19 GAS FIELD AND PIPELINE CONSTRUCTION PLAN 2010 TO 2014

19.1 PURPOSE AND SCOPE

As part of the approval process for the Queensland Curtis LNG (QCLNG) Project, QGC will apply for Environmental Authorities (as Chapter 5A activity projects) under the *Environmental Protection Act 1994* (Qld). For this, QGC will be required to prepare and submit an operational plan (the plan) which describes how the Gas Field Component of the Project will be developed.

This document (Gas Field and Pipeline Construction Plan 2010 – 2014) is based on draft model conditions under negotiation with the Department of Environment and Resource Management (DERM). The intent is to outline the initial works proposed for the construction period of the QCLNG Project (2010 – 2014) and, longer term, the scope of the project over its 20-year life, as required for EA assessment. It is envisaged that this represents the draft of the Operational Plan to be required under the Petroleum Authority.

The purpose of this plan is to provide:

- a level of development detail for the first five years of the Gas Field
- a description of any existing infrastructure that will used for conducting petroleum activities for the purposes of the QCLNG Project
- a description of proposed infrastructure that will be developed during the term of the plan
- details of the social and environmental constraints that QGC takes into account in developing the details of an operational plan.

This plan should be read in conjunction with the following sections of the draft environmental impact statement (EIS) and the supplementary EIS:

- Volume 2 – Chapter 7 – Gas Field Operations
- Volume 2 – Chapter 11 – Gas Field Construction
- Volume 3 – Environmental Impact Assessment of the Gas Fields
- Volume 9 – draft Environmental Management Plan for the Gas Fields

Note that the QCLNG Project EIS consists of both the draft EIS and the supplementary EIS.

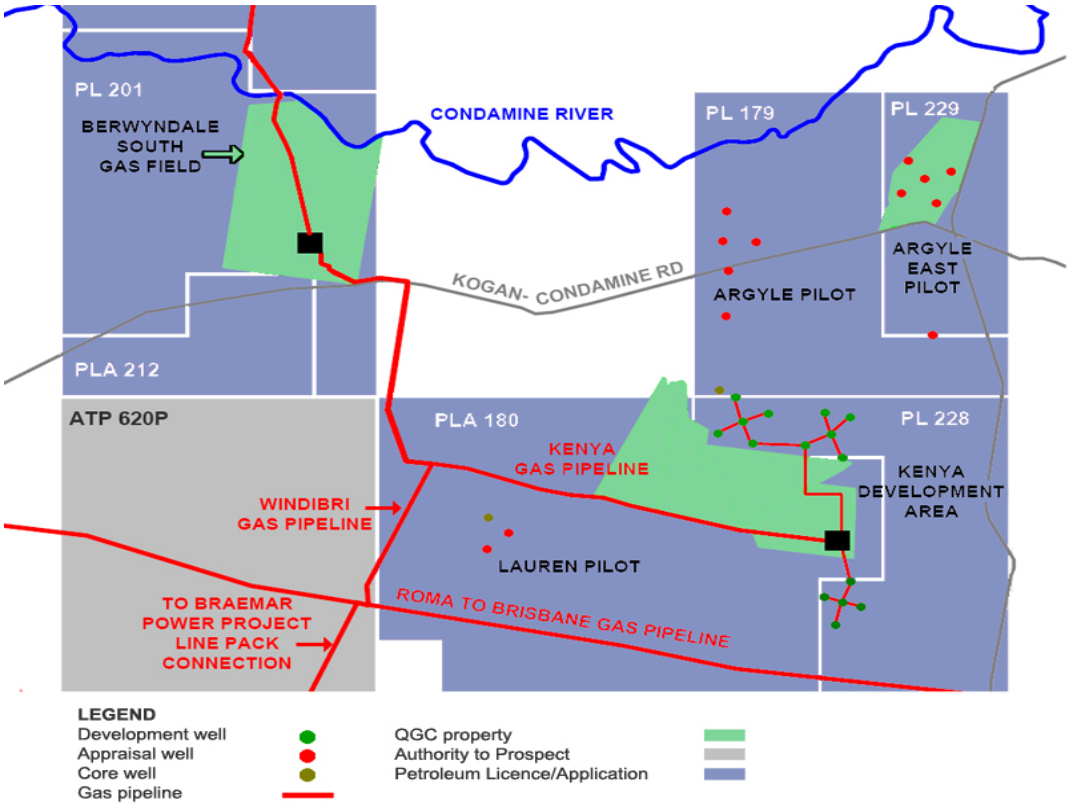
19.2 EXISTING OPERATIONS OVERVIEW

In Queensland, QGC holds interests in tenements covering more than 40,000 square kilometres. Previous gas production within QGC tenements has been to support domestic supply contracts. The following sections provide a brief background on the development to date of QGC's gas field and power

generation facilities. The QCLNG Project is a priority for QGC and its parent, BG Group plc.

Currently, QGC produces and transports coal seam gas from its Berwyndale South and Argyle Kenya gas fields (refer *Figure 3.19.1*).

Figure 3.19.1 Existing Operation Schematic



The activities that QGC and its contractors undertake in these gas fields include:

- exploration and tenement management
- well drilling, commissioning, operations and workover
- low pressure coal seam gas (CSG) gathering
- CSG compression (field compression stations and central processing plants) and dehydration
- CSG transmission and custody transfer
- infrastructure and facilities construction
- water transfer, storage and management infrastructure
- power generation operations
- the above-ground production infrastructure associated with the existing Berwyndale South central processing plant (CPP) and Kenya CPP.

19.2.1 Berwyndale South Gas Field

Berwyndale South gas field lies at the heart of Queensland's growing energy province on the Darling Downs, where power stations with a combined capacity of 4,250 megawatts are operating or under construction.

Berwyndale South gas field is centred on "Windibri", a 1,600 hectare property, owned by QGC, 20 km east of Condamine in Queensland's Surat Basin. It is connected to the Roma to Brisbane Gas Pipeline by QGC's 14 km export pipeline and is also connected to the Braemar Gas Pipeline.

19.2.2 Argyle-Kenya Gas Field

Development of QGC's second major gas field (Argyle-Kenya) commenced in 2007 to meet a 10-year gas sales agreement with Incitec Pivot (IPL) and respond to the opportunity to meet potential new gas demand.

The Argyle-Kenya gas field is located 15 km east of the Berwyndale South gas field, with development wells and associated infrastructure located within several petroleum leases (PL 228, PL 229 and PL 179). QGC is the operator of these leases and is the majority owner (59.375 per cent), with joint-venture partner Origin Energy CSG Limited (Origin Energy) holding a 40.625 per cent interest.

19.2.3 Condamine Power Station

Condamine Power Station is fuelled by coal seam gas produced at QGC's gas fields in the Surat Basin. With a potential generating capacity of 140 megawatts, the station provides clean and efficient power for the National Electricity Market.

Condamine Power Station is located on freehold land owned by QGC. The 518 hectare property is 8 km east of Miles on the southern side of the Warrego Highway.

The power station and its associated infrastructure have a footprint around 100 hectares.

