11 ASSOCIATED WATER

11.1 INTRODUCTION

This chapter provides responses to submissions received on the Queensland Curtis LNG (QCLNG) Project draft environmental impact statement (EIS) relating to Associated Water in the Gas Field Component.

Where changes to the Project description, as detailed in *Volume 2, Chapters 7* and *11*, have impacted on Associated Water, these impacts and measures to mitigate impacts are described. Supplementary information, on certain aspects of Associated Water management described in the draft EIS, is also presented. The potential for contamination of soils and water from Associated Water management is described in *Volume 3, Chapter 6* of the sEIS.

11.2 RESPONSES TO SUBMISSIONS

Table 3.11.1 provides a summary of the submissions received on Associated Water of the Gas Field and a response to those submissions.

Table 3.11.1 Responses to Submissions on the draft EIS

Issue Raised	QCLNG Response	Relevant Submissions (s)
Describe method for disposal of saline Associated Water and the disposal of waste products from the desalination process.	Refer to *Volume 3, Chapters 6* and *11* of the draft EIS and sEIS. Refer to *Section 11.4.*	7, 34, 9
QGC is using untreated Associated Water for dust suppression, resulting in contamination of soils and watercourses. Identify if any untreated Associated Water is currently being released to soils or surface watercourses. Provide evidence to support the use of dust suppression with total dissolved solids (TDS) of 4000 mg/L.	Refer to *Section 11.6.1*. QGC does not intend to use Associated Water for dust suppression where the TDS of the water is greater than 2,000 mg/L.	7, 12, 11, 19, 32, 9
Describe the purpose of desalination trials.	Desalination trials are required to test the effectiveness of treatment methods on Associated Water from QGC's tenements. As water quality differs across regions, trials are required to determine the effectiveness of desalination of QGC's water and to identify the optimum solution for both environmental and economic outcomes.	7
Provide water quality parameters for the release of treated Associated Water. Compare water quality parameters to moderate and low reliability trigger values provided by Australia and New Zealand Environment and Conservation Council; Agriculture and Resource Management Council of Australia and New Zealand (ANZECC & ARMCANZ) (2000).	Refer to *Section 11.6.4*	7, 12, 19, 32
Describe the potential impacts on human health from the use or release of untreated or treated Associated Water, including the supply of treated Associated Water to QGC's camps. Consider all contaminants in the Associated Water. Assess the rate of human consumption from Associated Water discharges.	Refer to *Section 11.6.4*. The potential release of untreated Associated Water, subsequent contamination of lands and measures to manage potential releases are described in *Volume 3, Chapter 6*. The release of untreated Associated Water would result in the release to the environment of some analytes in excess of Australian Drinking Water Guidelines (ADWG) 2004. These analytes are aluminum, cadmium, fluoride, lead, manganese and total dissolved solids. Therefore engineering design controls and monitoring measures will be put in place to prevent untreated Associated Water reaching drinking water sources. QGC is investigating the level of removal of each analyte through the detailed engineering of the water treatment process and will progress the comparison with drinking water and ecosystem protection guidelines. QGC will supply treated water (not potable water standard) to camps for various uses. Camps will be fitted with an appropriately sized water treatment plant to treat water to potable standard which will meet ADWG.	10, 32, 9
Describe water management infrastructure during the exploration phase	Exploration and appraisal activities are conducted under existing Environmental Authorities	7

