8 SOCIAL IMPACTS AND BENEFITS OF ASSOCIATED WATER

This chapter summarises assessment of the social impacts and mitigation strategies resulting from the production of associated (coal seam gas) water. The associated water infrastructure described in this report is based on the Gas Field's field development plan. For the purposes of describing the water infrastructure, three broad regions have been defined as follows:

- Northern – includes the Field Development Plan (FDP) areas 5 and 10.
- Central – includes the FDP areas 1, 2, 8 and 9.
- Southern – includes the FDP areas 3, 4, 6 and 7.

The water production for each of these three regions has been estimated over the life of the project. Peak production of approximately 170 ML/day across all regions is expected to occur between 2012 and 2013 then reducing to approximately 130 ML/day until 2030, before dropping away sharply to 20 ML/day by 2050. A wide range of variability exists for the current water production estimates from -20% to +50% for long-term estimates and -30% to +10% for short-term (18 month) estimates.

QGC believes that engagement with Government, industry, Council and community stakeholders is vital to successful water solutions, and is committed to an ongoing consultation process as options are refined.

8.1 WATER USE OPTIONS

Seven options for the use of associated water were assessed based on a range of social performance indicators, including water use, water supply, health, lifestyle, cultural heritage, agricultural land use, land acquisition, community/government institutional capacity, economic benefits and externalisation aspects. These options were as follows:

- Forestry (QGC owned).
- Aquifer injection.
- Industrial and mining external users.
- Power stations (external to QGC).
- Agricultural external users.
- Municipal (local towns) external users.
- River Discharge.

Considerations for ongoing water strategy planning and infrastructure locations are outlined in *Section 8.3* of this chapter.

8.2 CONSULTATION INPUT

Consultation with stakeholders during the EIS process indicated that the extraction, treatment and disposal of associated (CSG) water is of concern to a wide group of stakeholders, and of particular concern to farmers and local town residents in the gas fields. These concerns include:

- potential for salt from associated water management or beneficial use options to contaminate land and therefore affect the long-term sustainability of agriculture in the area
- groundwater levels and quality in relation to the removal of associated water through the gas extraction process
- the use of evaporation ponds, and the temporary nature of these as a solution
- how coal seam gas companies would be 'kept to account' regarding the management of salinity (i.e. who would monitor them)
- the cumulative effects of coal seam gas projects on groundwater levels or quality, and the need for more research.

Consultation also noted the potential for associated water beneficial use options and their positive environmental and sustainable development outcomes.

Treatment and disposal options will consider these concerns as fundamental values in developing water treatment and re-use options.

Three community consultation processes which recorded community responses to associated water issues were undertaken prior to and following the submission of the Queensland Curtis LNG Project Environmental Impact Statement (EIS).

Consultations throughout the draft EIS process provided community feedback on associated water, recorded and reported in the context of the overall project concerns. Also, comprehensive consultation was undertaken by QGC over a seven week period during August and October 2009 to fulfil the public disclosure requirement of the EIS public exhibition process.

8.2.1 Initial Survey Results

An initial survey was undertaken by UMR Research Pty Ltd in November 2008 and a summary of this study is available in the EIS. The November 2008 survey included four focus groups and 400 phone interviews conducted in Chinchilla, Miles, Dalby and Toowoomba.

Based on these surveys, 32% of respondents expressed concerns over the future costs of water and electricity. A high percentage (40%) of respondents expressed a belief that the saline water from the project will have a negative impact on the environment. The groups most concerned about the negative impact of the saline water from the project were farmers (59%), Dalby

residents (61%), Murilla (47%) and Toowoomba (45%). The option of providing desalinated water to communities as drinking water was considered to be a positive impact on the region by 62% of the overall population consulted and 70% of the Chinchilla residents. Construction of pipelines on good quality agricultural land was seen by 66% of respondents as having a negative impact in the area. Farmers in particular were concerned about the impacts on agricultural land due to project access (80%) and pipeline construction (69%) – (UMR Research, 2008).

8.2.2 EIS Public Disclosure Feedback

Across all study areas and stakeholder groups, salinity in associated water and impacts on groundwater from associated water ranked as the fourth and eighth most important issues. Stakeholders residing in the gas fields study area expressed concerns about how the salt from the associated water management or beneficial use options would contaminate land. They were concerned about the long term effects of salt and how this would impact on the sustainability of farming and agriculture in the area. Additional information on the management of associated water was requested by many stakeholders. The impact on groundwater quality and quantity by the extraction of associated water was expressed as a concern. Many stakeholders were concerned about future groundwater resources for agricultural and town use.

Within the gas field project area the following associated water issues were ranked highly:

- salinity
- groundwater levels
- groundwater quality
- impacts from the reverse osmosis (RO) plants
- quality and/or production of existing water bores
- beneficial use.

