ZOFNASS PROGRAM
FOR SUSTAINABLE INFRASTRUCTURE
Graduate School of Design
Harvard University

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POINT FORTIN DESALINATION PLANT – TRINIDAD & TOBAGO

Figure 1:Point Fortin Desalination Plant
Sources: Seven Seas Water Company Images

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Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective project design or implementation.

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EXECUTIVE SUMMARY

The Point Fortin Desalination Plant consists of a desalination plant developed, constructed, and currently operated by Seven Seas Water Company as part of a larger initiative to give Trinidad and Tobago potable water, after the region has been struggling with obtaining this important resource. The Caribbean nation's government is seeking to improve the water infrastructure so as to promise all citizens 24/7 accesses to clean, fresh water.

Contract for the Point Fortin plant, in southwest Trinidad and Tobago, was awarded in May 2010 and construction started in May 2012 with the intention of supplying water to the area's residents and the industrial sector. Until then the area had had limited potable water sources, with surface freshwater supplied through the country's Water and Sewerage Authority (WASA). The plant's new water output of 4.6 imperial million gallons per day (imgd) will help divert water currently being supplied to the Point Fortin from the Caroni Water Treatment Plant to other communities in the southwest part of Trinidad and Tobago, for a contract period of 17.5 years with a plant extension which was requested in order to expand the plant currently under operation. The purpose is to resolve increased water security issues that have led to riots and violence in the past over severe droughts and limited capacity to deliver water to residents.

US-based Seven Seas Water company constructed the Point Fortin Desalination Plant under a build-own-operate arrangement commissioned by WASA as a public-private partnership. Details on the financial benefits given through WASA to Seven Seas Water have not been released and are not available. Since 2010, WASA has refocused on the provision of water and wastewater services, and awarded 373 contracts worth approximately two billion dollars (TT$) or 305 million US$. Of these contracts only 10% have been awarded to foreign companies such as Seven Seas.

Overall, the project has done a good job of improving the quality of life of its surrounding communities through the product it serves, which is potable water. The project establishes a set of stakeholder meetings to gain an understanding of water needs and how the plant can integrate within the national and local needs. At the national level, the project improves the quality of life through the water it produces and subsequently the monitoring of the effluent returned to the sea. At the local level, the project improves the lives of the residents, saving women and children from the need to fetch water and leaving them more time for school homework or other work.

The project team has taken opportunity to develop better relationships in the surrounding communities, identifying community needs and goals and developing community-based projects for the provision of potable water, electricity, and safety in the area. Seven Seas Water

signed a partnership with the University of Trinidad & Tobago in order to offer apprenticeship opportunities to students enrolled on The National Engineering Technician Diploma (NETD) in Chemical Engineering. As a result, the outcome is more expertise on the water treatment industry for the future growth of this important resource for the island's geopolitcal future. Some of the areas of collaboration between the project team and the students are water plant operations as well as interpersonal and communication skills.

The project has also been completing several community outreach programs that standout. Mainly Seven Seas Water has constructed a tennis court which align with the country's pride in their past tennis court stars. One issue the community has experienced is an increase in tennis court maintenance, which is a reason it has offered to contribute with an additional court. In addition, the company will host World Water Day with small events in which younger students will learn the importance of water conservation. The latter is one first step towards teaching communities how to conserve a resource that is slowly becoming depleted.

In terms of improvements, the project team created a series of mitigation strategies to reduce noise and dust generation during the construction phase and improved site mobility, using internal roads in the industrial zone. Safety signage was important to the trucks traveling on the site. Particularly, local character is preserved because the project is located in an industrial area. The project can use mitigating strategies through creative designs that allow it to camouflage its presence. The project also should try to incorporate more active policies for community outreach, understanding the socioeconomic needs and potential ways they can improve.

In the Leadership category, the project has sought to supply its equipment from companies that achieve sustainable management goals. Dow and its Filmtec membranes are top-notch at delivering a sustainable membrane for the reverse osmosis brine, decreasing energy dependence. The project team has shown a commitment to sustainable development through its Environmental Compliance contract with WASA. In addition, the project collaborated with community stakeholders throughout the pre-phases of the project implementation. Synergies between government policies for water production, pipe infrastructure, and plant construction were synchronized so that the work implemented by the government matched initiatives to develop by the plant. The team also exhibits a long-term view of the project, with an extremely detailed long-term monitoring and maintenance plan that ensures equipment is maintained and continuously produces freshwater. The project's useful life is 17.5 years with the potential of extending it depending on the government's capacity to renew in the future.