Issue Raised	QCLNG Response	Relevant Submissions (s)
and from Condamine Power Station.	(EAs) for exploration activities. Under the conditions of those EAs, QGC constructs ponds for evaporating Associated Water produced during exploration and appraisal activities. It is QGC's intention to transition exploration and appraisal ponds into water storage ponds for the Queensland Curtis LNG (QCLNG) Project for the balancing of water flows between production wells and water treatment plants (WTPs). The Condamine Power Station (CPS) is not part of the QCLNG Project and information about water management at the CPS is not provided in this EIS.	
Can or will QGC locate ponds on land QGC does not own or in a floodplain?	QGC will not locate ponds in the 1:100 year floodplain unless no other reasonable alternatives exist. Should a pond be located in a floodplain, the embankment walls will be engineered to be higher than the 1:100 year flood level and capable of withstanding flows from flood waters. QGC will not locate large ponds (collection header ponds, raw water ponds, brine ponds and brine evaporation basins) on land that it does not own. QGC may locate small ponds (infield buffer storages and regional storage ponds) on land that it does not own. Refer to *Volume 2, Chapter 7* for a description of ponds. QGC is investigating the potential to use tanks as infield buffer storages.	7
Describe the process of reinjection and its potential impacts on bore water quality.	Refer to *Section 11.6.3*	7
Evaporation ponds should be discontinued in line with government policy.	Refer to *Section 11.6.5*.	32
Further information on tree cropping should be provided, including identification of suitable land, performance benchmarks, management of stormwater and assessment of long-term impacts. Tree cropping should not displace existing cropping.	Refer to *Section 11.6.2.*	32, 36
Justify the release of treated Associated Water to surface waters after consideration of all other options. What volume of Associated Water will be released.	Refer to *Section 11.6.4.*	32, 34
Treat water to potable water quality and supply potable water to local municipalities. The water treatment and distribution network can provide long-term benefits to the community.	Refer to *Section 11.6.4.*	36
Consider the cumulative impacts of aggregation of Associated Water, based on the Australian Petroleum Production and Exploration Association (APPEA) study.	Refer to *Section 11.6.6.*	32

Issue Raised	QCLNG Response	Relevant Submissions (s)
Include the *Water Supply (Safety and Reliability) Act 2008* in the sEIS and address the requirements of the Act where appropriate.	QGC recognises that registration as a "service provider" under the *Water Supply (Safety and Reliability) Act 2008* (WS Act) will be required where the company intends to supply Associated Water to a recipient for which a charge will be imposed. Where QGC applies for such registration, it recognises that it will also need to prepare and arrange certification of any relevant management plans outlined in part 4 of Chapter 2 of the WS Act. It is also recognised that where a Referable Dam is proposed as a component of the management strategy for disposing of Associated Water, the dam will be subject to a failure impact assessment under this Act. QGC will seek all necessary approvals for its projects that are required under the WS Act.	32

11.3 APPROVALS FOR ASSOCIATED WATER MANAGEMENT

QGC is seeking approval, through the QCLNG EIS, for water management of water flows from wells to water treatment plants, including brine and salt disposal. This is referred to as ‘‘upstream water management’’. Infrastructure required for upstream water management is described in *Volume 2, Chapters 7* and *11* and includes:

- separators at wells
- water gathering line
- water trunklines
- water collection header
- infield buffer storages
- regional storage ponds
- collection header ponds
- raw water ponds
- treated water ponds
- water treatment plants
- brine ponds
- brine evaporation basins
- salt disposal landfills.

Impacts from upstream water management infrastructure are described in relevant chapters of *Volume 3* of the draft and sEIS, including:

- *Chapter 7*, terrestrial ecology
- *Chapter 6*, land contamination
- *Chapter 12*, noise
- *Chapter 13*, air emissions
- *Chapter 14*, transport
- *Chapter 15*, visual amenity.

Greenhouse gas emissions from the upstream water management infrastructure are addressed in *Volume 7* of the *Draft* and *s*EIS.

QGC is not seeking approval through the QCLNG Project EIS for beneficial use or disposal of treated Associated Water, and has therefore not, at this stage, assessed in detail, the impacts from potential beneficial use or disposal options. Separate approvals under state and Federal legislation (if required) will be sought when QGC has selected preferred options for beneficial use and disposal of Associated Water.

Approval is not sought for tree cropping, supply to agriculture, reinjection, surface water discharge, evaporation ponds or any other means for beneficial use or disposing of Associated Water. Infrastructure and impacts for which QGC is not seeking approval include:

- pipelines and pumps to transfer treated water to beneficial use options
- ponds required for balancing water flows between WTPs and beneficial use options
- infrastructure for all beneficial use or disposal options including irrigation networks, reinjection wells, pipelines or evaporation ponds.

