1 INTRODUCTION

1.1 INTRODUCTION

This chapter provides responses to general submissions received on the Queensland Curtis LNG (QCLNG) Project's draft environmental impact statement (EIS) related to the LNG Component. In addition, a summary of findings is provided for:

- the potential impacts on environmental factors from changes to the LNG Component, as described in *Volume 2, Chapters 9* and *13*
- additional information gathered on aspects of the LNG Component described in the draft EIS.

1.2 CHANGES TO PROJECT DESCRIPTION

Changes to the LNG Component of the Project description are presented in *Volume 2, Chapters 9* and *13*.

1.3 STUDIES

Additional studies were undertaken by QGC to assess the impacts and, where necessary, identify measures to mitigate impacts from changes to the Project, or to supply supplementary information on aspects of the Project described in the draft EIS.

Studies were conducted to assess potential impacts associated with changes to the LNG Component of the Project description associated with:

- terrestrial ecology
- marine ecology
- coastal environment
- noise
- traffic
- visual amenity
- hazard and risk.

1.4 SUMMARY OF FINDINGS

1.4.1 Introduction

A summary of findings for *Volume 5, Chapters 2 to 18* of this sEIS is provided below.

1.4.2 Climate and Climate Change

There are no findings for the LNG Component additional to those presented in the draft EIS.

1.4.3 Topography and Geomorphology

There are no findings for the LNG Component additional to those presented in the draft EIS.

1.4.4 Geology and Soils

There are no findings for the LNG Component additional to those presented in the draft EIS. Some clarifications and responses to queries of a technical nature have been addressed.

A draft acid sulfate soils (ASS) management plan framework has been prepared for the Project, to provide a Project wide framework within which ASS will be addressed. More detailed site and activity specific ASS management plans will be prepared within this framework for approval by regulators prior to commencement of construction.

1.4.5 Land Use and Infrastructure

There are no findings for the LNG Component additional to those presented in the draft EIS.

1.4.6 Land Contamination

There are no findings for the LNG Component additional to those presented in the draft EIS.

1.4.7 Terrestrial Ecology

Additional bird surveys were commissioned to further gauge species presence and distribution at the LNG Facility site. This was done in response to the findings and recommendations of the draft EIS and the potential for impacts on threatened or migratory species at the LNG Facility. The following EPBC listed migratory species were targeted during the surveys:

- Bar-tailed Godwit (*Limosa lapponica*)
- Eastern Curlew (*Numenius madagascariensis*)
- Whimbrel (*Numenius phaeopus*)
- Common Greenshank (*Tringa nebularia*)
- Red-necked Stint (*Calidris ruficollis*).

The draft EIS also identified the presence of at least one pair of Powerful Owls (listed as vulnerable under the (Qld) *Nature Conservation Act 1992*) whose home range includes the area proposed for the LNG Facility. Further surveys

of this species were therefore undertaken to identify possible roosting and nesting locations within the site and the surrounding area.

In conjunction with a revised assessment of terrestrial ecology impacts associated with the revised Project description, this additional data was used to provide an updated assessment of impacts on these species, as well as to provide a basis for additional management and mitigation measures.

The assessment of impacts on vegetation was also revised to address modifications to the Project description.

Overall, the revised assessment indicates that changes to the Project description result in slightly reduced impacts, although the overall assessment of impact significance of the LNG Facility for terrestrial ecology remains moderate to major as per the draft EIS, for permanent impacts to endangered RE and impacts to Powerful Owl and migratory bird habitat.

1.4.8 Marine Ecology

A range of studies addressing specific aspects of marine ecology have been undertaken for the sEIS, to augment the baseline data provided in the draft EIS and to address revisions to the Project description. These additional studies included assessment of potential impacts:

- on the Port Curtis hydrodynamic regime
- on seagrass and corals in Port Curtis (including impacts arising from sedimentation and turbid plumes)
- of underwater noise associated with Project activities on marine fauna
- arising from discharge of effluents (particularly treated sewage effluent and reverse osmosis brines)
- on specific marine fauna including Australian Snubfin Dolphin and Indo-Pacific Humpback Dolphin, Dugong, and turtles.