19.3 EXISTING QGC PETROLEUM AUTHORITIES

QGC holds interests in a number of tenements in the gas-rich Surat Basin of southern Queensland (refer *Table 3.19.1* and *Figure 3.19.2*) either in its own right or in joint venture with third parties. The tenements in which QGC has interests are strategically located, being adjacent to an existing gas transportation pipeline network which provides direct access to Australia's gas and energy markets.

Table 3.19.1 QGC Petroleum Activities

QGC Petroleum Activities		
Tenement	**Name**	**Area**
Authorities to Prospect		
ATP 574	Pinelands	Shallows*
ATP 620P (totally covered by PL 180 & PLA 203)	Codie, Lauren, Matilda, John	Shallows* Deeps**
ATP 621P (totally covered by PLAs 261 &262)	Myrtle, Ridgewood, Will, Aberdeen, Teviot, Maire Rae	All
ATP 632P (partially covered by PLAs 211 & 212)	Connor, Arvin, Grace	Blocks 2161, 2449, 2450, 2521, 2522, 2594
ATP 648P (totally covered by PLAs 257, 259, 273, 274, 275, 278 & 279; and PCA Barney and PCA Michelle)	Kenya East, Jammat, Margaret, Jordan, Sean, David, Michelle, Celeste, Poppy, Ruby, Isabella, Barney, Clunie, Jen, Broadwater, Cougals, Glendower and Harry	Shallows* Deep**
ATP 651P (totally covered by PLAs 276 & 277)	Kathleen, Cam, Ross, Woleebee Creek, Mamdal	All
ATP 676P	Avon Downs, Wyalla	Section 1 blocks; 2237, 2386, 2456, 2457, 2458
	McNulty, Owen	Section 2 blocks; 2309, 2528, 2529, 2530
Petroleum Leases		
PL 171	Cherwondah, Carla, Alex	All
PL 179	Argyle	Shallows*
		Deeps**
PL 180	Lauren	Shallows*
		Deep**
PL 201	Berwyndale South	All of Petroleum Lease Area
PL 211	Berwyndale	All
PL 212	Berwyndale Deep	All
PL 228	Kenya	Shallows*
		Deep**
PL 229	Argyle East	Shallows*
		Deep**
PL 247	Bellevue	Shallows*
Petroleum Lease Applications		
PLA 278	Kenya East, Jammat	Shallows*
		Deep**
PLA 259	Sean	Shallows*
		Deep**
PLA 261 (from ATP 621P)	Myrtle/Ridgewood	All
PLA 262 (from ATP 621P)	Aberdeen/ Teviot	All
PLA 263 (from ATP 620P)	Matilda John	Shallows*
		Deep**
PLA 273 (from ATP 648P)	Sean	Shallows*
		Deep**
PLA 279 (from ATP 648P)	Broadwater	Shallows*
		Deep**
PLA 275 (from ATP 648P)	Jen	Shallows*
		Deeps**
PLA 276 (from ATP 651P)	Woleebee Creek	All

QGC Petroleum Activities		
PLA 277 (from ATP 651P)	Kathleen	All
PLA 278 (from ATP 648P)	Kenya East	Shallows*
		Deeps**
PLA 279 (from ATP 648P)	Broadwater	Shallows*
		Deeps**

Pipeline Licences	
PPL 91	Windibri Export Pipeline
PPL 107	Kenya Export Pipeline
PPL 108	Kenya Trunkline
PPL 125	Northern Corridor Pipleline
PSL 47	Corridor for QCLNG Project

Pipeline Licence Applications		
N/A	N/A	N/A

Non QCLNG Authorities to Prospect		
ATP 645P	Overston	All
ATP 647P	Myall Creek East	Block 2656
	Andrew	Blocks 2377, 2378
		All other blocks
ATP 684P	Atria, Red Rock	All
ATP 685P	Tadrum, Crocker Gully	All
ATP 688P	Tillbrook	All
ATP 693P	Cullin	All
ATP 722P	Luton	All
ATP 758P	Boombah	All
ATP 759P^	Codrilla	All
ATP 767P	Lacerta	All
ATP 768P	Polaris, Champagne Creek	All
ATP 769P#	Paranui	All
ATP 789P	Cooper Basin	All
ATP 795P	Lacerta	All
ATP 811P	Foxleigh	All
ATP 806P	Dingonose	All
ATP 831P^	Charley	All
ATP 852P	Cameron	All

