent with the approach of its parent BG Group to consultation and the direct requirements of the ILUA provisions of the *Native Title Act 1993* (Cth).

5.1.4 *Economic Mineralisation and Extractive Resources*

A number of quarries and sand and gravel extraction activities have been listed in *Table 4.5.3*, as well as mining, petroleum and mineral exploration permits, leases or claims, as overlaying much of the land between Miles and Gladstone as described in *Figure 4.5.4* and *Figure 4.5.5.* Many of these mining leases have not yet been granted and are still in the application and assessment stages.



Legend:

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

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0 20 40 60 80
Kilometres

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QUEENSLAND CURTIS LNG — A BG Group business	Project: Queensland Curtis LNG Project		Title: **Native Title Claims**
	Client: QGC - A BG Group business		
ERM — Environmental Resources Management Australia Pty Ltd	Drawn: Mipela	Volume: 4 Figure: 4.5.3	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: CDiP	File No: EO5-P-MA-96142	
	Date: 26.05.09	Revision: A	

Land overlain by mining permits, claims and leases is subject to the provisions of the *Minerals Resources Act 1989* (Qld) *(MR Act)*. QGC has considered the relevant provisions of the *MR Act* in determining the current proposed alignment of the Pipeline Component and has consulted with mining and exploration companies to determine the preferred route and to accommodate current and future needs of the mining and extractive resource sector.

Table 4.5.3 Quarries and Extractive Industries

Quarry name	LGA	Operation type
No name	Banana Shire Council	Hard rock
Callide Dam (Davies)	Banana Shire Council	Sand and gravel (in stream)

