# **Background**

The 'I in 150' year drought of 1994- 1995 during which over 3,000 households were regularly without water was the motivating factor for the Government of Barbados to take control of its destiny and build a desalination plant. On 31st July 1995 virtually the whole of Bridgetown, including the Queen Elizabeth Hospital was without water for a prolonged period. On the following day, August 1st 1995, the Government set into motion a chain of events which resulted in the construction of a reverse osmosis (RO) desalination plant at Spring Garden, St Michael. Never again would the islands economy, which is heavily dependant on tourism, be held back by the lack of availability of fresh water.



## **Project**

Barbados' new desalination plant began producing fresh drinking water in 2000 just 15 months after the signing of a water supply agreement between the Barbados Water Authority and Ionics Freshwater Ltd. The agreement covered detailed design, engineering, manufacture, delivery to site, site preparation, installation, start-up and commissioning of the brackish water desalination plant; and operation and maintenance of the plant for a 15 year period. The plant has provided consistent high quality potable water for the islands main water supply

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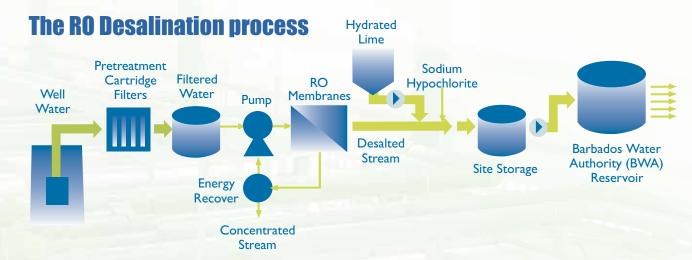


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# SPRING GARDEN DESALINATION PLANT, BARBADOS

- To augment the existing groundwater supplies, a complete brackish water RO desalination system for delivering 30,000 m³ / day of potable water for a period of 15 years was provided on a build-own-operate or privatised basis to the client, the Barbados Water Authority (BWA).
- The plant is the largest such brackish water desalination facility in the Caribbean. It started up successfully on 15th February 2000. The project scope included detailed design, engineering, manufacturing, installation, start-up and commissioning, and operation and maintenance.
- Water from the desalination plant passes all of the internationally accepted biological and other test for water quality and the plant can supply drinking water for up to 20% of the island's 264,000 people.
- In addition to its overall aesthetics, the desalination plant features virtually noiseless production and a low cost of operation.





## Water Intake

The brackish feedwater for the desalination plant is pumped from ten separate 80 foot deep wells, located behind the plant.

### **Pretreatment**

Before the actual desalination occurs, the brackish well water requires pretreatment. This is primarily to remove the suspended solids and particulates which may foul the reverse osmosis (RO) membranes. In addition, antiscalant is included in the pretreatment to prevent mineral scale build-up, allowing the desalination plant to run at higher water recoveries.

#### Desalination

The heart of the plant is the RO system. RO is a widely accepted membrane-based technology for separating the incoming feed water into a desalted stream and concentrated stream by the application for pressure. The RO system design at the Spring Garden plant utilizes a combination of advanced membranes operating at low pressure and a single array to reduce the plant's overall energy requirements and provide high quality drinking water.

In the desalination system, up to 75% of the pressurized feed water is recovered as fresh water. The remaining portion of the high pressure feedwater concentrate is passed through an energy-recovery turbine to minimize electrical consumption before it is returned to the sea via deep well injection.

### Post treatment

The desalinated water is further treated for public consumption by a lime dosing step, which adds back some mineral content to the water and ensures good taste. The water is then chlorinated by dosing with a small amount of sodium hypochlorite.

#### Distribution

After post-treament, the potable water is transferred to the site storage tank where it is constantly tested to ensure consistent water quality, conforming to all World Health Organisation (WHO) drinking water quality standards. The water is then transferred to the BWA reservoir for distribution.