

SUMMARY OF CUMULATIVE ENVIRONMENTAL IMPACTS

The Terms of Reference (TOR) for the Queensland Curtis LNG (QCLNG) Project require a clear and concise summary of the cumulative impacts of the Project, and a description of these cumulative impacts both in isolation and in combination with other known, existing or proposed project(s) (where details of such proposed projects have been provided to QGC by the Department of Infrastructure and Planning or are otherwise published).

Volume 1, Chapter 3 describes the approach used in the Environmental Impact Statement (EIS) to assess cumulative impacts. *Volume 1, Appendix 1.6* identifies and provides an overview of the proposed projects considered in assessing cumulative impacts.

This chapter summarises the potential cumulative impacts on a range of environmental values associated with constructing and operating the Pipeline Component of the Project. Proposed projects assessed for cumulative impacts to the Pipeline Component are described in *Figure 4.17.1* and *Table 4.17.1*.

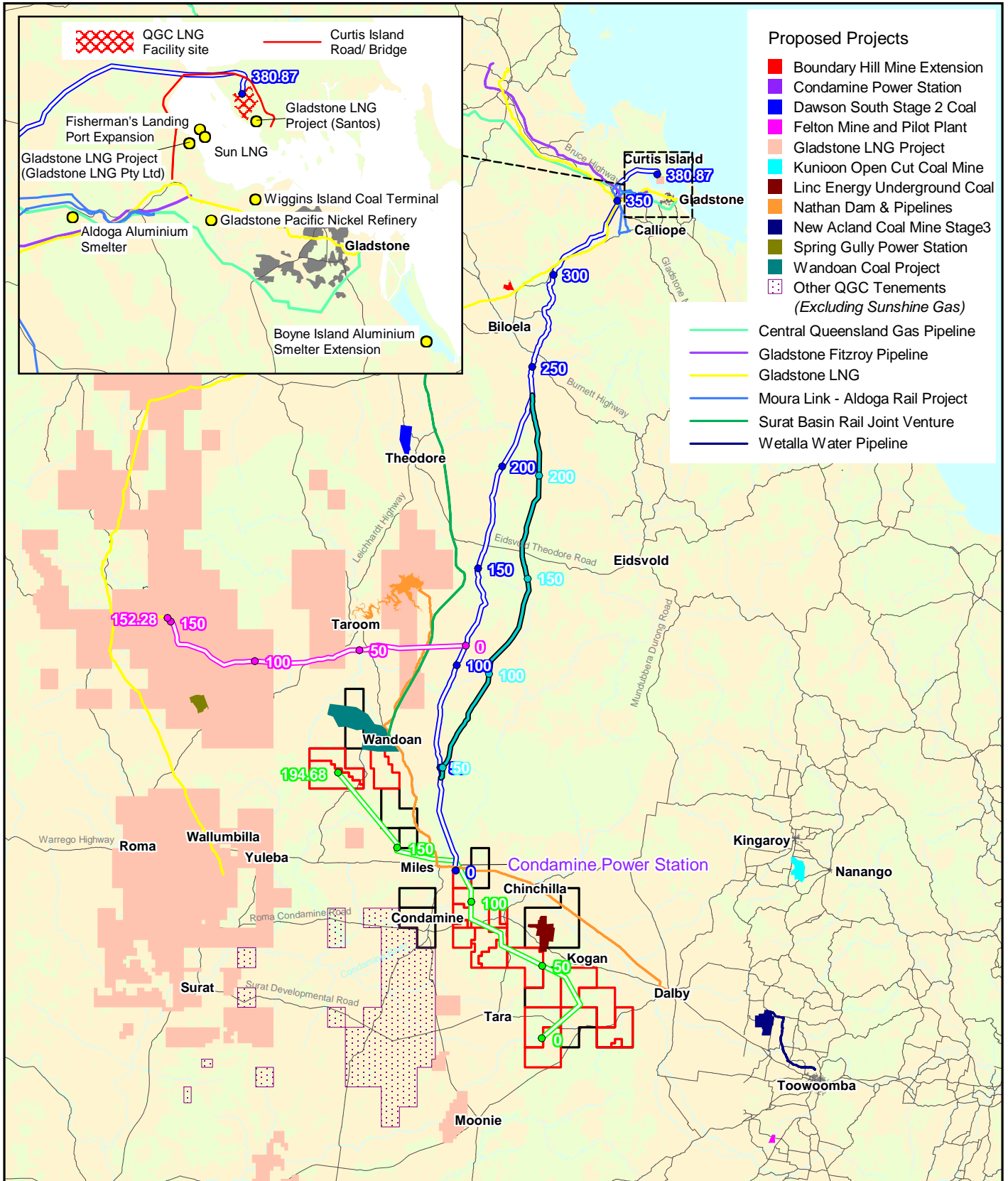
17.1**OUTCOMES OF THE CUMULATIVE IMPACT ASSESSMENT**