Within 5km of proposed route

Sourced from DME December 2008

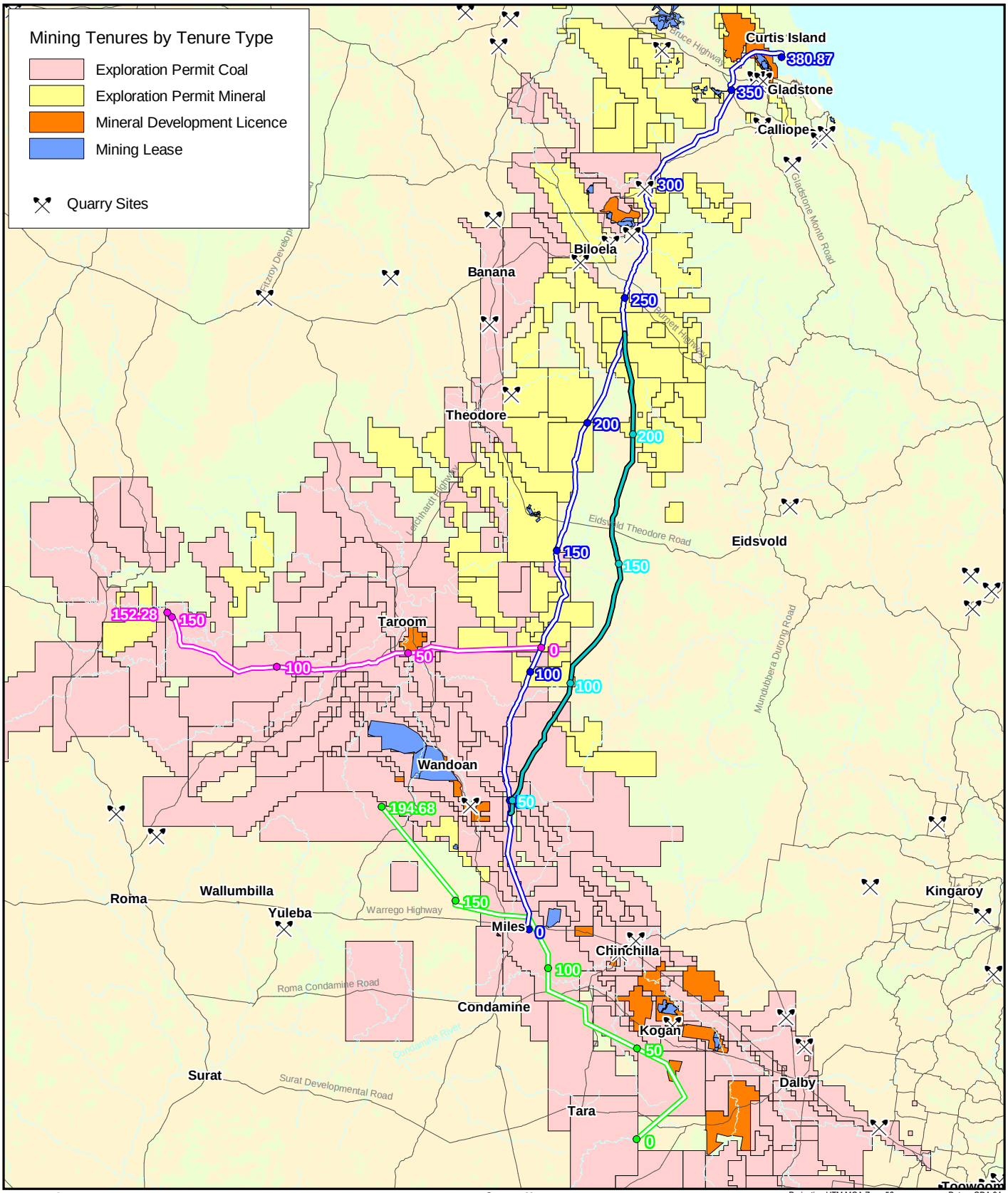
5.1.5 Infrastructure

The location of various types of infrastructure such as roads, power lines, railways and other pipelines in proximity to the proposed pipeline route are shown in *Figure 4.5.2*.

The corridor crosses a number of infrastructure corridors as set out in *Table 4.5.4* to *Table 4.5.6*. In addition to the roads listed in *Table 4.5.4*, the Export Pipeline route intersects 14 proposed roads and 12 unnamed roads and the Collection Header intersects 13 proposed roads and nine unnamed roads.

All key highways are bitumen-sealed. A series of secondary, minor and local roads and farm access tracks will be used by vehicles associated with pipeline construction activities or crossed by the pipeline route. Transport routes are discussed in *Volume 4, Chapter 13*.

The depth of pipe under road crossings will be a minimum of 1.2 m below the bottom of the table drains. In accordance with the Department of Transport and Main Roads (DTMR) requirements this depth will be maintained under the full width of the road reserve for those roads highlighted in bold in *Table 4.5.4.*



Legend:

