

Coal seam gas water dams

In all but exceptional circumstances, evaporation dams have been banned for coal seam gas (CSG) water—and existing dams will be either converted to other uses or decommissioned. Strong standards have also been introduced for coal seam gas water dams.

CSG water contains significant but variable concentrations of salts. The salinity of CSG water is typically measured as the concentration of total dissolved solids (TDS) with values ranging from 80 to more than 11 000 milligrams per litre. For comparison, good quality drinking water has TDS values of less than 500 milligrams per litre. The TDS of sea water is between 36 000 and 38 000 milligrams per litre.

CSG water is treated through advanced desalination processes producing both reusable water and CSG water concentrate¹ brine². Dams are used by CSG companies to store or aggregate CSG water, CSG water concentrate and brine as part of the management regime to maximise the beneficial use of treated CSG water.

The main types of dams found at CSG operations are CSG water “aggregation” dams (containing untreated or partially treated CSG water) or CSG brine dams (containing the concentrated waste products from the advanced desalination process). Certain CSG operations have evaporation dams which are used to store untreated CSG water for the purposes of passive treatment, via evaporation.

The Queensland Government recognises the need for these dams to be designed, constructed and operated in a manner that does not threaten the community’s safety through collapse, or does not result in adverse impacts on the environment through contamination.

In its Blueprint for Queensland’s LNG Industry and the Coal Seam Gas Water Management Policy, the Queensland Government committed to minimising the size and number of dams and to regulate the construction and operation of these dams.

The establishment of the Government’s Coal Seam Gas Water Management Policy and recent amendments to the *Environmental Protection Act 1994* have resulted in:

- a discontinuation of the use of evaporation dams as the primary means of disposal of CSG water
- no authorisation of any new evaporation dams unless there is no feasible alternative to managing the CSG water
- the temporary prohibition of the construction of already approved CSG evaporation dams under existing environmental authorities until a revised environmental management plan (EM Plan) is submitted to the Department of Environment and Resource Management (DERM), demonstrating that there is no feasible alternative for managing the CSG water
- ensuring that all dams necessary for the aggregation of CSG water or brine are lined to a standard defined by DERM
- a requirement that remediation action for existing evaporation dams is timely, reasonable and appropriate
- by October 2011, transition existing evaporation dams into either CSG aggregation dams or brine dams which meet the new policy standards.

Regulation of CSG dams to protect the environment

The construction, operation and management of CSG dams are regulated by the conditions of an environmental authority issued under the *Environmental Protection Act 1994*.

Applications for CSG environmental authorities must be accompanied by specific information about the need for the dam and how it will be monitored and operated into the future.

If the dam proposed is an evaporation dam, the CSG operator must demonstrate that there is no feasible alternative to managing the CSG water.

DERM is also in the process of amending proposed model conditions for environmental authorities for higher risk CSG activities.

1 CSG water concentrate is the concentrated saline water waste from desalination processes. It does not exceed a TDS of 40,000 milligrams per litre.

2 Brine is defined as saline water with a TDS greater than 40,000 milligrams per litre.

This will ensure that activities do not:

- concentrate flood flows
- increase flood duration
- increase the safety risk to people or property from flooding.

Under the current model conditions, dams must not be constructed in a way that interferes with the flow of water in a watercourse, wetland or spring.

In addition, dams must be designed to prevent flood waters from entering the dam and to withstand erosion and overtopping during flood events.

Environmental authorities authorising construction of CSG water dams contain strict standards for construction, operation and monitoring of dam performance.

DERM conducts targeted compliance inspections to ensure dams meet the conditions of environmental authorities.

Where any existing dams do not meet the strict standards for construction, operation and monitoring of dam performance, DERM will continue to work with the CSG industry to ensure these existing dams are transitioned to meet these standards.

Conditions on environmental authorities for dams to aggregate CSG water, CSG concentrate or brine are designed to effectively avoid environmental harm through contamination of surrounding or underlying land and groundwater.

Conditions vary depending on the dam and its contents. Typically the following design standards are applied to protect the environment:

- the floor and sides of the dam must be made of material capable of containing the wetting front and any entrained contaminants within the bounds of the containment system during the dams operational life, including any period of decommissioning and rehabilitation
- a system to detect any passage of the wetting front or entrained contaminants through either the floor or sides of the dam must be incorporated
- it must be possible to either repair any passage of the wetting front through the floor or sides of the dam, or be decommissioned and rehabilitated
- there must also be a system in brine dams for the collection and proper disposal of any contaminants that move beyond the bounds of the containment system.

In addition, environmental authorities contain comprehensive monitoring conditions requiring companies to undertake:

- an annual integrity and available storage assessment
- annual dam water quality monitoring
- shallow groundwater impact monitoring.

Companies must also have emergency and contingency plans in place for dam management and repair when required.

What happens once a dam is no longer being used?

Once a dam is no longer being used for CSG operations it must be rehabilitated, as required by conditions of an environmental authority, within a defined time period, unless there is an agreement entered into with a registered owner or occupier of the land where the ownership of the dam is transferred to that owner or occupier.

In cases where an owner or occupier requests that a CSG company leave a dam on their property, the company may negotiate with DERM for this to be authorised. This would not be authorised without the landholder's written agreement. It should be noted that for a dam to be left on a landholder's property, the landholder may require further approvals from DERM, depending on its size and use.

In the event that ownership of a dam is not transferred and needs to be rehabilitated, the CSG operator will need to firstly decommission that dam and have a suitably qualified third party conduct a contaminated

land site investigation to assess whether there are residual contaminants. If there is any residual contamination of the land, the CSG operator will need to have these contaminants removed or remediated.

After the land has been remediated (if applicable), the CSG operator will need to undertake rehabilitation to create a final landform that is safe, non-polluting, stable and self-sustaining. The rehabilitation objectives, indicators and completion criteria for dams are based on best practice environmental management standards and are prescribed in the environmental authority, thereby being a legal obligation for the CSG operator.

More information

- CSG/LNG hotline on 13 25 23
- Visit www.lng.industry.qld.gov.au