11.4 CHANGES TO THE PROJECT DESCRIPTION

None of the changes to the Project description relate to the beneficial use or disposal of Associated Water. Further information is supplied, in *Volume 3 Chapter 6* of the sEIS*,* on the design, construction and operation of untreated water storages, brine storages and salt disposal landfills. The impacts from WTPs on air quality, noise and visual amenity are assessed in the *Volume 3, Chapters 12, 13,* and *15* respectively of the sEIS.

11.5 SUPPLEMENTARY INFORMATION ON ASSOCIATED WATER

Associated Water management options are described in detail in *Volume 3, Chapter 11* of the draft EIS. Additional, relevant information on Associated Water management, which has become available since the submission of the draft EIS, is presented in this chapter.

11.6 BENEFICIAL USE OPTIONS

The suite of beneficial use options presented in the *Volume 3, Chapter 11* of the draft EIS is unchanged. QGC's base case option for disposal of Associated Water is tree cropping, using treated Associated Water for irrigation. However QGC is investigating a number of other options, which may be preferred to tree cropping. These options include reinjection to aquifers, river discharge, evaporation ponds, supply to agriculture and supply to industry. QGC has secured contracts to supply water to two external users. QGC's assessment of the benefits and constraints posed by each of these options is provided in *Volume 3, Chapter 11* of the draft EIS.

A Water Development Plan (internal QGC planning document) has been prepared for QGC's petroleum activities, which quantifies Associated Water production and defines a strategy for managing the treatment and disposal of this water over the life of the QCLNG Project. The Water Development Plan will address current Associated Water production forecasts for the Gas Field development, which show a peak water production in 2014 of approximately 190 ML/day. QGC will prepare an Associated Water Management Plan and

submit to government as required under environmental authorities issued for petroleum activities.

11.6.1 QGC Construction Activities

QGC intends to use Associated Water, treated to the appropriate standard, for construction activities. *Table 3.11.2* identifies the potential volumes of Associated Water for construction and the maximum concentration of TDS proposed for each use of the Associated Water.

QGC does not intend to use Associated Water for dust suppression where the TDS of the water is greater than 2,000 mg/L. Prior to proposed construction uses, QGC will assess the suitability of the soils for each proposed use and the potential for contamination, of soils (through salt accumulation), , surface water and groundwater. QGC will consider using coarse-grained materials such as gravels and sands for road construction to reduce the need for dust suppression. Chemical chelating products such as lignin sulfonates and surfactants that reduce the amount of water required for dust suppression may also be considered for short-term requirements.

Table 3.11.2 Indicative Water Requirements for the Gas Field during Construction

Activities, processes and facilities requiring water	Water quantity requirement (m^3)	Water quality requirement	Preferred source of water	Additional treatment requirements
Construction Phase				
Drill rigs including slurry and concreting	Mean daily: 1,875 kL/day Annual total: 684,000	TDS < 2000	Associated Water	Treatment by RO[3] or other methods
Dust control	Mean daily: 1,650 kL/day Annual total: 602,000	TDS < 2000	Associated Water	Treatment by RO or other methods
Trunk lines and gathering lines pressure testing	Mean daily: 700 kL/day Annual total: 256,000	TDS < 2000	Associated Water	Treatment by RO or other methods
Road construction[1]	Mean daily: 5250 kL/day Annual total: 1,916,000	TDS < 2000	Associated Water	Treatment by RO or other methods
Well lease area and infrastructure hardstand areas[1]	Mean daily: 6,750 kL/day Annual total: 2,464,000	TDS < 4000	Associated Water	Treatment by RO or other methods
Pond construction[2]	Mean daily: 8,000 kL/day Annual total: 2,928,000	TDS < 4000	Associated Water	Treatment by RO or other methods
Wash down	Mean daily: 300kL/day Annual total: 110,000	TDS < 2000		
Temporary construction camps	Mean daily: 0.2 kL/person/day Annual total: 365,000	Australian Drinking water Guidelines 2004	Groundwater / Associated Water	Treatment by RO or other methods
Fire-fighting and other emergency services	Annual total: as required	TDS < 2000	Associated Water	Treatment by RO or other methods
Construction Phase Total	*Annual total: 9,325,000*			