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

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0 20 40 60 80

Kilometres

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QUEENSLAND CURTIS LNG A BG Group business	Project	Queensland Curtis LNG Project	Title Mining Tenures Along Pipeline Routes
	Client	QGC - A BG Group business	
ERM Environmental Resources Management Australia Pty Ltd	Drawn Mipela	Volume 4 Figure 4.5.4	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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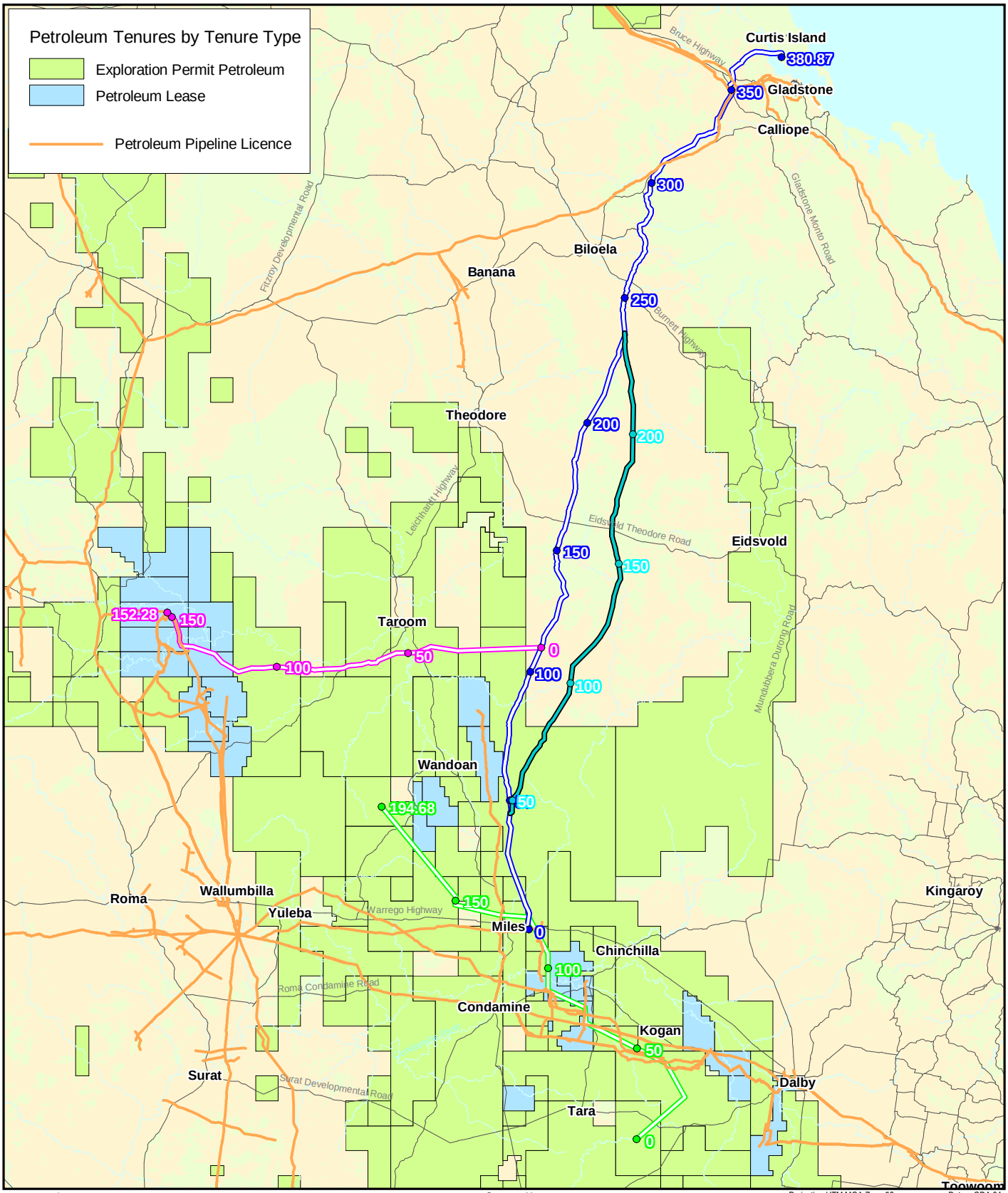
	Date 28.05.09	Revision A	



Legend:

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

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QUEENSLAND CURTIS LNG A BG Group business	Project	Queensland Curtis LNG Project	Title Petroleum Tenures Along Pipeline Routes
	Client	QGC - A BG Group business	
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	Date 28.05.09	Revision A	

Table 4.5.4 Road Crossings

Key Road Crossings	Approx KP
Export Pipeline[1]	
Burnett Highway	257
Dawson Highway	310
Bruce Highway	350
Eidsvold Theodore Road	163
Gladstone Mt Larcom Road	356
Defence Road	167, 173, 186
Coal Road	283, 284,289,290, 293
Hookswood Pelham Road	12
Myall Park to Hookswood Road	14
Warramoo Road	24
Little Tree Creek Road	30
Welshs Road	34
Upper Downfall Road	45
Upper downfall Road	45
Knights Road	51, 56
Roche Creek Road	69
Knudsens Road	88
Andrews Road	118
Redbank Road	144, 146
Calrossie Road	164
Knockbreak Road	169
Knockbreak Tireen Road	175
Glencoe Knockbreak Road	1861
Glencoe Monto Boundary Road	190
F Goodys Road	192
Redmount Road	199
Glencoe Road	208
Pinedale Road	210
Camboon Road	220
Gravings Road	227
Dingley Dell Road	231
Lookerbie Circle Road	237, 242
Thangool Lookerbie Road	248
Halls Road	250
Tollemaches Road	252
Kirkwoods Lane	255
Russian Club Road	260
Valentine Plains Road	270

1 Note that the Figures show a crossing of the Warrego Highway for the Export Pipeline however as discussed in *Volume 2, Chapter 12* it has since been decided that this will not occur and the Export Pipeline will commence north of the highway.

