8 AQUATIC ECOLOGY

8.1 INTRODUCTION

This chapter of the supplementary environmental impact statement (sEIS) for the Queensland Curtis LNG (QCLNG) Project addresses the aquatic ecology-related submissions that were received in regards to the Gas Field Component of the draft EIS.

Additionally, this chapter will discuss the findings of further studies that have been conducted to supplement the aquatic ecology information presented in the draft EIS, and to assess potential impacts that may arise from changes to the description of the Gas Field Component of the QCLNG Project in *Volume 2, Chapters 7 and 11*.

Key amendments relevant to aquatic ecology include:

- significant increase in the amount of Gas Field infrastructure
- release of treated Associated Water to surface waters is identified as a preferred option.

Note that the release of treated Associated Water to surface waters will require separate approvals and detailed aquatic ecology assessments. Detailed aquatic ecology assessments are proposed to be undertaken at the time that those separate approvals are sought, and when more detailed specifications of likely release characteristics are known.

As described in *Volume 2, Chapter 7,* consideration of Associated Water beneficial uses is outside the scope of this sEIS.

8.2 RESPONSES TO SUBMISSIONS

Table 3.8.1 provides a summary of the comments received on aquatic ecology for the Gas Field. The table indicates the relevant section of the draft EIS to which the submission pertains and the last column either outlines the response or indicates where in this chapter (or in the sEIS) the comment is addressed.

Table 3.8.1 Summary of Aquatic Ecology Submissions on the Draft EIS

Summary of Submission	Response	Submitter
The findings of the AquaBAMM assessment for the Condamine-Balonne catchment should be discussed in the context of the proposed development	Refer to *Section 8.3.1* of this chapter	32
It is recommended that should any biological data be available from any DERM monitoring stations, this should be utilised in any potential biological community impact assessments. If there is no biological data available, this should be clearly stated in the s EIS	A web search of the DERM monitoring sites within the study area found no reference to macro-invertebrate data. The only data available at the monitoring sites within the Study Area are “flow” and ”water quality”. This was confirmed in consultation with DERM staff	32
Reference should be made to of least concern, near-threatened, rare, vulnerable or endangered wildlife and the DERM Back on Track species prioritisation process	Throughout the sEIS, the term “EVR” has been used to describe all species listed under the *Environment Protection and Biodiversity Conservation Act* (*EPBC Act*) 1999 (Cth) as extinct in the wild, critically endangered, endangered, vulnerable and conservation dependent, and under the *Nature Conservation Act* (*NC Act*) 1992 (Qld) as Extinct in the wild, endangered, vulnerable, rare and near-threatened. The DERM Back on Track species prioritisation process framework has been referenced and will be used in the development of management plans for any EVR species that may be significantly impacted by the proposed development. See *Volume 4*, *Chapter 7*, *Section 7.6*	32
The draft EIS failed to address any potential impacts on the *EPBC Act* Threatened ecological community, ‘The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin’.	Refer to *Section* 8.3.3 of this chapter.	32
The sEIS should ensure that environmental values of groundwater-dependent ecosystems are recognised, potential impacts are fully assessed and appropriate mitigation measures are adopted	Groundwater dependent ecosystems (GDEs) are typically associated with surface drainage features or shallow groundwater resources related to aquifer recharge and discharge zones. The extent of GDE dependency on groundwater can range from being marginally to entirely dependent on groundwater. The *Hydrogeological Framework Report for the Great Artesian Basin Water Resources Plan Area (2005)* includes a discussion of the two types of GDEs that are most relevant to the QCLNG Project area:	32

Summary of Submission	Response	Submitter
	• Springs (including recharge, discharge or mound springs of the GAB) • Rivers receiving baseflow. There are no GDEs of *EPBC Act* concern that will be affected by the Gas Field development. As described in *Volume 3*, *Chapter 10* of the sEIS, due to the remoteness of springs from the Project, impacts upon all springs are likely to be minimal. Wherever the pipelines cross watercourses, stringent mitigation measures will be in place to avoid disturbance to associated GDEs. These mitigation measures are discussed in *Volume 3*, *Chapter 8, Section 8.4.1* of the draft EIS. Subterranean ecosystems and phreatophytic terrestrial vegetation are not included within the scope of the terms of reference for this sEIS.	
Large habitat trees must be left wherever possible, in particular along watercourses.	Large habitat trees will be left wherever possible. Where riparian vegetation is required to be cleared, large trees that provide habitat will be avoided and retained wherever possible. One site pre-clearance survey will be conducted prior to final location of all infrastructure to facilitate retention of large habitat trees wherever possible.	25

8.3 ADDITIONAL STUDIES

Additional aquatic ecology studies undertaken since the release of the draft EIS include review of:

- the AquaBAMM assessment for the Condamine-Balonne Catchment
- the Queensland Wetlands mapping (DERM, Version 2.0, September 2009)
- the Springs of Queensland Dataset to determine whether any *EPBC Act* Threatened ecological communities of "native species dependent on natural discharge of groundwater from the Great Artesian Basin" occur within or in proximity to the Project.