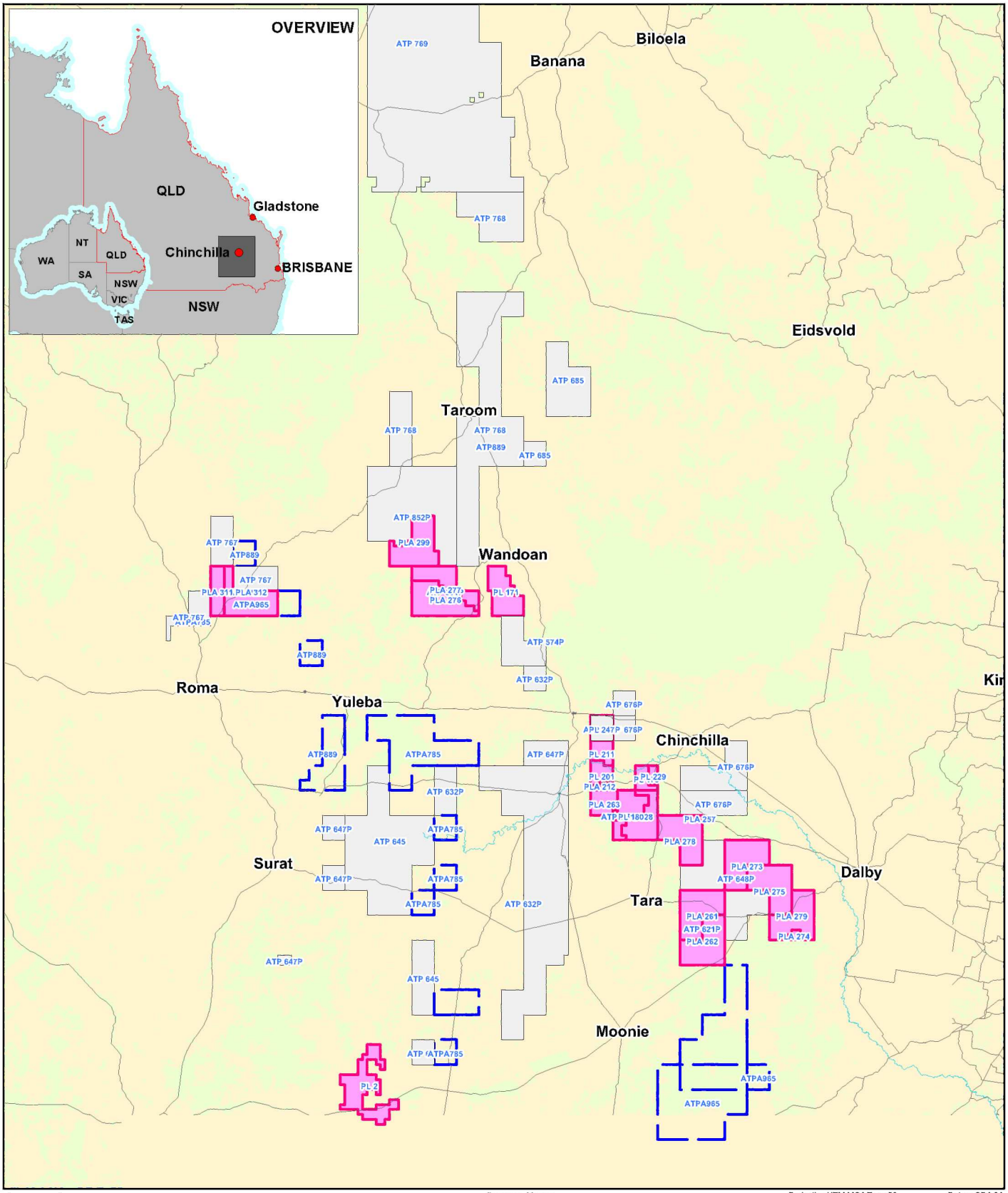
Notes

* Below surface to a depth 100' below Walloon Coal Measures

** Subsurface section below 100' below Walloon Coal Measures

^ Operated by Arrow Energy NL

Part operated by Westside ATP 769P Pty Ltd



Legend:

- Authority to Prospect
- Petroleum Lease/Application
- Authority to Prospect Application
- Railways
- Major Roads
- Condamine River

Source Note:

1:250,000 Topographic vector copyright Geoscience Australia
Mining Tenements - Dept of Mines and Energy

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: **QGC Tenements**

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	Unidel	sEIS Volume 3 Figure	S3.19.2
Approved	CDP	File No:	QC02-T-MA-00163
Date	21.01.10	Revision	Supplementary

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19.4 PROPOSED GAS FIELD INFRASTRUCTURE

The gas field component of the QCLNG Project involves the expansion of QGC's coal seam gas (CSG) operations in Queensland to supply gas to the proposed LNG Plant at Curtis Island, near Gladstone. The project is anticipated to have a life of at least 20 years.

Development of the Gas Field Component over the life of the Project is described in *Volume 2, Chapters 7* and *11* of the supplementary EIS. Over the first five years of the Project from 2010 to 2014 the Gas Field development will comprise:

- up to 1,500 gas wells
- approximately 2.5 million m^3 of quarry material, potentially supplied from local quarries and/or from the development of up to 20 borrow pits
- development of about 2,200 km of gas and water gathering lines, located in approximately 1,500 km of easements
- development of approximately 540 km of gas and water trunklines located in approximately 200 km of easements, which also include power transmission lines
- 20 field compressor stations
- four central processing plants
- three water treatment plants
- approximately 45 infield buffer storages (ponds or tanks) and 30 ponds for water balancing, brine storage and brine evaporation
- provision for up to three engineered salt landfills
- about 1,700 km of access tracks
- about 4,000 workers at peak construction
- about five to 10 construction camps.

Table 3.19.2 describes:

- the QCLNG Project infrastructure expected to be developed in the five years from 2010 to 2014
- existing infrastructure constructed under non-QCLNG Project approvals.

Table 3.19.2 Proposed Gas Field Infrastructure to be developed from 2010 – 2014

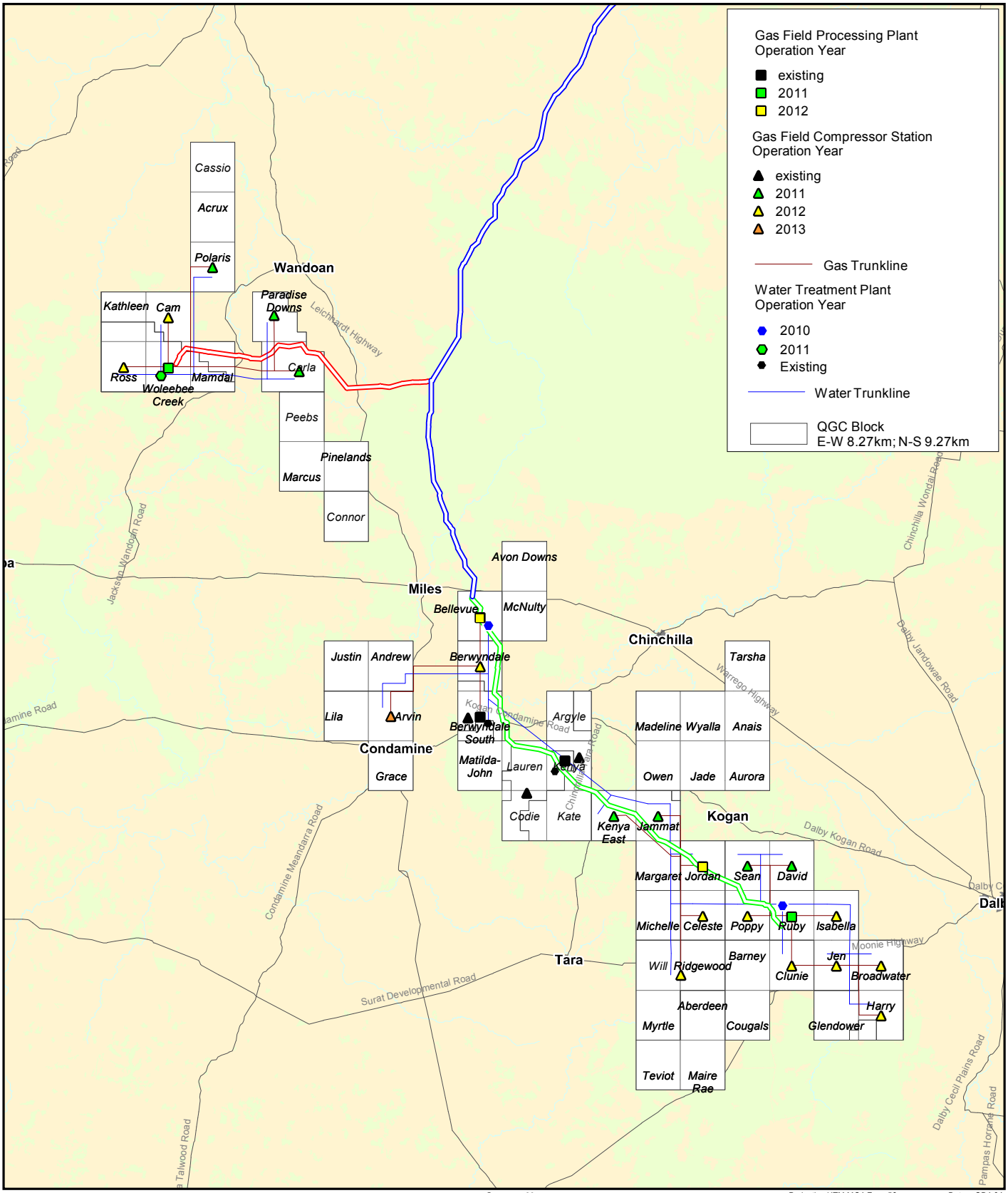
	Existing*	Year					QCLNG Project total to 2014
Infrastructure/Activity (number / km)	To 2009	2010	2011	2012	2013	2014	
Central Processing Plants (CPPs)	2	0	0	4	0	0	4
Field Compression Stations (FCSs)	3	0	0	12	8	0	20
Gathering lines – Gas and Water (km)	500	270	150	230	650	900	2200
Infield Buffer Storages (pond or tank)	3	0	2	4	13	26	45
Balancing and Emergency Ponds and Brine Storage	0	0	8	9	7	4	28
Landfill sites	0	0	1	1	1	0	3
Exploration and Appraisal Ponds	9	0	0	0	0	0	0
Evaporation Ponds	20	0	0	0	0	0	0
Gas and Water Trunklines (km)	47	0	60	330	150	0	540
Wells	334	150	100	130	370	500	1250
Water Treatment Plants	0	0	1	1	1	0	3
Workers accommodation camps	2	2	3	3	2	0	10