Concerns were expressed about salinisation resulting from current practice of evaporation ponds and potential beneficial uses such as the brine from the RO plants. Stakeholders in the gas field were particularly concerned about land contamination by salt from water management and beneficial use options. The impact of salt on the long term sustainability of farming and agricultural practices and lack of detail and information on the management of saline associated water was also expressed. Cumulative impacts of salinisation and monitoring of salinity levels were further concerns.

Anecdotal evidence of reduced groundwater levels was expressed by stakeholders in the gas field area. Many stakeholders expressed concern about how the extraction of groundwater would impact water quality. The cumulative impacts of all the coal seam gas projects on groundwater

levels and quality was raised as a concern and it was stated that insufficient information on the groundwater levels impacts was included in the EIS.

Additional information was also requested on the disposal of brine from the RO plants. Landholders with existing bores expressed concerns about impacts on groundwater levels and quality.

Beneficial use options were raised in many consultations with stakeholders. These included tree cropping, agricultural cropping, town water supply, and supply to other industry and RO plants. The options considered of greatest importance were town supply, other industry supply and RO plants. Beneficial use of associated water was seen as a potential positive environmental and sustainable development outcome of the project.

A number of written submissions on the EIS were received which relate to the associated water impacts and options. These are summarised in *Table 8.8.1* below.

Table 8.8.1 Associated Water Issues and Concerns for Stakeholder Group Documented in Written Submissions to the EIS

Stakeholders	Issues/Concerns
Wildlife Preservation Society of Queensland	• re-injection into aquifers not supported • disposal of solid waste as a by-product of associated water • cumulative effects of all CSG projects • use of treated waters to irrigate invasive introduced pasture plants disrupts native habitats • discharge into rivers and drainage lines creates environmental harm • use of prime agricultural land for tree-cropping • impacts on and monitoring of groundwater aquifers
Western Downs Regional Council	• objection to establishment of tree plantings on land currently used for farming and cropping • support treatment and supply of potable water to local towns by LNG industry • ensure use of associated water (coal seam gas water for all LNG industry requirements • drawdown effects on groundwater levels • cumulative impacts on water supply, sewerage and waste management
Queensland Health	• human health impacts of the associated water used for human consumption • presence of contaminants such as salt and heavy metals • potential for use of water on food crops causing soil contamination and bioaccumulation • large volume and water disposal options

Stakeholders	Issues/Concerns
Fodder King	• require a comprehensive Water Management Plan • should use the term coal seam gas (CSG) water not associated water • should comply with Queensland Government policy which does not support evaporation ponds • should be responsible for treating and disposing of CSG water • no plan for tree-cropping - assumption that tree crops will withstand high salt levels, no costs or plans for maintaining the forests, risks of increasing soil salt levels, fire hazards, impacts on employment compared to agriculture • propose to use all CSG water on high yielding fodder crops
Tara Resident	• impacts on groundwater supplies • treatment and disposal of saline water • impacts on groundwater quality by chemicals leaching out during gas production • release of untreated water onto roads in rural residential areas flowing into dams and local watercourses and being used to irrigate gardens, stock, pasture land and crops • disposal of toxic waste from desalination process • independent monitoring and release of information on water quality • disposal of associated water on QGC owned land • coastal discharge should not be considered
Tara Resident	• dumping of CSG water on roads which flow into private dams in the catchment of the Murray-Darling River System • salinisation risking long term food production • contamination of water

8.3 CONSIDERATIONS FOR WATER STRATEGY PLANNING

8.3.1 Associated Water Infrastructure

The locations and amounts of land required for treatment, storage, transport and disposal of the associated water will impact on the owners of this land.

If the land is owned by QGC, it needs to be managed in a manner that will not result in long term environmental or social impacts. This will include being mindful of how the associated water infrastructure is being managed so that it does not create impacts on adjacent holdings.

If land needs to be acquired or leased for construction of WTPs, pipelines and other water infrastructure, significant and meaningful engagement with landholders on the associated water strategies will be required throughout the project to enable initial access and to ensure ongoing access. Adequate compensation arrangements will also need to be in place to enable infrastructure construction to proceed.

Infrastructure construction crews for all of the associated water options will result in an influx of people which require accommodation, transport, food,

water and waste disposal solutions. These impacts will be managed in accordance with provisions outlined for CSG facilities, in the draft and sEIS *Volume 8, Chapter 4*. However, the construction will also provide employment and additional income which may be welcomed in agricultural areas which have been affected by long term drought conditions.

8.3.2 Forestry

Although irrigated forestry plantations owned by QGC is a preferred mitigation strategy for the use of the associated water, it does not have wide support from community as it will not maximise benefits from the availability of water to the impacted communities. Forestry has the advantage of minimising potential health risks to community by reducing direct exposure to associated water, however the long term impacts on soil chemistry and structure are still being assessed.

Employment generated by management of forestry plantations could be considered an off-set to the lack of water supplied to adjacent communities, however agricultural production usually creates more long term employment than forestry once the initial establishment period is completed.