The project exhibits a great performance in the Resource Allocation category in relation to energy but could use a more thorough understanding of opportunities present in the Materials subcategory. In terms of Water, the project has mixed reviews, with a restoration of the island's water capacity for freshwater resources but with room for improvement in its water usage and its design to canalize rainwater and use stormwater to its full potential. The reverse osmosis process allows the plant to save 30% of its energy usage in comparison to distilling, which represents business as usual. This simple choice in design has given the project a high performance in energy efficiency. In addition, it mitigates all potential emissions in the construction phase with alternative strategies that decrease emissions. Long-term monitoring and maintenance have also been put in place. The project has the opportunity to develop a waste management plan to decrease waste and divert it from landfills or reutilize excavated materials from the construction of its internal roads, buildings, and drainage.

In the Natural World category, the Point Fortin plant showcased an impressive goal of maintaining marine biology intact and preserves marine habitats, species, and non-living natural systems. It does this by measuring baseline data of all natural habitats before construction of the plant and receiving third-party recommendations to mitigate any negative effects it has on the surrounding environment. Another great aspect was the project's choice of site, which was in a previously developed and polluted space with scrap metal and trash. With the development of the plant, this site was renovated and cleaned, allowing for a more active use of this industrial zone. The project avoids development in a site of high ecological value or adverse geology. The site's main geological risk is its location on the Caribbean, which is prone to the effects of climate change such as high temperatures and sea level rise. In order to address this, the project chose suppliers that met these challenges with adequate equipment and materials for the tanks. Given its siting, defined as industrial, the project spares greenfields and prime habitat from being developed and also saves coastal areas from being unnecessarily built over, reserving these spaces for the natural habitat.

Finally, the plant has indicated a reduction in greenhouse gas and other types of emissions thanks to the type of technology used. Reverse osmosis cuts down on the dependence on distillers as a desalination process (a process that relies on fossil fuels). The project also avoids greenhouse gas emissions in the construction phase with the use of cranes in optimal time and efficiency. The project might also develop a carbon assessment to measure the emissions saved through these mitigation strategies in tons of CO_2 per year. The Climate and Risk category presents an opportunity to approach climate change issues with a more conscious effort. A shift of view from provider to end user is needed to understand how the plant's construction makes it a customer of other resources, encouraging the project team to account for all water and energy usage. The project team has an emergency plan as well as short-term contingency

protocols to put into action in case of any risk associated with the plant itself, and to safeguard its employees from any potential harm. The plan includes training and supervision for numerous threats.

The Point Fortin Desalination excels as a model for generating fresh potable water, as well as for its contribution to Trinidad and Tobago's sustainable development and water goals. At the same time, there are some areas for growth and an opportunity to develop further with a holistic approach to sustainable infrastructure development.

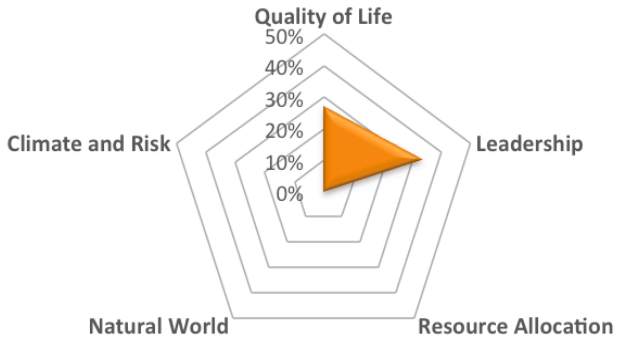

Figure 2 People and Leadership Awards Summary of Results

Figure 3 Climate and Environment Award Summary of Results

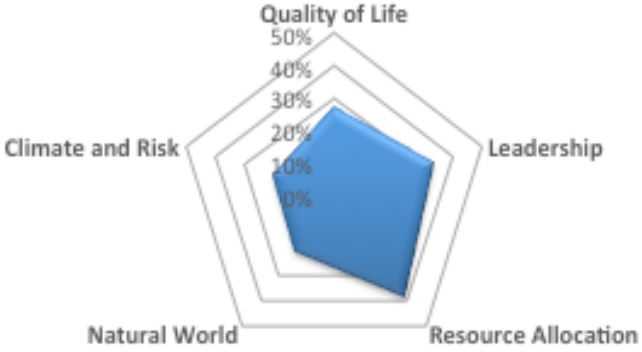

Figure 4 Infrastructure 360 Award Summary of Results