* not included in totals; supplying current domestic markets

Gas Field Development Plan

A field development map is provided in *Figure 3.19.3* which shows the development program for QGC tenements to 2014 by operational year.

Figure 3.19.4 shows the Gas Field development programme for the life of the project.



Legend:

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

Source Note:

1:250,000 Topographic vector copyright Geoscience Australia

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: **Gas Field Areas and Major Facilities to 2014**

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	Unidel	sEIS Volume 3 Figure	S3.19.3
Approved	CDP	File No:	QC02-T-MA-00162
Date	20.01.10	Revision	Supplementary

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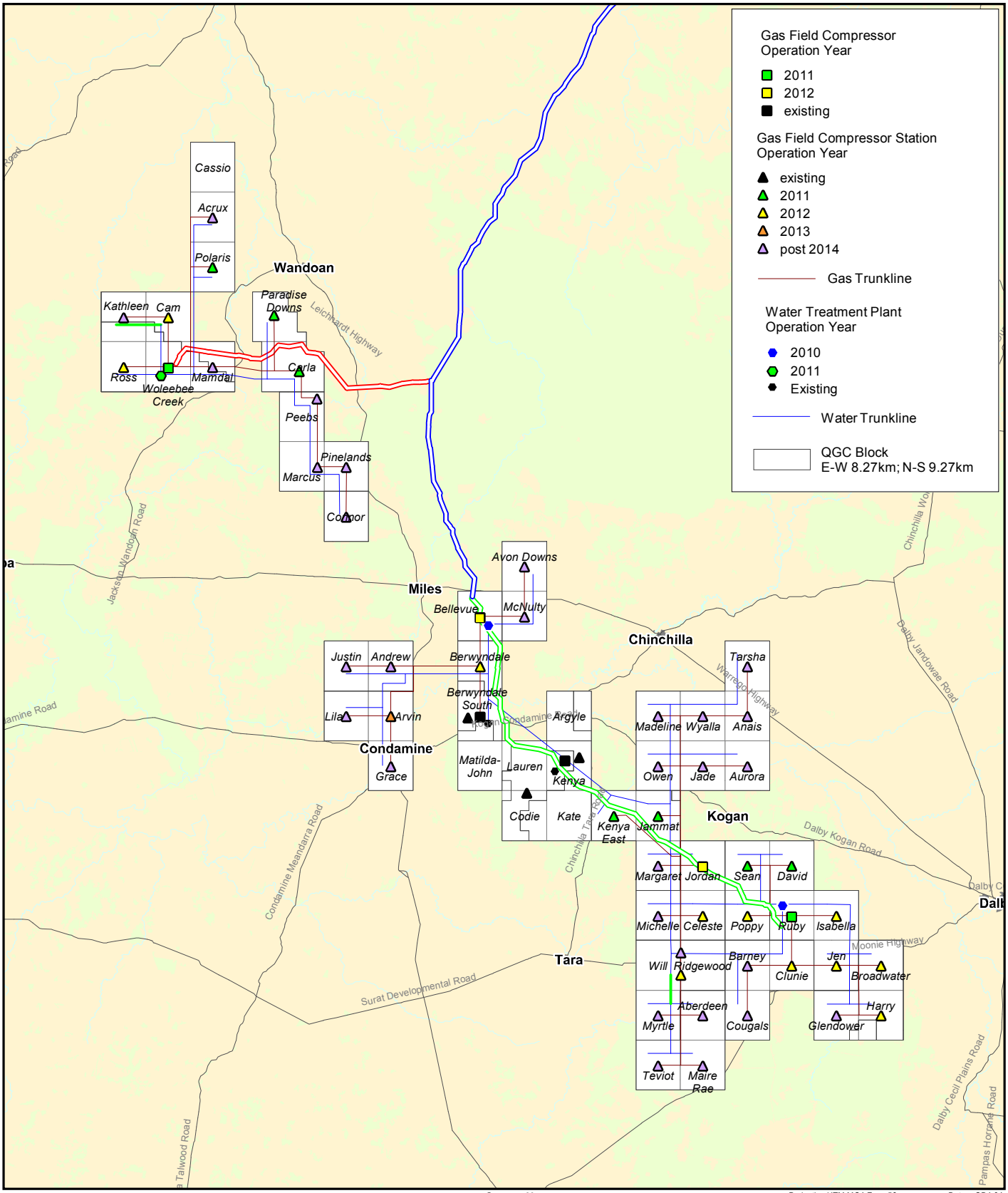

Legend:

- Export Pipeline & Kilometre Point
- Upstream Infrastructure Corridor & Kilometre Point
- Woleebee Creek Option & Kilometre Point

Source Note:

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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 **Gas Field Areas and Major Facilities by Operational Year**

ERM
Environmental Resources Management Australia Pty Ltd

Drawn	Unidel	sEIS Volume 3 Figure	S3.19.4
Approved	CDP	File No:	QC02-T-MA-00161
Date	14.01.2010	Revision	Supplementary

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19.4.1 Gas Field Development Infrastructure Schedule by Block

Table 3.19.3 outlines the proposed development schedule by block. This table provides a detailed overview of the development, the type of development and the timeframe for development per block. Once engineering and site selection processes have occurred, landholders will be notified and landholder negotiations will commence.