Carbon sequestration by the forestry plantations has the potential to provide benefits to the global community in the challenge to manage human induced climate change. However, the amount of energy required to treat, transport and irrigate the plantations may not be sufficiently off-set by the plantations and will need to be thoroughly assessed.

8.3.3 Aquifer Injection

If associated water can be successfully injected into deep groundwater aquifers it has the potential to reduce groundwater drawdown impacts. This could lead to a replenishment of groundwater systems which could improve groundwater availability for other uses such as agriculture and residential use.

However, as the system for injecting groundwater has not been finalised, it is uncertain whether this can be achieved without reducing the quality or introducing contaminants into the water within existing aquifers.

Furthermore, if all the associated water is injected into groundwater systems and none made available to external users, it is unlikely that wide support from the impacted communities will be achieved.

8.3.4 External Water Users

The supply of large amounts of untreated associated water to external users for industrial and mining purposes would have the benefit of reducing the amount of water that these other companies would need to extract from already depleted groundwater reserves. However, these benefits are unlikely to be widely acknowledged by local residents and farmers who are currently experiencing water restrictions and/or have experienced a long period of drought conditions.

It is more likely that local stakeholders would prefer options where associated water was treated and supplied to power stations, agricultural producers and local councils. Non-QGC Power Stations (such as Tarong) supply essential energy to the region and are more likely to be seen as socially acceptable users than another industrial company (although often the two are linked such as coal mining).

Local councils are currently under severe stress regarding water supply to local communities and have expressed strong interest in received water that they can treat and use for drinking water. A cost benefit analysis will need to be conducted to inform provision of water to councils and local communities, as the cost and effort involved and also the fact that the supply can only be guaranteed for a finite period of time, may not make this an economically viable option. These external users also may not be able to utilise all the associated water during peak times and the costs of treatment and transport may be more costly than other options, however these options are much more likely to generate community support for the project than alternative strategies.

Any treated associated water for human consumption would need to be treated to Australian Drinking Water standards, as discussed in *Volume 3, Chapter 11* the draft EIS. The quality of treated associated water not intended for human consumption may not always be acceptable and could potentially result in health impacts if used inappropriately.

In addition, the supply of associated water will not last beyond the project and long term dependency on this water supply may be created if used inappropriately to service unsustainable residential areas or develop irrigation dependent farming systems.

8.3.5 River Discharge

If suitable locations can be determined and appropriate treatment technologies developed, the discharge of treated associated water to local river systems could result in wide spread benefits to local communities. The water could recharge depleted surface water flows and provide water at locations that would enable extraction for use by irrigators and municipal authorities.

Local impacted communities would be much more likely to support this option than disposal of water to land uses such as forestry and aquifer injection that do not benefit the broad community. Issues of community health and long term dependency of unsustainable land practices would need to be managed carefully to minimise the risks associated with this option.

8.3.6 Cumulative Impacts

The social impacts resulting from implementation of associated water options are just one of the many impacts that the landholders and town residents in the gas field will experience if the project proceeds. The construction of associated water and gas infrastructure will be scheduled to manage the influx of people and local employment opportunities.

The implementation of a multiple strategy approach such as river discharge, forestry where appropriate (e.g. in the Central tenement areas), aquifer injection where appropriate (e.g. in the Southern tenement areas), and provision to external users across all areas will also need to be well planned and communicated to avoid confusion and misinformation amongst local stakeholders.

It will also be necessary for QGC, other CSG producers and the Queensland Government to identify the cumulative impacts and benefits of more than one CSG project in the Western Downs area, as the project's respective strategies are defined. This will need to include a monitoring strategy to ensure public confidence in the treatment and re-use of coal seam gas water for all projects in the area.

8.4 CONCLUSION

Supply to local towns, river discharge, supply to industrial users and supply to agricultural users are considered positive from a social perspective, as discussed in preceding sections. Forestry and aquifer injection are considered the least beneficial in terms of social impacts.

A range of options will need to be implemented as external users will only require approximately one third of the water which will be available during peak production. From a social impact perspective, discharge to local rivers will be considered as an additional option. This would allow currently depleted river systems to be recharged and would also enable water to be accessed by local towns for treatment as drinking water. If sufficient environmental flows are restored, irrigators would also be able to access the river waters.

Once the precise mix of water treatment and discharge options is determined, a full assessment of water use options will be conducted against criteria including economic costs and benefits, environmental costs and benefits, social benefits and impacts, the long term sustainability of supply, and per capita cost of supply options.

Additional updated information is required on water predictions and infrastructure designs to fully determine the social impacts of the various options. Furthermore, a key residual social impact of the recommended option is the development of dependency on associated water if water is supplied to local towns and irrigators.

Assessment of the cumulative impact of multiple CSG operations will also be required, in co-operation with Government and CSG industry stakeholders.