Cumulative impacts that may impinge on environmental values are identified in *Table 4.17.1* for both the construction and operational phases of the Pipeline Component. These values may be impacted as a result of a geographic overlap of project areas, scheduling overlap, or using the same infrastructure, services and resources.

It is important to clarify that the matrix in *Table 4.17.1* does not show which environmental values are affected by each of the proposed projects. Rather, it shows the values that could be adversely or beneficially affected as a result of the proposed projects being constructed or operated in close proximity to, or at a similar time as, the QCLNG Project. The resultant cumulative impact could therefore exacerbate a negative impact or enhance a positive benefit.

Note that QGC does not intend to construct a bridge to cross The Narrows or associated roads on the mainland or Curtis Island outside the LNG Facility boundary. Similarly, the Project does not require road access to the LNG Facility for construction or operations.

QGC will not be the proponent should these components be constructed. However, for completeness, the bridge and associated roads have been included in this cumulative impact assessment.



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

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

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

Projection UTM MGA Zone 56 Datum GDA 94

0 50 75 100
Kilometres

N

 QUEENSLAND CURTIS LNG <small>A BG Group business</small>	Project Queensland Curtis LNG Project		Proposed Projects Considered for the Gas Field and Pipeline Components
	Client QGC - A BG Group business		
 <small>Environmental Resources Management Australia Pty Ltd</small>	Drawn Mipela	Volume 4 Figure 4.17.1	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 CD	File No: E05-P-MA-96191	
	Date 17.06.09	Revision A	

Table 4.17.1 Identification of Cumulative Environmental Impacts for the Pipelines

Proposed Projects	<div style="display: flex; justify-content: space-between; text-align: center;"> Land Use and Infrastructure Land Contamination Terrestrial Ecology Aquatic Ecology Marine Ecology Surface Water Resources Groundwater Resources Coastal Processes Air Noise and Vibration Road Transport Shipping Transport Visual Amenities Waste Management Hazard and Risk </div>																
	CON	OPS															
Condamine Power Station	CON																
	OPS																
Expansion of QGC CSG fields for domestic markets	CON																
	OPS																
Gladstone LNG Project: CSG field (Santos)	CON																
	OPS																
New Acland Coal Mine: Stage 3 Expansion & Wetalla Water Pipeline	CON																
	OPS																
Wandoan Coal Project	CON																
	OPS																
Linc Energy Underground Coal Gasification	CON																
	OPS																
Spring Gully Power Station	CON																
	OPS																
Felton Mine and Dimethyl Ether Pilot Plant	CON																
	OPS																
Kunioon Open Cut Coal Mine	CON																
	OPS																
Gladstone LNG Project: Pipeline (Santos)	CON																
	OPS																
Central Queensland Gas Pipeline	CON																
	OPS																
Gladstone - Fitzroy Pipeline	CON																
	OPS																
Surat Basin Rail	CON																
	OPS																
Moura Link - Aldoga Rail	CON																
	OPS																
Nathan Dam and Pipelines	CON																
	OPS																
Boundary Hill Mine Extension	CON																
	OPS																
Dawson South Stage 2 Coal Project	CON																
	OPS																
Curtis Island Bridge/Road	CON																
	OPS																
QCLNG LNG Plant	CON																
	OPS																
QCLNG Gas Field	CON																
	OPS																

17.1.1 Geology and Soils

Clearing activities associated with the Pipeline Component may lead to soil erosion issues. Other pipelines and mining projects occurring within proximity of the Project pipelines may also create soil erosion issues leading to an overall loss of topsoil and increased soil erosion issues in the region.