Key Road Crossings	Approx KP
Calvale Road	277
Zangaris Road	287
Specimen Hill Road	294, 295
Blacks Road	299
Thompsons Road	306
Fig Tree Road	319
Mt Alma Road	320, 327, 329, 330, 332
Kaluda Road	339
Cullens Road	362
Targini Road	369
Flinders Road	380
Collection Header	
Warrego Highway	122
Leichhardt Highway	135
Surat Developmental Road	10
Tara Kogan Road	47
Chinchilla Tara Road	71
Kogan Condamine Road	91
Jackson Wandoan Road	193
Old Moonie Road	2, 3.6, 3.8
Bridles Road	3, 3.5
Reserved Road	21
Glen Mona Road	38
Kerrs Road	41
Millbank Road	57
Weiambilla Road	70
Dougalls Road	77
Vanrenans Road	79
Fairymeadow Road	105
Tames Road	111
Freemans Road	113, 115
Brownlies Road	116
Gearys Road	126, 129
Hookswood Pelham Road	131
Glenafton Road	135, 136
Coates Road	153
Devoncourt Road	156
Wallan Creek Road	166
Eys Road	171
Willetts Mill Road	178
Cormacks Road	181

Table 4.5.5 Rail Crossings

Railways	Approx KP
Export Pipeline	
Western	1.5
Moura Short Line	315
East End Mine Branch	352
North Coast	357
Collection Header	
Glenmorgan Branch	14
Western	122
Wandoan	135

Table 4.5.6 Power line Crossings

Power line	Approx KP
Export Pipeline	
Power line	3.5
Power line	278
Power line	284
Power line	299
Power line	314
Power line	343
Power line	360
Collection Header	
Power line	124

5.1.6 Residential and Recreational Areas

The pipeline routes has been planned to largely avoid residential areas. The key residential and recreational areas along the pipeline routes are associated with the townships shown in *Figure 4.5.1* and noted in *Table 4.5.2*. There are no designated recreational areas within the corridor of the Export Pipeline or Collection Header.

5.2 POTENTIAL IMPACTS AND MITIGATION METHODS

5.2.1 Land Use

The pipelines will not impose any long-term restrictions on the current use of identified land tenure along the routes.

The main impact of the Project in terms of land use will be primarily during the construction program when land used for activities such as agriculture and grazing will be temporarily restricted over the Right-of-Way (RoW).

QGC will maintain ongoing landholder negotiations with the aim of achieving mutually agreed pipeline routes and a fair and reasonable compensation for any disruptions.

Where required along the route, temporary fences will be erected to protect landholders, the general public and livestock.

As discussed in *Section 0*, several quarries and extractive industries have been identified within 5 km of the proposed pipeline route. Recognising that the Export Pipeline traverses the region from the Surat Basin coal fields to Gladstone, and that the Collection Header is located within the Surat Basin, the route selection process has endeavoured to avoid highly prospective coal mining and mineral areas. In particular Option 2 for the Export Pipeline provides for less interaction with mining tenements as shown in *Figure 4.5.4*.

Location of the pipeline alignments has been, and will continue to be, negotiated with the relevant operators to help ensure that, where practicable, the installed pipeline will have limited adverse impacts on future extraction activities and to ensure that extraction activities have no adverse impacts on the integrity of the pipeline. QGC is working closely with the Department of Employment, Economic Development and Innovation (DEEDI) on the route development in relation to mineral, petroleum and extractive resources.

5.2.2 Native Title

QGC, through its native title negotiations, is in constant dialogue with traditional owners across the Project area. The aim of this dialogue is to develop and agree on a benefits package that has the potential to address many of the elements of social disadvantage associated with this element of the local community. The nature of the proposed package ties benefits to the scale of Project impact and production, with economic benefits to indigenous people linked to the Project's production levels. The more the Project expands, the more benefits will flow to indigenous people. In order to develop the Project to its full capacity, and deliver this increased benefit arrangement, broad consent for Project activities is being sought.

Queensland South Native Title Services has been approached to enter a service agreement with QGC to undertake a desktop review of the engagement process and certify the ILUA agreements prior to the agreements being lodged with the National Native Title Tribunal (NNTT) for registration.

5.2.3 *Co-location of Other Infrastructure*

Consideration of co-location with other infrastructure has been undertaken by QGC in the development of the preferred pipeline alignments and this is discussed in *Volume 2, Chapter 12.*

5.2.4 *Electrical Interference*

A number of Projects in recent years (e.g. Enertrade's Central Queensland Gas Pipeline, Gladstone Pacific Nickel's Marlborough Pipeline Project) have assessed the capacity of gas pipelines to be co-located with electric rail lines around the Gladstone area.