Table 3.19.3 Gas Field Development Infrastructure Schedule by Block

ID	Block Name	CPP	WTP	ID	Block Name	Wells	Gathering	Ponds	FCS	Trunkline
BC18	RubyJo	2011	2010	BB15	Sean	2010[(1)] 2012	2010[(1)] 2012	2011	2011	2011
				BB16	David	2010[(1)] 2012	2010[(1)] 2012	2011	2011	2011
				BB17	Poppy	2010[(1)] 2012	2010[(1)] 2012	2012	2012	2012
				BB18	RubyJo	2010[(1)] 2012	2011	2011	2011	2012
				BB19	Isabella	2010[(1)] 2012	2011	2011	2012	2012
				BB20	Jen	2010[(1)] 2012	2011	2012	2012	2012
				BB39	Barney	2010[(1)] 2012	2010[(1)] 2012	post 2014	post 2014	post 2014
				BB40	Cougals	2010 [(1)] 2012	2010[(1)] 2012	post 2014	post 2014	post 2014
				BB41	Clunie	2010[(1)] 2012	2010[(1)] 2012	2012	2012	2012
				BB40	Broadwater	2012	2012	2011	2012	2012
				BB43	Harry	2012	2012	2011	2012	2012
				BB44	Glendower	2012	2012	post 2014	post 2014	post 2014
BC12	Jordan	2012	N/A	BB09	Kenya East	2010	2010	2011	2011	2011
				BB10	Jammat	2010	2010	2011	2011	2011

ID	Block Name	CPP	WTP	ID	Block Name	Wells	Gathering	Ponds	FCS	Trunkline
				BB13	Michelle	post 2014	post 2014	post 2014	post 2014	post 2014
				BB14	Celeste	2013	2012	2011	2012	2011
				BB33	Will	2010[(1)] 2014	2010[(1)] 2013	2011	2012	2011
				BB34	Ridgewood	2010[(1)] 2014	2010[(1)] 2013	post 2014	post 2014	post 2014
				BB35	Aberdeen	post 2014	post 2014	post 2014	post 2014	post 2014
				BB36	Myrtle	2010[(1)] 2014	2010[(1)] 2013	post 2014	post 2014	post 2014
				BB37	Teviot	post 2014	post 2014	post 2014	post 2014	post 2014
				BB38	Maire Rae	post 2014	post 2014	post 2014	post 2014	post 2014
BC24	Woleebee Creek	2011	2011	BB21	Kathleen	2010[(1)] 2012	2010	post 2014	post 2014	post 2014
				BB22	Ross	2010[(1)] 2012	2010	2011	2012	2012
				BB23	Cam	2010[(1)] 2012	2010	2011	2012	2011
				BB24	Woleebee Creek	2010[(1)] 2012	2010	2011	2011	2011
				BB25	Mamdal	2010	2010	2011	2011	2011
				BB26	Peebs	2010[(1)] 2016	post 2014	post 2014	post 2014	post 2014

ID	Block Name	CPP	WTP	ID	Block Name	Wells	Gathering	Ponds	FCS	Trunkline
				BB27	Marcus	2010[1] 2016	post 2014	post 2014	post 2014	post 2014
				BB28	Pinelands	2010[1] 2016	post 2014	post 2014	post 2014	post 2014
				BB29	Connor	2011[1] 2018	post 2014	post 2014	post 2014	post 2014
				BB30	Polaris	2010[1] 2012	2011	2011	2011	2011
				BB31	Lawton (Paradise Downs)	2010[1] 2012	2011	2011	2011	2011
				BB32	Carla	2010[1] 2012	2011	2011	2011	2011
				BB60	Arthur	post 2014	post 2014	post 2014	post 2014	post 2014
BC07	Bellevue	2012	2010	BB07	Bellevue (Stage 2)	2010	2010	2011	2012	2011
				BB54	Berwyndale	2010	2010	2011	2012	2011
				BB52	Avon Downs	2010	2011	post 2014	post 2014	post 2014
				BB53	McNulty	2010	2011	post 2014	post 2014	post 2014
BC02	Kenya	Existing	Existing	BB02	Kenya	note 2	note 2	note 2	note 2	note 2
				BB04	Codie	note 2	note 2	note 2	note 2	note 2
				BB76	Argyle	note 2	note 2	note 2	note 2	note 2
				BB06	Lauren	note 2	note 2	note 2	note 2	note 2

ID	Block Name	CPP	WTP	ID	Block Name	Wells	Gathering	Ponds	FCS	Trunkline
				BB08	Kate	note 2	note 2	note 2	note 2	note 2
				BB05	Matilda-John	note 2	note 2	note 2	note 2	note 2
BC01	Berwyndale South	Existing	Existing	BB01	Berwyndale South	2010	2010	Existing	Existing	Existing
				BB07	Bellevue (Stage 1)	2010	note 2	note 2	note 2	note 2
				BB45	Andrew	2010	2011	post 2014	post 2014	post 2014
				BB46	Arvin	2010	2011	2013(3)	2013	2013(3)
				BB47	Grace	post 2014	post 2014	post 2014	post 2014	post 2014
				BB48	Madeline	post 2014	post 2014	post 2014	post 2014	post 2014
				BB49	Wyalla	2013	post 2014(3)	post 2014(3)	post 2014(3)	post 2014(3)
				BB50	Owen	2013	post 2014(3)	post 2014	post 2014	post 2014
				BB51	Jade	post 2014	post 2014	post 2014	post 2014	post 2014

Notes

1 Exploration and appraisal activity
2 Not included in QCLNG Project scope
3 Estimate date

19.4.2 *Approximate Disturbance from Development*

Table 3.19.4 outlines the approximate disturbance, by activity or infrastructure type, for the Project life of the Gas Field during construction and after progressive rehabilitation of non-operational footprint. The financial assurance calculated for the Project will be based on the areas of disturbance for a plan period and will be reduced through progressive rehabilitation.

The Gas Field Component area will be progressively rehabilitated as exploration, appraisal and production wells and associated infrastructure are no longer required. Partial rehabilitation will also be carried out following construction of infrastructure, such as well lease areas and pipelines, where a portion of the well lease area and right-of-way (ROW) used during construction will be restored.

During construction of larger facilities (e.g. greater than 4 ha), topsoil will be stored adjacent to the site, in a stable and safe location, for rehabilitation purposes. This will reduce the need to import topsoil or fill during rehabilitation.

Within two years of initial rehabilitation works at a restoration site, it is expected that the land use will return to the minimum expectation (e.g. low-intensity grazing). Should vegetation not be established within this timeframe, rehabilitation methods will be reviewed. The criteria used to assess the success of the rehabilitation works at the project site will also be site-specific, and might encompass:

- actual land use and constraints
- measures of vegetative success
- soil physical and chemical stability
- a lack of weed species.

For areas that remain operational, a comprehensive 'Project (draft) Vegetation and Biodiversity Offset Strategy' has been developed and is attached as *Appendix 2.3* of the sEIS.

Table 3.19.4 Life of Project Area of Disturbance Before and After Progressive Rehabilitation

Activity / Infrastructure	Supplementary EIS - Disturbance Area (ha)	
	Before rehabilitation	After rehabilitation
Gas wells pads	6,000	3,000
Borrow pits	420	0
Gas/ water gathering line easements	15,600	6,800
Gas and water trunklines (including power transmission)	1,600	550
FCSs and CPPs	500	500
Water treatment plants	75	75

Activity / Infrastructure	Supplementary EIS - Disturbance Area (ha)	
	Before rehabilitation	After rehabilitation
Ponds, including brine ponds and brine evaporation basins	665	665
Salt landfill	50	50
Access tracks	1,600	1,440
Construction camps	250	60
Total Area	**26,760**	**13,140**
Percentage of Gas Field[1]	**5.7%**	**2.8%**

1 Based on a total Gas Field tenement area of 468,700 ha.

Based on the above table, 2.8 per cent or 13,140 ha of the Gas Field tenements (468,700 ha) will remain disturbed (i.e. 97.2 per cent or 455,560 ha will not be disturbed) after post rehabilitation works. Infrastructure in these areas will be decommissioned and the areas fully rehabilitated at the conclusion of the Project.