There is limited potential for overlap of the various identified projects because they are not close to the pipeline works.

Overall significance of the cumulative impacts to geology and soils: negligible.

17.1.2 Land Use and Infrastructure

Construction of the pipelines is expected to have a negligible impact on infrastructure as it does not interfere with any existing infrastructure, other than roads (refer to *Section 17.1.11*). No evidence suggests that other concurrent projects will impact on the Pipeline Component of the Project.

The pipeline will have negligible impacts on land use, with existing grazing and agriculture resuming once the Pipeline Component is constructed and the Right-of-Way reinstated.

Overall significance of the cumulative impacts to land use and infrastructure: negligible.

17.1.3 Land Contamination

Due to the distance between the various projects cumulative impacts in relation to land contamination have not been identified.

Overall significance of the cumulative impact to land contamination: negligible.

17.1.4 Terrestrial Ecology

The various projects identified in proximity to the Pipeline Component will involve additional clearing of vegetation, and this will equate to a cumulative increase in habitat loss and fragmentation. This will be of most relevance where projects are in close proximity to one another or within communities in the same bioregion.

Appropriate mitigation and rehabilitation measures will minimise these cumulative impacts on terrestrial ecology. Offset requirements potentially provide cumulative benefits to regional terrestrial ecology values.

In relation to common terrestrial flora and fauna species and the majority of Endangered, Vulnerable and Rare (EVR) terrestrial flora and fauna species, the cumulative impacts of the various projects are unlikely to result in significantly long-term impacts. This is because similar habitats are available in adjacent areas and common species would use these habitats

(note: aquatic flora and fauna species are discussed in *Section 17.1.5*).

There are three EVR flora species for which the potential impacts associated with the Pipeline Component construction are likely to increase significantly due to potential cumulative impacts. These are Large-fruited *Zamia* (*Cycas megacarpa*), *Micromyrtus patula* and *Philothea sporadica*.

The potential for increased cumulative impacts on these species is identified because they have populations which could potentially be concentrated within constrained Project locations. In particular, the entire known extent of *Micromyrtus patula* and *Philothea sporadica* are limited to the area affected by a number of the proposed Gas Field developments. The potential for a significantly cumulative impact on Large-fruited *Zamia* is less because, although it is of limited geographical extent, this species occurs on steep rocky ranges which are unlikely to be suitable sites for Project infrastructure (with the exception of being transected by linear infrastructure).

Of the EVR fauna species, those with highly restricted distributions are the most likely to suffer from cumulative impacts. This would include species such as the Northern Quoll and Large-eared Pied Bat. In this Project proposal, such species and their habitats have been largely avoided. If similar guidelines are adopted by other projects, cumulative impacts should be minor.

False Water Rats may occur in the mangrove habitats around The Narrows near Curtis Island and since this is a preferred location for all projects accessing the island, it is likely that cumulative impacts could occur in this area and these may impinge on habitat for this species. This will largely depend upon the construction techniques used. Estuarine impacts are considered further in *Volume 5, Chapter 8*.

As such, all projects need to consider the potential for increased risks as a result of the cumulative impacts from the various projects to the species described above. In particular, where potentially unavoidable impacts are identified, each project should be required to develop an EVR species conservation plan which includes consideration of the potential cumulative impacts. The Commonwealth Department of Environment, Water, Heritage and the Arts and the Queensland Department of Environment and Resource Management should approve the plan for the *Environment Protection and Biodiversity Act 1999* (Cth) listed species and for *Nature Conservation Act 1992* (Qld) EVR-listed species, respectively. These departments have greater knowledge of proposed future developments and planning policies under consideration at state and federal levels.

Overall significance of the cumulative impact to terrestrial ecology: negligible.

17.1.5 Aquatic Ecology

The various projects identified in proximity to the pipelines may involve additional clearing and disturbance in the vicinity of aquatic habitats and in catchment areas. They may also contribute to changes in hydrological regimes, geomorphological processes and water quality, particularly where

catchment and watercourse disturbance is not effectively managed. The risk of introducing aquatic weeds from a wider number of sources is present too.

As for terrestrial ecology, appropriate mitigation and rehabilitation measures will minimise these cumulative impacts and offsets will potentially provide cumulative benefits.