8.3.1 AquaBAMM Review

The Aquatic Biodiversity Assessment and Mapping Methodology (AquaBAMM) assessment of the Condamine catchment, otherwise known as the Condamine Aquatic Conservation Assessment (ACA), was not available at the time of the assessment for the draft EIS. The matters covered by this document were addressed in the Surface Water Report presented in *Appendix 3.3* of the draft EIS.

The scope of the Condamine ACA covers some of the riverine areas located within the central and eastern tenements of the Gas Field. The study focussed on issues relating to aquatic fauna, aquatic and riparian flora and wetland ecology for the Condamine Catchment's non-riverine and riverine wetlands.

The Condamine ACA divides the catchment into 305 smaller sub-catchment areas and assigns each different conservation/ecological values. The ecological values that are considered for the purposes of the ACA include naturalness, biodiversity, potential to provide habitat for Threatened species, connectivity and special features. These values are then combined to calculate an overall conservation score, otherwise known as an AquaScore. As recommended by the Condamine ACA, all sub-catchment areas with an overall AquaScore of "Very High" were considered for the purposes of this assessment.

Overall findings from the ACA indicate that riverine, palustrine and lacustrine wetlands in the Condamine River Catchment were generally in good ecological condition. Additionally, the Condamine River Catchment is described as containing significant aquatic ecosystem conservation values (i.e. Lake Broadwater), despite being intensively farmed and developed over most of its area, with consequent pressures on and in the aquatic ecosystems.

Four sub-catchments with an AquaScore of Very High occur within or downstream of the central QGC tenements. These sub-catchments are made up of the section of the Condamine River that extends from Chinchilla to Miles.

8.3.2 Queensland Wetlands Mapping

A review of the Queensland Wetlands mapping identified several additional water bodies and wetlands Regional ecosystems within the Gas Field to those presented in the draft EIS (*Figure 6* and 7 of *Appendix 3.1*). Many of these are artificial wetlands such as dams, ringtanks, weirs and levee banks. Others include riverine wetlands Regional ecosystems such as REs such as 11.3.2b, 11.3.3c, 11.3.24a, 11.3.25b, 11.3.25g, 11.3.27b, 11.3.27c and 11.4.3a.

Satellite imagery interpretation indicates that the majority of these riverine fringing wetlands (i.e. riparian areas) are dry ephemeral watercourses adjacent to riparian vegetation that is mostly grazed and in degraded-to-average condition.

8.3.3 Review of Springs of Queensland Dataset

Review of the Distribution and Assessment of the Queensland Herbarium Springs of Queensland Dataset (Version 4.0) indicates that no *EPBC Act* threatened communities of "native species dependent on the Great Artesian Basin" will be affected by the Gas Field. No habitat areas (i.e. mound springs) occur within the footprint of the Gas Field, including the potential area of influence of CSG depressurisation activities (refer to *Figure 3.10.1* in *Volume 3, Chapter 10*). For further discussion on springs and groundwater, see *Volume 3, Chapter 10*.

8.4 UPDATE OF AQUATIC ECOLOGY IMPACTS

Review of the Queensland Wetlands mapping led to the identification of additional wetland areas within the Gas Field. The review of the Condamine ACA confirmed that riverine areas of high ecological and conservation value occur within and downstream of the QGC tenements. However, despite this additional knowledge, and an increase in the scale of field infrastructure, potential impacts on Aquatic Ecological Values are expected to be the same as those presented in *Volume 3*, *Chapter 8*, *Section 8.3.1* of the draft EIS. Although discharge of treated Associated Water is identified as a potential key component of overall Associated Water management, specific and detailed ecological studies and assessment of potential impacts will be carried out prior to submitting an application for approval from the appropriate authorities. The potential impact on surface water and groundwater is described in *Volume 8, Chapters 9 and 10.*

8.5 CUMULATIVE IMPACTS

The potential cumulative impacts on aquatic ecology values of the Gas Field remain the same as those presented in the draft EIS.

8.6 MITIGATION

The Project identifies wetland systems and riverine systems, including those given high conservation significance by the Condamine ACA, as key areas of flora and fauna biodiversity values. Gas Field development has and will continue to put in place stringent mitigation measures to minimise impacts on these areas and values (refer to *Volume 3*, *Chapter 8* of the draft EIS).

All wetland and riverine (riparian) areas have been classed as Very High ecological constraints areas (see *Volume 3, Chapter 7*, *Section 7.6.2* of the draft EIS). This constraint mapping will help minimise clearance in riparian areas and recommends complete exclusion from wetlands. In a small number of instances, it may be impossible for linear infrastructure to avoid crossing watercourses (riparian areas). Provided unavoidable impacts are minimised, combined with the fact that most disturbances are likely to be temporary, potential impacts that may result from these watercourse crossings are projected to be minor. A full list of mitigation guidelines are provided in *Volume 3, Chapter 8, Section 8.4* of the draft EIS.

Overall, given the majority of watercourses are dry ephemeral systems, it is projected that, with such mitigation measures in place, potential impacts on wetland areas, riverine systems and associated aquatic species are likely to be minor.