Overall, these additional studies concluded that changes to the hydrodynamic regime will result in negligible impacts upon high and low tide levels, that marine mammals and turtles would not be significantly impacted by underwater noise, lighting or vessel movements associated with the Project, and that other than 1 to 2 ha of permanent losses, impacts to sea grasses and corals from sedimentation and turbidity are expected to be temporary and limited in extent. Notwithstanding these conclusions, the studies identified measures that will be adopted to reduce risks of vessel interactions with marine mega fauna and to manage water quality and sedimentation impacts from dredging.

1.4.9 Surface Water

There are no findings for the LNG Component additional to those presented in the draft EIS.

1.4.10 Groundwater

There are no findings for the LNG Component additional to those presented in the draft EIS.

1.4.11 Coastal Environment

Additional hydrodynamic modelling has been undertaken to address revisions to the Project description and in response to a submission on the draft EIS specifically relating to estimates of e-folding times (a measure of tidal mixing) for any parts of Port Curtis affected by the Project. Outcomes of the modelling with regard to e-folding times have been presented, although the implications of this modelling in terms of potential impacts on marine biota are addressed in *Volume 5, Chapter 8: Marine Ecology*.

1.4.12 Air

Responses have been provided to submissions relating to LNG Component air quality, predominantly with regard to providing further detail on the modelling methodology and the inputs.

Overall, the description of the air quality baseline and assessment of impacts for the LNG Facility as described in *Volume 5, Chapter 12* and *Appendix 5.13* of the draft EIS remains valid, and changes to the Project as described in this sEIS are not anticipated to result in any significant change to the air quality or aviation safety impacts as described in the draft EIS.

1.4.13 Noise and Vibration

Additional assessment of potential impacts associated with noise and vibration was undertaken to address changes in Project description, and in particular:

- change in LNG Facility layout
- potential noise impacts associated with Project traffic (and particularly heavy vehicles) on the Gladstone mainland.

The overall noise impact associated with the LNG Facility remains unchanged from that described in the draft EIS. Impact significance remains minor as construction and operations phase noise and vibration are not predicted to impact on sensitive receptors under most conditions. Predicted exceedences of noise criteria will be experienced infrequently by residents of Tide Island.

Some additional mitigation measures have been proposed specifically to address potential impacts associated with the movement of heavy vehicles.

1.4.14 Transport

Refinement of Project workforce and logistics requirements has resulted in changes to scenarios modeled in the draft EIS. In response, further modelling and impact assessment has been undertaken for the supplementary EIS, superseding that previously presented in the draft EIS.

The revised traffic impact assessment took into consideration:

- revised construction and operations workforce estimates and shift rosters
- revised estimates of heavy vehicle movements to the LNG Facility via the staging area at Auckland Point, based on further definition and refinement of the construction logistics plan
- revised estimates of transport of Export Pipeline, assumed to be imported through the Port of Gladstone and transported inland via road. It should be noted that refinement of pipeline transport continues, with QGC actively pursuing the use of rail for transport of materials, although the revised modelling assumed that all pipeline is transported by road as a worst case scenario
- further detail for movement of aggregates and other bulk materials required for construction of the LNG Facility and associated works in the Gladstone region.

The assessment also took into consideration cumulative impacts associated with other potential Projects, as well as background growth over the life of the Project.

A range of mitigation measures has been proposed and incorporated into the revised traffic modelling, including:

- a bussing strategy for approximately 55 per cent of the total peak construction workforce (for workers accommodated in construction camp on Curtis Island)
- car parking split between Auckland Point (for Gladstone residents) and an off-site location
- various distribution options for Project personnel entering and departing Auckland Point
- intersection upgrades
- pavement contributions.