The aquatic ecology features and values are concentrated within the watercourse networks which drain large expanses of land over which the various projects occur. As such, impacts from individual projects can mount in a cumulative manner and increasingly affect the aquatic features and values.

EVR aquatic fauna that may suffer from such cumulative impacts include the Murray River Cod which inhabits the Murray-Darling catchment adjacent to the Upstream Infrastructure Corridor, and the Fitzroy River Turtle, which inhabits the Dawson River catchment in the vicinity of the Export Pipeline.

As described in *Volume 4, Chapter 8*, the Pipeline Component is unlikely to significantly impact on any freshwater aquatic features or values in its own right. The pipelines, in conjunction with the proposed Curtis Island bridge/road crossing, potentially may impact on the estuarine wetlands adjacent to The Narrows. These possible impacts are discussed in *Volume 5, Chapter 8*.

Cumulative impacts of infrastructure and other urban development projects in the area may affect freshwater species as a result of impacts to water quality. However, with appropriate conditioning of development approvals and environmental management of any proposed projects, the overall impact will be minimised to ensure that the freshwater ecology is not affected.

Overall significance of the cumulative impact to aquatic ecology: minor.

17.1.6 Marine Ecology

The construction of a bridge/road to Curtis Island potentially could interact with constructing the pipeline crossing of The Narrows. This will depend upon the type of crossing technique adopted for the pipeline crossing.

Cumulative impacts on marine ecology are addressed in *Volume 5, Chapter 19*.

17.1.7 Surface Water Resources

Cumulative impacts in relation to surface water resources have not been identified due to limited potential impacts on surface water from the construction and operation of the Pipeline Component and the distance between the various projects.

Overall significance of the cumulative impact on surface water resources: negligible.

17.1.8 **Groundwater Resources**

Cumulative impacts in relation to groundwater resources have not been identified due to limited potential impacts on groundwater resources from the construction and operation of the Pipeline Component and the distance between the various projects.

Overall significance of the cumulative impact on groundwater resources: negligible.

17.1.9 **Air**

The key air emission during the construction of the Pipeline Component would be dust. A number of pipelines proposed in the Gladstone area, the Gas Field's current expansion for the domestic market and the Linc Energy Underground Coal Gasification project in the Surat Basin all potentially create dust emissions within the same airshed as the pipelines.

The cumulative impacts will occur only during the construction period and all projects would implement effective dust management measures, rendering the impacts temporary.

Overall significance of the cumulative impact on air: negligible.

17.1.10 **Noise and Vibration**

Noise from Pipeline construction could be discernible up to 1 km from the construction area. The only projects potentially within a 1 km radius of the Export Pipeline are the Curtis Island bridge/road and the various pipelines in the Gladstone area.

If all of the projects proceed simultaneously noise impacts potentially increase. The area with the greatest potential to be impacted on would be around Yarwun and through the Gladstone State Development Area (GSDA). The GSDA is a designated industrial development area and therefore works should not adversely impact on sensitive receptors in this location. In the Yarwun area, it may be necessary to take into account the timing of the various projects to lessen the impact on sensitive receptors.

State and federal development approval processes require implementation of appropriate planning and noise management strategies, which would negate adverse impacts.

Overall significance of the cumulative impact of noise and vibration: negligible.

17.1.11 **Road Transport**

The preliminary road transport assessment carried out for the Pipeline Component has been based on the assumption of road transport for all materials, plant, equipment and personnel movements. This provides a

conservative estimate of the potential impacts on the road network and has highlighted heavy impacts on the road pavement for a number of state-controlled and local government-controlled roads.

Should the various other projects proposed within the vicinity of the pipelines use the same roads as the pipeline traffic and proceed at the same time as the QCLNG Project, there is the potential for major impacts to the road network. This would be both in terms of pavement impacts and increased traffic volumes. However, it is extremely unlikely that these projects will all be approved and commence at the same time because they are at different design stages and construction phases.

The cumulative impact of any one of the projects proceeding at the same time as the Pipeline Component potentially creates moderate impacts due to traffic interaction.

Consideration has been given to the cumulative impacts associated with the various elements of the Project (i.e. LNG Facility/pipeline transport in Gladstone and Pipeline/Gas Field transport around Miles and Dalby). The cumulative impacts that could occur in Gladstone as a result of the Project have been addressed in *Volume 5, Chapters 14 and 19*.