1 Based on 3 per cent of total volume of material required

2 Based on 3 per cent of embankment volumes

3 Reverse Osmosis

11.6.2 *Tree Cropping*

Tree cropping remains the base case for long-term management of Associated Water. Should QGC seek approval for tree cropping this will be supported by an identification of suitable land, assessment of long-term impacts on soils at all suitable locations, detailed monitoring guidelines, establishment of performance benchmarks and stormwater management plans. QGC will not seek to locate tree crops on land currently under cropping practices.

QGC will undertake soil analysis for each intended plantation site prior to final site selection. Threshold Electrolyte Concentration (TEC) and soil stability lines will be established through the soil analysis. Land will be selected for plantation sites based on the suitability for irrigation using Associated Water blends and the appropriate applications rates. QGC has obtained approval from the Department of Environment and Resources Management (DERM) for the beneficial use of Associated Water in tree planting trials at the Windibri site and is seeking an approval for the Glenmona site. It was noted in the Beneficial Reuse Permit application documents that TEC is tested prior to planting and irrigating. Different water blend ratios of Associated Water are currently being trialled at the Windibri site to determine the various application rates and soil responses. The trial results will be used to inform the wider forestry plantation program that QGC is currently developing. QGC recognises that trial results in one location may not be applicable in another, therefore the trials will aid in fine-tuning an understanding of physical and chemical responses of the soil to the application of Associated Water so a similar understanding can be applied to different soil types at other sites.

The Beneficial Reuse Permit application outlined the key objectives and performance criteria established for the trial which may be used in the wider forestry plantation program and fine-tuned in response to the trial program. The key objective is to demonstrate that coal seam gas (CSG) production and sustainable forestry and farming practices can co-exist. The trial will give an understanding of the various blend options and the impact these may have on the soil structural integrity, the use of additives such as gypsum to reduce the impact on soil structure and the effect of irrigation on the solute movement through the root zone and potential movement into the groundwater.

The trial will nominate key thresholds that will be monitored and should any thresholds be exceeded, irrigation can be altered in response to the exceedance. Thresholds will be set below levels necessary to protect soil structural integrity, groundwater quality and to minimise the potential for environmental harm. The monitoring regime to determine compliance with the stated objectives and performance criteria will consist of climate monitoring including rainfall and evapotranspiration; quantity of irrigated water and diluents; irrigated water quality; water movement through the soil profile and water uptake; soil salinity; soil structural stability and crop growth.

Long-term average annual rainfall for the region is approximately 640 mm per year. The majority of rain days receive less than 10 mm, 3.3 per cent of rain days received 10 to 20 mm, 1.2 per cent received 20 to 30 mm and 0.9 per

cent received greater than 30 mm. These figures represent a low frequency of high intensity rainfall days when significant run-off is expected. Notwithstanding, when significant run-off does occur, the high volume of fresh water will dilute any salts carried in run-off from the irrigation areas, so any impacts of increased salt loads in run-off water will likely be offset by the dilution.

The irrigation system will be managed to store salts deep in the soil profile. This process has occurred historically as small annual salt inputs through rainwater which, over millennia, have led to an accumulation of natural salts in the profile of many western Queensland soils. Many soils in the target plantation region have a natural level of salinity in the root zone reaching two to 10 dS/m (sometimes higher) within one to two metres depth from the surface.

An important part of the design criteria is to select sites that have sufficient permeability to transmit salts through the soil profile, and to then manage irrigation applications such that:

- the level of salinity in the profile remains below the threshold salinity tolerance of the tree or crop species by ensuring a “leaching fraction”
- water in excess of that required to provide the minimum leaching fraction does not drain below the tree or crop root zone and lead to the creation of perched water tables and/or subsurface lateral and vertical flows that could have the potential to move into surface or groundwater systems.