Overall, the assessment demonstrates that the LNG Component of the Project as presented in this sEIS is not anticipated to have a significant impact on state or local-controlled road or rail networks, or on transport infrastructure, facilities or services provided that recommended mitigation measures are implemented.

1.4.15 Shipping

This chapter addresses submissions on the draft EIS specifically relating to Project shipping, and describes some key amendments to the description of shipping as provided in the draft EIS. These amendments include:

- The QCLNG Project no longer proposes spiking of LNG with propane prior to export, and hence bulk LPG carriers to deliver propane to the LNG Facility site will not be required. This change results in a reduction in shipping traffic to that described in the draft EIS.

- The draft EIS indicated that LNG shipping associated with the Project will solely use the outer route along the Great Barrier Reef Marine Park. However, cyclone or winter weather conditions may require that for safety reasons vessels take the Inner Route through the GBRMP, at the discretion of the vessel's captain.

1.4.16 Visual Amenity

The sEIS considered visual impacts to address changes to the Project description, specifically relating to:

- amendments to the LNG Facility layout
- removal of the mainland road bridge from the Project scope.

Overall, the significance of the landscape and visual impacts from the amended LNG Facility layout from a range of viewpoints remain unchanged or reduced from that described in the draft EIS, and no additional mitigation measures are proposed.

1.4.17 Waste Management

This chapter provides additional detail on proposed waste management and on indicative volumes of wastes to be generated during construction and operations, both in response to submissions on the draft EIS and to address changes to the Project description. The draft EIS conclusion that measures are available to adequately manage the wastes arising from the construction and operational phases of the LNG Facility remains valid.

1.4.18 Hazard and Risk Assessment

This chapter provides responses to submissions on the draft EIS applicable to hazard and risk, and provides updated outcomes of quantitative risk assessments undertaken for the LNG Facility and ship-loading operations to address key changes in the Project description, being in particular:

- the LNG loading jetty has been moved further south from than as described in the draft EIS, with the new location providing approximately 600 m between the manifold and southern plant boundary
- the QCLNG Project no longer proposes spiking of LNG with propane prior to export, and consequently the bulk propane storage tank shown in the draft EIS has been removed from the design, along with ancillary equipment associated with bulk unloading and storage of propane at the site. Bulk LPG carriers to deliver propane for LNG spiking are no longer required
- LNG tanks and other infrastructure have been moved further inland
- reduction in LNG tank capacity from 160,000 m^3 (as assumed in the QRA for the draft EIS) to 140,000 m^3 for the revised QRA.

QGC with BG Group has ensured that the highest level of technical excellence is applied to the design and operations of both the QCLNG Project and the export of LNG to the market. QGC has engaged independent third party experts to undertake risk assessments for the LNG Facility and the loading of LNG onto its carriers. QRAs have been submitted to the Queensland Hazardous Industries Chemical Branch (HICB) for assessment.

Overall, the QRA for the LNG Facility indicates that all the HIPAP (*Hazardous Industry Planning Advisory Paper No. 10 – Land Use Safety Planning*) risk criteria are satisfied by the layout and design of the LNG Facility. This is due to the low level of risk associated with terminals of this scale and design as well as the location of the terminal in an uninhabited area away from residential development.

The key findings of the revised ship loading QRA include:

- The accident scenarios associated with the loading of LNG have been identified. The likelihood and consequences of these scenarios have been estimated quantitatively and the risks compared to the land use planning criteria in use in Queensland.
- The risks associated with the berth loading and unloading meet the injury risk criterion for residential areas, and the fatality risk criteria for sensitive land uses, residential areas, commercial areas and neighboring industrial facilities.

1.4.19 Conclusion

Volume 5 of the QCLNG Project's sEIS provides responses to submissions related to the LNG Component described in the draft EIS. The volume also discusses how environmental values for each environmental factor have been assessed in relation to any changes in the Project description as set out in *Volume 2, Chapters 9* and *13*.