19.5 CONSTRAINTS MAPPING

This section describes the objective of constraints maps, the process for identifying and ranking the significance of constraints and the constraints identified to date. Examples are provided of the application of constraints mapping in locating some elements of Gas Field infrastructure.

19.5.1 Objective of Constraints Mapping

QGC has developed constraints maps to identify areas that are subject to significant environmental constraints and are considered higher risk for Gas Field development because of their environmental and social sensitivity. Constraints maps assist in identifying areas of land that may potentially be suitable for the development of the Gas Field infrastructure. The refinement of constraints mapping is an ongoing process.

Examples of the environmental and social factors considered in constraints mapping include:

- terrestrial and aquatic ecology
- topography and soil erosion potential
- sensitive receptors, such as residential dwellings
- Good Quality Agricultural Land and land under cropping
- community centres, rural residential zones (under regional council planning schemes), towns and cultural heritage sites.

The environmental and social data gathered for this environmental impact assessment has been collated in the QCLNG Project geographic information system for the use in site selection for facility and pipeline infrastructure. QGC does and will use these data to make initial site selection.

Engineering and land access constraints are also considered in locating infrastructure, particularly major facilities. These constraints may dictate the property or area within a graticular block on which a major facility can be located and therefore reduce the potential to avoid or minimise all environmental and social constraints.

19.5.2 Identifying and Ranking Constraints

All constraints associated with environmental and social factors are assigned a ranking of:

- low
- medium
- high
- very high

A low constraint implies that standard environmental management will permit development to commence.

A medium constraint implies that additional non-standard environmental management measures are required to permit development to commence.

A high constraint implies that the environmental and/or social feasibility must be assessed prior to development and/or landholder agreement/compensation or offsets are required to be determined prior to commencement.

A very high constraint implies that development is not environmentally and/or socially feasible for the proposed infrastructure.

Depending on the environmental or social factor constraining development, there may be a number of underlying data sets that are considered in determining a constraints ranking.

The same environmental or social constraint layer may have a different constraint ranking for different categories of infrastructure. This is because different categories of infrastructure provide different degrees of environmental hazard due to their scale, nature or longevity in a location. Infrastructure categories are divided into:

- major facilities such as FCSs, CPPs, WTPs and large ponds
- wells, linear infrastructure (pipelines and access tracks) and small ponds/tanks.

The following sections describe the process for identifying constraints for the location of major facilities.

19.5.2.1 Engineering and Land Access Constraints

Engineering constraints include the proximity of major facilities to wells and each other such that gas flows are maximised for a given set of facilities. It is technically and economically optimal to site each FCS roughly in the centre of each block and CPPs within 40 km to 60 km of the furthest FCS.

QGC's intention is to site all major facilities on QGC owned land. However, it is not possible in all instances to acquire the property that is optimal from an engineering perspective and which minimises environmental and social constraints. Where QGC owns a property in a graticular block, QGC will not generally seek to acquire a separate property in a block which may have engineering or environmental advantages. This will minimise disruption to the community through avoiding acquisition of more properties than required.

19.5.2.2 Ecological Constraints

In order to evaluate the conservation significance of areas in the Gas Field the following data were overlaid using GIS layers:

- DERM's Environmentally Sensitive Areas
- Threatened Species and Ecological Communities (EPBC Act)
- Endangered REs (VM Act) (incorporated within Biodiversity Assessment Mapping Methodology (BAMM)
- Of Concern REs (VM Act)
- Woodlands fringing drainage lines (RE 11.3.25)
- Wetlands (RE 11.3.27)
- the BAMM (the GIS product referred to as a Bioregional Planning Assessment).

Numerical values were assigned to the criteria and summed to produce an overall score. In some cases, where several BAMM criteria evaluated a number of co-dependent attributes, only one of these was used in the analysis to prevent double or triple scoring of essentially the same attribute. In the case of threatened species status, both Commonwealth and State values were used, since they are appraised through separate processes and thus may differ markedly.

The mapping derived from this process was used to identify Environmentally Sensitive Areas and formed the basis for the development of the constraints mapping.

This process is further described in *Appendix 3.2* of the draft EIS.

19.5.2.3 Topography and Erosion Potential

Table 3.19.5 provides a constraints matrix for topography and erosion potential when applied to the development of major facilities. The constraints are applied through the Project Geographic Information System (GIS). For

topography and erosion potential, only very high and high constraints (respectively) have been identified.

Table 3.19.5 Topography and Erosion Potential Constraints Matrix for Major Facilities

Constraint	Topography	Erosion Potential
Very High	Relief ≥ 90 m and / or slopes >10 per cent and dissected plateaus, mountains and hills	None identified
High	None identified	Areas identified in *Vol3, Ch 4* of draft EIS has having severe or extreme erosion potential
Medium	None identified	None identified
Low of No	All other areas	All other areas

19.5.2.4 Sensitive Receptors

Sensitive receptors are principally residential dwellings in the area of the Gas Fields. Proximity of development to sensitive receptors is constrained by operational noise, visual amenity and localised air emissions. The development of major facilities is very highly constrained at distances from sensitive receptors where environmental performance criteria are exceeded. Nominally, for major facilities, noise from operations will result in distances of less than 2 km from a sensitive receptor being highly constrained for development. However, this distance will depend on the level of acoustic mitigation applied to major facilities.

Visual amenity of major infrastructure is considered to have low constraints at distances greater than 1 km. There are not expected to be localised exceedences of air emissions that would result in constraints on the separation distance to sensitive receptors.

19.5.2.5 Good Quality Agricultural Land and Cropping Land

Good Quality Agricultural Land (GQAL) is defined under State Planning Policy 1/92 and described in *Volume 3, Chapter 5* of the draft EIS. Land under cropping may be situated on GQAL. Not all GQAL Class A and B may be currently utilized for cropping. *Table 3.19.6* provides a constraints matrix for GQAL and cropping land. There were no very high constraints for GQAL or cropping land identified. QGC has used data sets from relevant government agencies and local government authorities to inform the Project GIS.

Table 3.19.6 GQAL and Cropping Land Constraints Matrix for Major Facilities

Constraint	GQAL / Cropping Land
Very High	None identified
High	Currently utilized for cropping
Medium	Class A and B
Low	Class C and D

19.5.2.6 Social Infrastructure

Social infrastructure comprises community centres, towns, schools, recreational facilities, non indigenous cultural heritage sites (NICHS), mining leases, and rural residential zones (as defined under regional council planning schemes).

Table 3.19.7 provides a constraints matrix for social infrastructure for the location of major facilities. No medium constraints for other social infrastructure and NICHS were identified.