This is achieved by:

- matching the rate of irrigation water application to the rate of plant water use;
- managing irrigation scheduling to ensure that the volume of water moving below the root zone is just sufficient to maintain soil root zone salinity below the tree or crop salinity tolerance threshold;
- use of soil moisture probes to continuously monitor soil moisture status and plant water-use demand.

Once salts have moved below the root zone, provided irrigation is managed to avoid excessive deep drainage, then the drainage water will move very slowly under unsaturated conditions and disperse through the regolith (loose rock above bedrock) and remain as a long-term salt store. The effect of this approach to site selection and management is to not increase the salinity of the root zone.

Irrigation water may be discharged to plantations at the rate of approximately 8000 l/hr or 0.8 mm/hr. Irrigation applications will be scheduled such that all applied water infiltrates into the soil so that overland flow and run-off does not occur. Selection of sites with good soil permeability, and management of these sites, through a combination of water chemistry, soil management and vegetation management, is critical to ensure that adequate permeability rates are maintained. This can be achieved by ensuring:

- the water chemistry is correctly balanced
- soil disturbance and cultivation is minimised, which is achieved with perennial crops
- trees or crops are managed to encourage a high level of soil organic matter
- that a healthy groundcover is maintained to minimise erosion potential, slow water movement and encourage infiltration
- that high evapotranspiration potential is maintained by ensuring that the soil maintains sufficient soil water storage capacity to absorb heavy rainfall events.

Key mitigation measures to manage stormwater include:

- managing irrigation applications to maintain a soil moisture storage buffer that can accommodate 98 per cent of rainfall events
- maintaining a healthy ground vegetation cover that will slow surface water movement
- use of perennial crops to avoid the need for cultivation (other than at establishment) in order to maintain soil structural integrity and infiltration capacity
- design of plantations to include cultivation buffer zones for wetlands and watercourses in line with best management practices or regulations
- cultivation of planting rows tangential to the contour to slow overland water movement and avoid channelling of water that may otherwise lead to erosion
- location of plantations on land of predominantly less than 4^{o} slope
- cross drainage on roads and tracks in line with assessed erosion potential and slope
- use of soil moisture probes to ensure irrigation applications are in line with tree or crop water use, to ensure a soil moisture profile in line with desired management objectives can be maintained.

11.6.3 Reinjection

Groundwater reinjection could potentially negate the requirement for some water treatment and all Associated Water could be injected directly into deep formations. The Precipice and Hutton aquifers have been targeted for reinjection trials. These aquifers are approximately 200 to 400 m deeper than the Walloon Coal Measures (WCM) from which the CSG is taken. The WCM, Precipice and Hutton are not considered to be connected due to aquitard interbedding between each stratigraphic formation.

The reinjection trials involve the extended drilling of a number of gas exploration wells. As well as obtaining core data from the coal seams, it is proposed to extend the wells through the Hutton and Precipice formations

underlying the Walloon Coal measures and obtain core data for analysis and definition of the properties of each aquifer. Specified testing, sampling and analysis will be conducted in the drill extensions aimed at gathering hydrogeology and geochemical data with which to further the development of regional computer simulation models of the subsurface geology, hydrogeology and geochemistry with the purpose of investigating the viability of reinjection. The extension of gas exploration wells may be supplemented by the drilling of dedicated aquifer data acquisition wells.

Associated with each reinjection trial will be the drilling of two dedicated monitoring wells, one located 100 m and the other 1000 m, from each reinjection well. The purpose of the two monitoring wells is to sample water from all aquifers above the target formations and monitor the response of the aquifer to the reinjection activity.

The data collected from the investigations will be used to model and develop a reinjection program so that Associated Water of acceptable quality can be injected into the Hutton and Precipice aquifers at volumes equal to or in excess of the water production volumes. It should be noted that while initial investigations indicate the quality of the Hutton and Precipice formations is similar to Associated Water, some level of treatment may be required, by means and to a degree as yet to be defined, in order to achieve the necessary quality required for reinjection.

