



# Brackish Groundwater Desalination

Issue Paper

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The 2007 Texas State Water Plan identified brackish groundwater desalination as one of the water supply strategies to be used across the state to meet the State's projected water demands over the next 50 years. Brackish groundwater desalination is the process of treating water that contains a high level of total dissolved solids to a quality where it may be used for drinking water or other beneficial uses.

This is not a new idea as in 2006 there were already 85 desalination plants in operation in Texas treating both brackish surface and/or groundwater resources. However the process is gaining interest as water demands increase. The 2007 State Water Plan recommended six new projects to be built over the next 50 years with an estimated combined production of approximately 175,000 acre-feet of water per year. A number of regional water planning groups are currently studying the feasibility of using brackish groundwater desalination as a future water management strategy.

There are 9 major and 21 minor aquifers in Texas and most of these aquifers contain some volume of brackish groundwater. While the total volume of brackish groundwater in Texas aquifers is estimated to be over 2.5 billion acre-feet, not all of this is accessible.

Brackish groundwater makes up a portion of the total amount of water stored in aquifers and is defined by the amount of total dissolved solids the water contains. Technically, brackish groundwater is defined as groundwater containing between 1,000 – 10,000 milligrams per liter (mg/L) of total dissolved solids (TDS). In comparison, fresh water contains under 1,000 mg/L TDS and seawater contains over 35,000 mg/L TDS.

As groundwater flows through an aquifer, it reacts with the surrounding soils and rock minerals and the total dissolved solids in the water typically increase. Some of the factors controlling this process include the mineral composition of the aquifer, the flow rate of the groundwater through the aquifer, and the amount of time the groundwater is in the aquifer. In many cases the chemical and physical properties of the brackish groundwater have been developing for a very long time, perhaps thousands of years or longer. (Brackish Groundwater Manual for Texas RWPG, 2003)

Brackish groundwater desalination holds promise as a water supply strategy. It offers opportunities such as providing a viable water resource where other supply options are not readily available. It can also free up pressure on freshwater resources that are of vital



importance to the environment. However, a number of important issues should be addressed when considering this as a water supply option.

- **What is the total cost?** This includes building the facility, extracting the source water, disposal of waste brine and the associated energy costs. Energy costs in particular can be a large component of cost and will likely be highly variable over the life of a project. All of these costs should be taken into account upfront.
- **Are there more economical ways to meet needs, such as increased water efficiency or conservation?**
- **What are the potential impacts to interconnected water resources?** Freshwater portions of the aquifer could be impacted negatively by removing large amounts of water from the brackish zone.
- **Is there a groundwater conservation district in place to regulate withdrawals and provide the regulatory framework necessary to guarantee the long term availability of the groundwater?**

Since this is a relatively new strategy (on a large scale), it is important to carefully monitor and evaluate the individual projects, especially disposal of brine. It is also important to acknowledge that producing water through brackish groundwater desalination is an energy intensive endeavor. Energy use and its role in contributing to climate change should be strongly considered when evaluating water supply options

Brackish groundwater desalination is only one tool in the toolbox for meeting water supply needs. One must take care that it is the most appropriate, environmentally sound and cost effective tool for the specific situation. With proper planning, siting, attention to energy and environmental factors and thorough evaluation of the full costs of operation, brackish groundwater desalination could be a part of a comprehensive water supply program that also includes advanced water conservation and effective drought management measures.

For more information on Texas' groundwater resources and desalination, read *Desalination: Is it Worth it's Salt? A Primer on Brackish and Seawater Desalination* (Lone Star Chapter, Sierra Club, 2008) located at [http://www.texaswatermatters.org/resources\\_publications.htm](http://www.texaswatermatters.org/resources_publications.htm) and *Brackish Groundwater Manual for Texas Regional Water Planning Groups*, Texas Water Development Board, 2003.

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