



Project Summary

Organization:

Prolagos/Aegea Group

Solution:

Water Network Analysis

Location:

Região dos Lagos,
Rio de Janeiro, Brazil

Project Objective:

- Expand the water supply network for Região dos Lagos over short-, medium-, and long-term horizons
- Calibrate the hydraulic network model
- Optioneer the best scenarios for the water distribution system
- Reduce energy consumption and non-revenue water
- Accommodate increased water demand during high tourist season

Products used: WaterGEMS

Fast Facts

- WaterGEMS helped Prolagos model more than 50 hydraulic scenarios for the new water distribution system.
- The interoperability of WaterGEMS allowed Prolagos to integrate a variety of data.
- WaterGEMS provided an improved water supply from 91 to 98 percent of residents.
- The new water distribution system helped to manage seasonal population fluctuations.

ROI

- Prolagos implemented a water network design that reduced energy consumption by 59 percent, delivered revenue gains of 30 percent, and generated an annual cost savings of BRL 17 million.
- Energy savings and revenue gains resulting from the project delivered a total return on investment of 323 percent.

Prolagos Designs Water Distribution System Delivering Energy Savings and Revenue Gains

Hydraulic Modeling in WaterGEMS Is the Solution

Provide Potable Water to Nearly 2 Million People

Prolagos, a subsidiary of Aegea Group, is responsible for providing water and sewerage services to five municipalities in Região dos Lagos, Rio de Janeiro. Prolagos manages a total water network encompassing 2,000 kilometers of distribution pipelines and accommodates for variable seasonal fluctuations ranging from 400,000 to almost 2 million inhabitants at the peak of the tourist season. The region also lacks fresh water resources as all the surrounding lakes contain hypersaline water, which is unfit for human consumption. Water is distributed from a spring 70 kilometers away, and four pump stations were required to provide water to the inhabitants, but the current system had not been performing optimally.

Prolagos undertook a major program called the Water Master Plan 2041 to expand the water supply system with short-term and long-term goals for a more sustainable future. To implement this project, Prolagos used Bentley's WaterGEMS to create, compare, and optioneer more than 50 hydraulic modeling scenarios, reduce energy consumption and non-revenue water, calibrate the network model, and enable collaborative decision making for the new water distribution system.

Meeting Numerous Challenges

The existing water distribution network in the Região dos Lagos region consumed BRL 26 million in energy annually and operated at a 45 percent water-loss rate. The system supplied 91 percent of the resident population and needed to meet demands five times greater during tourist season, with supply sources more than 50 kilometers away. "Região dos Lagos is a tropical paradise without freshwater resources," explained Prolagos Senior Project Manager Wagner Carvalho. "It is a huge challenge to collect water in another province, so we need to invest a lot in infrastructure. At the same time we have high energy costs to keep the system working."

In addition to the lack of resources, fluctuating demands throughout the seasons, and financial implications of the

project, Prolagos also faced integrating enormous amounts of data from different systems, devices, sensors, and instruments within the water network. In order to be more efficient and to provide a decision support tool for the different what-if scenarios, the project team needed to utilize an interoperable platform to manage the multitude of document formats and the huge volume of data.

Relying on Calibrated Hydraulic Modeling and Interoperability

Using WaterGEMS, Prolagos implemented a systematic approach to combining asset, customer, and operational information from various sources in the water network into a collaborative, calibrated hydraulic modeling environment. To make coordinated decisions about the designs for the supply and distribution system, the Prolagos team relied on WaterGEMS to create precise, hydraulic modeling to reduce energy consumption related to pumping costs. Integrating the calibrated hydraulic models with a geographic information system (GIS) and a supervisory control and data acquisition (SCADA) system made it possible to improve the operational efficiency of the intake system by using real-time data and historical data, as well as the relevant geo-coordination.

The project team used the hydraulic network models to simulate the behavior of existing and planned systems under a wide range of conditions. WaterGEMS provided a visual, collaborative solution utilized by all stakeholders, and enabled the team to evaluate numerous, what-if scenarios for better decision making for optimal network performance.

"WaterGEMS is reliable and beneficial because it allows us to simulate and choose the best scenario. We were able to integrate our system and create a virtual model with unrivalled visualization utilized by all stakeholders to engage and approve this project in record time," said Carvalho.

Furthermore, the team could precisely simulate the effects of the expansion alternatives to meet the future demands of the Water Master Plan 2041 fostering regional development and improved health and quality of life.

“The challenge of water utilities in the 21st century is to be able to respond quickly to the increase of water demand in a more efficient way and with a sustainable approach.

The use of software like WaterGEMS allows companies to integrate the entire water network database, including field data, and obtain the best scenario—the one that optimizes the water distribution and decreases energy consumption of the system.”

*—Wagner Oliveira de Carvalho,
Senior Project Manager,
Prolagos*

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Reaching Cost-effective Design Decision

Simulating new intake scenarios in WaterGEMS helped the team to determine how to reduce high-pressure loss, automate terrain extraction and node allocation, and optioneer the best pumping strategy with complex pump combinations for optimal, cost-efficient operation. Modeling in WaterGEMS enabled Prolagos to identify the points in the hydraulic system most vulnerable to transients, thereby minimizing operational risk.



Prolagos used Bentley’s WaterGEMS to create, compare, and optioneer more than 50 hydraulic modeling scenarios.

Using WaterGEMS to leverage network data, the team implemented a design that reduced energy consumption by 59

percent, delivered revenue gains of 30 percent, and generated an annual cost savings of BRL 17 million. The design enhanced network efficiency and expanded water supply to residents from 91 to 98 percent. By modeling the various supply scenarios, Prolagos optimized water distribution during the summer months when demand is at the highest, and was able to increase the pressure to reach high altitudes of the region facilitating a better quality of service.

WaterGEMS Drives the Water System Evolution

Using WaterGEMS, the team created the hydraulic model and integrated it with SCADA, client demand, the system registry of water-supply network, and maintenance history data to enable all stakeholders to accurately visualize the expansion scenarios and compare the best solutions in a fast, simple, and effective manner. The interoperability and user-friendly environment of WaterGEMS enabled approval of the design in record time, reducing delivery time and cost.

WaterGEMS helped the Prolagos team to deliver a 323 percent return on investment resulting from energy savings and revenue gains. Carvalho concluded, “The use of software such as WaterGEMS allows companies to integrate the entire network database available and obtain the best scenario – the one that optimizes water distribution and decreases energy consumption of the system.”