The target aquifers have only two existing groundwater extraction bores in the QCLNG Project tenements, both in the Precipice formation. Information to date indicates that one is not used and the other bore supplies groundwater to the Kogan Power Station. Reinjection of suitable quality water may benefit these groundwater bores through an increase in well recharge. There is one known off tenement bore in the Precipice, the Miles Town bore, however, it is up dip and some 15 km from the nearest reinjection trial point so it is unlikely to register any response to reinjection. This bore would be subject to monitoring should reinjection prove feasible.

Works currently being undertaken to establish the feasibility of groundwater reinjection include:

- undertaking desktop investigations to determine the realistic long-term reinjection rates that can be achieved
- collecting measured data from various wells to determine the water quality of the target reinjection formations
- determining the required treatment level of Associated Water for reinjection
- preparing trial reinjection wells to confirm the outcome of the desktop investigations
- seeking approvals to undertake reinjection.

From the work that has been undertaken to date the potential reinjection locations have been identified. Current predictions for long term reinjection rates range from 2 to 4 ML per day per reinjection well. On this basis approximately 70 reinjection wells would be required. The greatest opportunity for reinjection is in the South East and Central Development Areas.

11.6.4 Surface Water Discharge and Municipal Supply

QGC believes that river discharge offers a reliable short- and long-term solution for disposal of Associated Water, subject to compliance with relevant water quality standards. River discharge has the potential to offer community and environmental benefits through increased availability of treated water to meet water allocations, resulting in an improved security of water supply. QGC will comply with the *Environmental Protection (Water) Policy 1997* and the Queensland Water Quality Guidelines (2006) prior to surface water discharge. It is the responsibility of individual water licensees to ensure that water taken from the river system meets potable drinking water standards prior to consumption.

QGC will treat Associated Water for surface water discharge to the required standards to minimise risk to the receiving environment. A typical treatment process involves microfiltration, ion exchange and reverse osmosis. These processes are likely to result in the reduction in concentrations of all analytes including aluminium, bicarbonate alkalinity, calcium, chloride, fluoride, magnesium, pH, potassium, sodium, sulfate, total dissolved solids and total hardness. Microfiltration reduces the concentration of solids and contaminants, ion exchange reduces concentrations of hardness units such as calcium and magnesium, and the reverse osmosis reduces the concentration of salts.

Preliminary treated water quality data from a trial water treatment plant has provided water quality data, including analytes for which there are no ANZECC (2000) aquatic water quality guidelines. QGC will identify all analytes in treated water from WTPs, compare these to relevant standards and only release treated water to surface waters where analytes do not present an unacceptable risk to the receiving environment. QGC will utilise ANZECC (2000) aquatic ecosystem water guidelines unless, by agreement with the regulator, alternative water quality guidelines are established. Where ANZECC (2000) guidelines are used, the high reliability trigger values for aquatic water guidelines values will be used as the standard against which to assess treated water quality. Where the high reliability trigger value is not available, QGC will use low or moderate reliability trigger values. The use of high reliability trigger values will provide the most certainty that the release of treated water will have minimal impact on aquatic ecosystems.

QGC does not propose to fulfil the role of water service provider for the direct supply of potable water for human consumption. QGC may supply treated water (not treated to potable standard) to water service providers. Consequently should this option be progressed, it would be the responsibility of the water service provider to ensure that the quality of water supplied to consumers for human consumption complies with Australian Drinking Water Guidelines (2004).

Release of treated Associated Water to surface water potentially avoids some of the constraints to beneficial use of Associated Water for tree cropping or reinjection. Tree cropping is reliant upon identifying and obtaining access to suitable soils. Reinjection is dependent on proving its technical feasibility. All options will be explored for beneficial use of Associated Water. All water proposed for surface water discharge would be treated to a standard suitable for release to surface waters in the Gas Fields. Monitoring of surface water systems in the Gas Fields will be undertaken. Applications for approvals for discharge to surface waters will be supported by environmental assessment of potential impacts, proposed management methods, monitoring regimes and other mitigation measures as required.