The preliminary transport studies for Gas Field and Pipeline Components has identified the potential for major impacts on the road pavements for most of the roads seen as possible key transport routes, as discussed in *Volume 3, Chapter 14* and *Volume 4, Chapter 13*.

Once a transport haulage contractor has been appointed and the actual methods and routes of transport identified, the transport studies will be revised to determine the real impact. At this time the cumulative impacts will be considered. The overall impact on roads and transport is expected to be less than the conservative result of preliminary impact assessment.

Staggering transport requirements for the Gas Field and Pipeline Components so that both activities do not occur together may minimise cumulative traffic impacts. However, QGC will work closely with the Department of Transport and Main Roads (DTMR) to work out the best transport routes and mitigate any identified adverse impacts.

Successful negotiation of the management of road impacts with the relevant road authority (e.g. DTMR or regional council) is expected to form part of the conditions of Project approval.

Once traffic studies are reviewed in the detailed design phase, and negotiations with relevant road authorities have been completed and transport routes designed and agreed upon, impacts will be minor.

Overall significance of the cumulative impact to road infrastructure: minor.

17.1.12 Visual Amenity

The clearing of vegetation and the presence of construction equipment has the potential for temporary visual amenity impacts on the area. Where these actions are carried out close to other pipelines, the increased vegetation clearing and construction equipment movements would create cumulative impacts. These would largely be confined to the GSDA.

Overall significance of the cumulative impact to visual amenity: negligible.

17.1.13 Waste Management

Pipelines generate relatively small amounts of waste which would normally be recycled or disposed of by landfill, using the services of a waste management contractor. Waste management facilities in most regional council areas are limited particularly in Central and southern-central Queensland. Should all of the identified projects proceed together, services in the area could become overloaded. Therefore, waste management contractors may need to transport the waste materials a greater distance for final disposal.

The construction phase of the Pipeline Component will require accommodation camps. Construction camps normally have their own sewage treatment facilities which require effluent discharge to land. In the event of wet weather it may not be possible to discharge this effluent to land and pump out and disposal to a regional council facility may be required.

In extended wet weather work will decrease on site (work safety) and camp numbers will decrease over this time, therefore effluent quantity will decrease. A contingency plan in case of extreme conditions will include pumping the effluent and carting to the nearest municipal treatment facility.

Alternatively the size of the wet weather storage on site can be increased to suit extreme requirements i.e. greater than the standard design for three days where council facilities are not able to accept additional loads due to the number of competing projects.

Overall significance of the cumulative impact of the various projects: minor.

17.1.14 Hazard and Risk

Cumulative impacts from hazards are generally localised to the areas surrounding the pipeline infrastructure. The various gas pipelines and Surat Basin Rail (if electric lines are used) may result in minor-to-moderate cumulative hazard impacts.

This will depend upon the proximity of infrastructure presenting the hazard and the probability of that hazard event interacting with other projects' infrastructure.

Mitigation measures for QGC's potential hazards associated with pipelines are

described in *Volume 4, Chapter 16*. Potential hazards will not be located where they could interact with other projects. Hazards from other projects will be managed under the relevant environmental authorities for those projects and appropriate management strategies for the QCLNG Project will negate these cumulative impacts.

Overall significance of the cumulative impact to hazard and risk: negligible.

17.2

CONCLUSION

The main cumulative impacts associated with the Pipeline Component of the Queensland Curtis LNG (QCLNG) Project relate to roads and transport corridors used for the Project and other proposed projects in the area. Appropriate management strategies are being developed to reduce this impact including negotiating scheduling times for the transportation of good and services within this Project and with other projects. The minor-to-moderate impacts identified in this risk analysis are both short term and temporary, making the cumulative impact assessment negligible.

A summary of the cumulative impacts associated with this Pipeline Component and outlined in chapter is provided in *Table 4.17.2*.

Table 4.17.2 Summary of Impacts

Impact assessment criteria	Assessment outcome
Impact assessment	Negative
Impact type	Direct
Impact duration	Short term for construction phase traffic impacts
Impact extent	Local
Impact likelihood	High

Overall assessment of impact significance: negligible.