Table 3.19.7 Social Infrastructure Constraints Matrix for Major Facilities

Constraint	Rural Residential	Other Social Infrastructure & NICHS
Very High	Rural residential or rural zone with lot < 20 ha	All residential and industrial zones All intensive animal production < 2 km from a town community centre, school or recreational area < 200 m from a NICHS
High	< 500 m from a rural residential or rural zone with lot < 20 ha	> 200 m and < 500 m from a NICHS Mining Leases held by third parties
Medium	Rural residential zone with lot > 20 ha	None identified
Low or No	All Other	All Other

19.5.3 Application of Constraints

In locating major facilities the constraints imposed by each environmental factor are considered in the location of infrastructure. *Figure 3.19.5* and *Figure 3.19.6* demonstrate the constraint layers that have been considered in selecting locations for the CPP and FCS in the Woleebee Creek and Bellevue blocks respectively. These constraint layers will be applied to all major facility locations. Note that where a site has low to medium constraints in most data layers, QGC may use mitigations to offset high or very high constraints that are unavoidable, rather than select a site with multiple high to very high constraints.

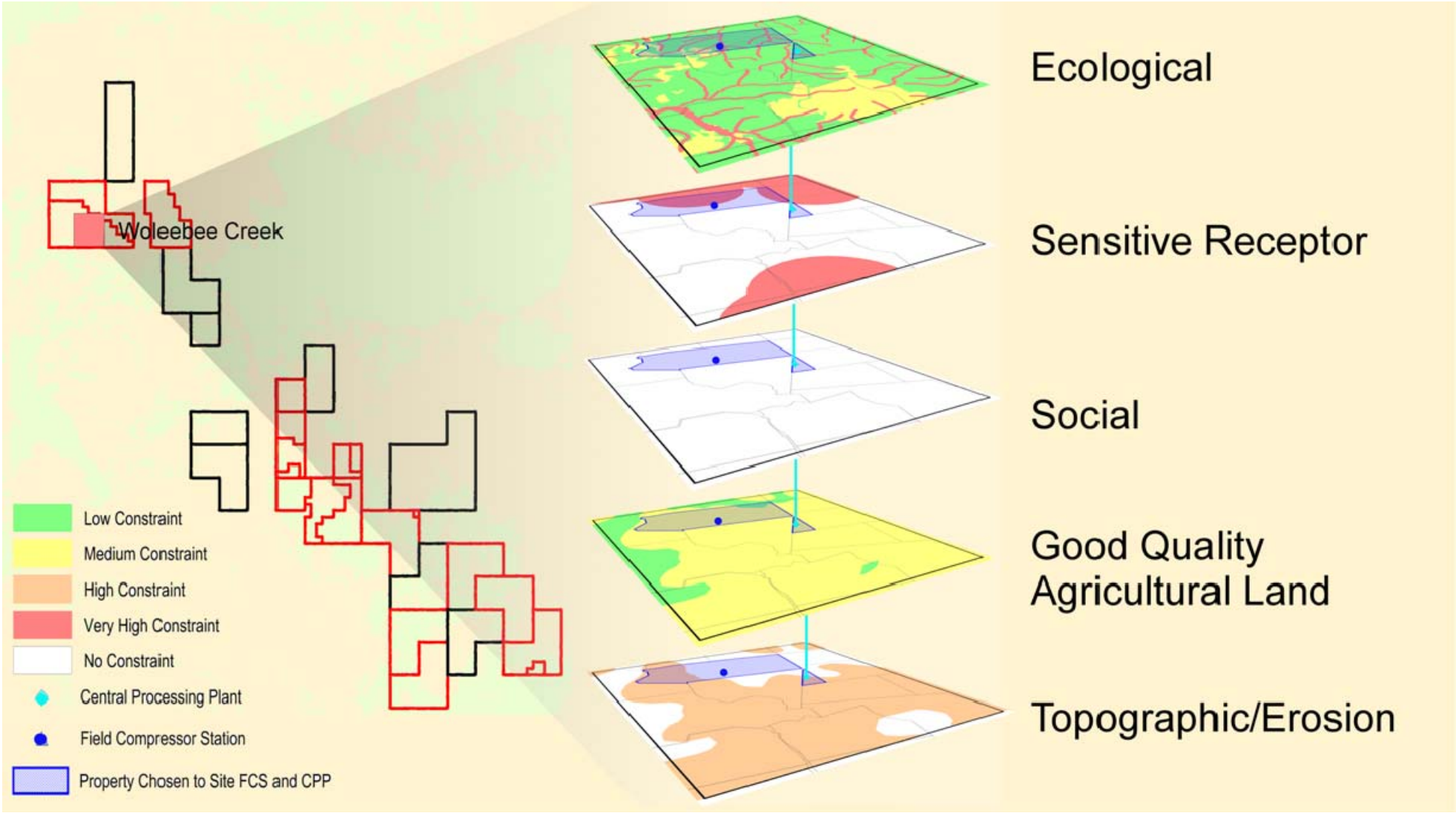
The properties highlighted in each figure are owned by QGC. QGC does not generally seek to purchase additional properties, where a property is owned within a block. Thus the owned property boundaries provide a limit to the area in which environmental and social constraints can be minimised.

As demonstrated in *Figure 3.19.5* QGC has located the CPP and FCS at Woleebee Creek:

- to provide a reasonable separation distance from the nearest noise sensitive receptors such that modelling indicates noise limits (refer *Volume 3, Chapter 13*) will not be exceeded
- to avoid social constraints
- in areas of low ecological constraint, avoiding streams which are very high constraint
- in areas of GQAL land class A and B, which has a medium constraint
- in areas of no topographic constraint or high erosion potential.

The majority of the property is considered to GQAL Class A or B, and the minor portion of the property that is GQAL Class C or D is not preferred due to the overriding noise and engineering constraints.

Figure 3.19.5 Major Facility Constraints – Woleebee Creek Block



As demonstrated in *Figure 3.19.6* QGC has located the CPP and FCS at Bellevue:

- to provide a reasonable separation distance from the nearest noise sensitive receptors such that noise limits (refer *Volume 3, Chapter 13*) will not be exceeded
- to avoid social constraints
- in areas of low or medium ecological constraint, avoiding streams which are very high constraint
- in areas of GQAL land class C or D, which has a low constraint
- in areas of high topographic constrain or high erosion potential.