At this stage, QGC cannot estimate the volume of treated water that may discharged to surface waters, as other beneficial use options may be used in conjunction with surface water discharge. If all water was treated and discharged to surface waters, approximately 190 ML/day, at peak water flows, would be released.

QGC has commenced investigating river discharge locations in the Central Area in order to prepare the technical information required to support an application to DERM for surface water discharge. The following will be undertaken for submission with the application:

- determine and establish reference site locations (upstream and ownstream)
- assess aquatic habitat and ecosystem values for areas downstream of proposed discharge locations
- prepare a water quality monitoring program
- collate and assess regional reference data to develop locally relevant surface water quality guidelines
- prepare a Receiving Environment Monitoring Plan (sampling protocols, parameter selection and water quality data handling).

11.6.5 Evaporation Ponds

The primary function of exploration and appraisal (E&A) ponds is to contain water produced from E&A wells. E&A wells and ponds will normally be constructed in advance of other water management infrastructure such as WTPs or pipelines to connect to WTPs. E&A ponds will evaporate stored water until such time as they are converted to regional storage ponds for balancing water flows or decommissioned. As most E&A ponds are expected to become part of the water balancing network**,** they will be designed to the same standards as regional storage ponds. This includes design by suitably qualified engineers, use of geosynthetic lining, a design life of 20 years and compliance with the relevant guidelines for designing hazardous dams. Further design, construction and operations standards for ponds are provided in *Volume 2, Chapter 11*.

Evaporation ponds constructed under existing Environmental Authorities for granted Petroleum Licenses (PLs) will serve the dual function of evaporation and water balancing. These ponds were approved by DERM under negotiated design criteria at the time including a minimum 20-year design life. QGC has invested considerable resources and effort in designing and constructing these evaporation ponds to minimise, to as low as reasonably practicable, the risks of contamination posed by such ponds. QGC does not consider the decommissioning, in the short term, of these ponds to be a reasonable option given that the design criteria used were assessed by DERM to be appropriate at the time. These ponds will form part of the water-balancing network, however their combined capacity is greater than required for balancing water flows, and emergency storage requirements These ponds will continue to be used for evaporation until such time as their useful life is reached or they are no longer required as a result of water drawdown following water treatment plant implementation.

QGC does not intend to construct any untreated water storage ponds, solely for the purpose of evaporation, as part of the QCLNG Project. Brine evaporation basins will evaporate water from saline brine as a means to reduce the volume of salt requiring disposal. Ponds constructed under existing PLs will be integral to the management of Associated Water while other beneficial use or disposal options are developed. Once other beneficial use or disposal options are developed, evaporation ponds will no longer be a primary means of Associated Water management, but will continue to function in accordance with their approved design criteria and will function as water storage ponds to balance water flows between wells and WTPs.

11.6.6 Aggregation

The preliminary recommendations and cost estimated put forward in the joint study conducted through APPEA in early 2009 on the potential benefits of aggregation of Associated Water are currently being considered by the major CSG companies. To date QGC, Arrow and Origin are further investigating opportunities to treat and supply Associated Water to large beneficial users. As stated in the draft EIS, if the outcomes of the investigations are favourable, QGC would consider pursuing aggregation options further. At this time it is too early to report any findings or recommendations that have been adopted. In the absence of a framework to co-ordinate water management across the CSG industry it remains unlikely that QGC can rely on an aggregated scheme to provide short-term solutions for water management to meet the Project timelines.

11.7 CONCLUSION

QGC's options for beneficial use of Associated Water are as described in the draft EIS. Further information is supplied here on some of those options. In supplying this information, QGC is demonstrating its commitment to finding a robust solution for Associated Water management that overcomes many of the constraints presented by each option. QGC will seek approval for beneficial use of Associated Water through a separate approvals process to the QCLNG Project.