These studies were carried out by Brian Martin and Associates in accordance with the design principles and limits set out in *AS 4853: 2000 Electrical hazards on metallic pipelines*. These reports generally found that gas transmission pipelines could not be safely co-located with electric rail lines due to the potential for electrical interference with cathodic protection systems and transmission of electric currents along the pipeline.

The studies determined that at least a 500 m separation distance would be required to mitigate any potential adverse affects.

It is anticipated, based on the cited studies, that co-location of the pipeline in an electric rail corridor would result in unacceptable safety issues relating to induced currents within the pipeline and possible accelerated corrosion of the pipeline.

High-voltage power lines also have the potential to create unacceptable electrical interference with the pipeline if followed for long distances. Co-location of the pipelines with other infrastructure has not been recommended.

5.2.5 *Millable Timber*

Consultation has commenced with DEEDI, to identify any millable timber areas affected by the preferred pipeline routes. These negotiations will continue as pipeline routes are finalised. Where commercially viable quantities of timber are identified for removal, sufficient lead time will be provided for the department to carry out the necessary removal ahead of construction. However, based on the 40 m clearing width it is not anticipated that commercially viable quantities of timber will be involved.

5.2.6 *Workforce Accommodation*

Potential workforce accommodation locations for pipeline construction personnel and their potential impacts are discussed in *Volume 2, Chapter 12* and *Volume 8.* Locations are indicative only and will be confirmed once the construction contractor has been selected. However, it is not expected that the construction and operation of these camps will impact on land use or infrastructure in the immediate or longer term.

5.2.7 *Operational Impacts*

Once the pipeline is operational, land use impact will be minimal comprising periodic inspections and maintenance of the route by a small number of QGC personnel. Potential impacts on local communities are described in *Volume 8*.

5.2.8 *General Management Methods*

Mitigation methods to be implemented in association with land use and infrastructure include:

- ensuring appropriate buffers are maintained between the pipeline and existing and planned development, or where this is not practicable, ensuring pipeline design meets the safety requirements for developed areas
- ensuring appropriate discussions with landholders and occupants in relation to the provision of access for pipeline construction and ongoing maintenance during operation
- liaising with mining permit, claim or lease holders to determine the most appropriate alignment based on current and future needs and ensuring that existing legislation has been considered
- consultation with infrastructure providers (e.g. regional councils for water pipelines, telecommunications providers for fibre optic cables) and “Dial Before You Dig” queries to identify other underground infrastructure
- minimising impacts on Good Quality Agricultural Land (GQAL) by following fence lines where practicable and/or minimising construction and camps in areas designated as Class A agricultural land or land used for cropping
- ensuring that associated work areas are minimised in environmentally sensitive areas, state forest, and riparian zones
- ensuring minimal impact on major transport corridors by boring under all sealed state controlled roads and railway lines
- ensuring that the pipeline is appropriately signposted
- ensuring appropriate notification and management of noisy and dusty activities particularly in proximity to residential areas, roads and schools.

5.2.9 Specific Management Measures

Specific management measures along the pipeline will include weed and erosion control. Strict weed-management protocols will be implemented as identified in *Volume 4, Chapter 7* and *Volume 10*.

Some areas have very shallow topsoil overlaying highly dispersive subsoil which can be adversely impacted as a result of clearing activities. These areas will require specific management measures as identified in *Volume 4, Chapter 4*. Potential impacts and mitigation methods in relation to GQAL are also discussed in *Volume 4, Chapter 4.*

5.3 CONCLUSION

The proposed pipelines for the Pipeline Component of the Queensland Curtis LNG (QCLNG) Project occur within an area that is principally rural with grazing as the primary land use. However, there are also areas of state forests, protected areas and lands subject to mining and petroleum tenures. Existing infrastructure potentially affected is geared towards servicing small, rural towns.

QGC has endeavoured to minimise these impacts on existing land use and infrastructure through the route selection process. Pipelines will be buried for their entire length with only limited above-ground infrastructure. QGC has also endeavoured in its route planning to minimise impacts to mining and petroleum tenures.

A summary of the impacts outlined in this chapter is provided in *Table 4.5.7*.

Table 4.5.7 Summary of Impacts for Land Use

Impact assessment criteria	Assessment outcome
Impact assessment	Negative
Impact type	Direct
Impact duration	Short term (limited to construction phase for existing land use)
Impact extent	Local
Impact likelihood	High

Overall assessment of impact significance: minor in the short term to negligible in the long term, based on the ability of existing land uses to resume on completion of construction.