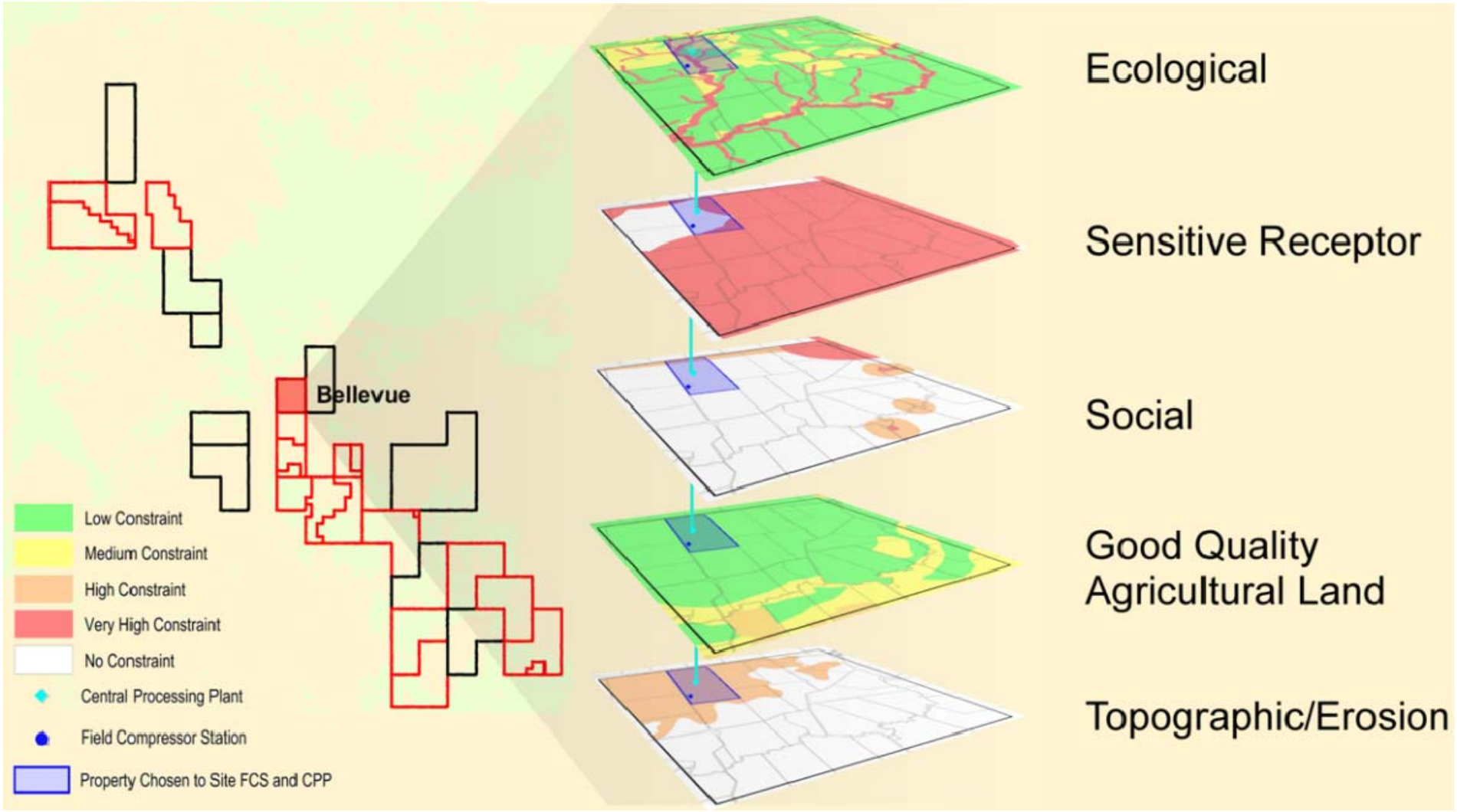
The entire property is considered to have high erosion potential and therefore cannot be avoided and can be managed through engineering and environmental controls. QGC will implement appropriate mitigation measures to minimise erosion from construction activities.

Social and environmental constraints define those areas within the gas field project area that may or may not be suitable for particular types of gas field infrastructure. These constraints have been mapped and provided to QGC's Gas Field design team. The Gas Field design team overlays these maps to determine where infrastructure may be located. Social and environmental constraints maps are being continually updated with the results of consultation and site-specific research as initial infrastructure locations are confirmed.

Social and environmental constraints and mitigations will be used in:

- refining locations for CPPs, FCSs and water management infrastructure
- locating wells, routes for gathering lines and trunklines
- location of works accommodation and management strategies
- locations for logistic and other construction-related sites
- developing social impact management plans addressing behavioural issues and community safety
- landholder consultation
- driving engineering solutions for matters that affect social and environmental values.

Figure 3.19.6 Major Facility Constraints – Bellevue Block



19.6 *WORKING WITH AND IN COMMUNITIES*

Throughout the life of the Project, QGC will continue to consult affected landholders and seek their input in developing and implementing systems that prevent or mitigate environmental and social impacts when gas field or pipeline infrastructure is to be located on their land.

QGC and its contractors will continue to consult local governments on the location of workers accommodation camps. It will also consult businesses and other stakeholders to maximise the benefits of camps to local towns while minimising potential adverse impacts as a result of poor worker behaviour or increased numbers using community facilities and services.

QGC's consultation with traditional owners and submissions from these groups reinforced the importance of managing impacts on indigenous and cultural values. QGC will continue to consult traditional owners to identify potential areas of value and to avoid these where possible in development of all components.

19.6.1 *Community Safety*

A risk assessment for the gas field and pipeline components will result in the development of comprehensive emergency management plans, including the establishment and maintenance of adequate safety zones for each infrastructure type to ensure that the risk to people is minimised as far as possible. When locating infrastructure on private land, QGC will ensure that land owners are familiar with the infrastructure. Any safety procedures, including emergency numbers, will be provided.

QGC is developing transport management plans in consultation with local governments and state government services such as Department of Transport and Main Roads, Police and Emergency services to ensure that driver safety for all road users is not compromised in any way by the transportation of Project materials and infrastructure to the Gas Field, pipeline route or LNG Facility areas. Where road safety issues have been identified, QGC will work with local and state governments to determine if road or intersection up-grades are required.

QGC is also working with local and state emergency services, and will continue to do so as the Project develops to deliver appropriate response plans for bushfire prevention and management, primary health care and emergency medical services and other emergency response procedures required as a result of the Project's development.

19.7 APPROVALS REQUIRED

The primary approvals for all Gas Field development arise from tenements granted under the *Petroleum and Gas (Production and Safety) Act 2004* (Qld) and the respective environmental authority issued under the *Environment Protection Act 1994* (Qld). The scope of these approvals will be the construction and operation of the project and the production of CSG for the life of project.

QGC will apply for Petroleum Leases (PL) over areas not currently subject to application, Petroleum Facility Licences (PFL) for infrastructure, such as central processing plants where PL ownership structures limit the transfer of gas between tenements and pipeline licences (PPL) where gas transfer crosses multiple PL boundaries. It is intended for relevant EA applications to be consistent with the concept of Project Environmental Authorities for those aspects that are integrated.

Construction related permits will be sought by QGC or its contractor for land based activities, such as construction through watercourses (Riverine Protection Permit) or temporary use of water (Water Permit) under the *Water Act 2004*. QGC will develop and maintain a register and schedule of construction permits required to undertake the QCLNG Project development.

19.8 FINANCIAL ASSURANCE

As part of the EA approval process, financial assurance will need to be calculated and submitted under section 312O of the EP Act. At this time in the project approval stage, the final levels of disturbance on which the financial assurance calculation is based have not been finalised. The supplementary EIS describes a number of options for the development of the Gas Field. The final configuration and area of disturbance will change as a result of the options selected.

19.9 REVIEW

This plan will be reviewed as required by the Department of Environment and Resource Management at an interval of not less than three years since the last review. A review of this plan will include:

- a comparison of what was proposed to be developed for the first five years for the Gas Field versus actual development
- a description of proposed infrastructure that will be developed during the following term of the plan
- an update on any environmental authorities, licences, permits or approvals issued or lapsed since the last plan and that impact on the development of the Gas Field.