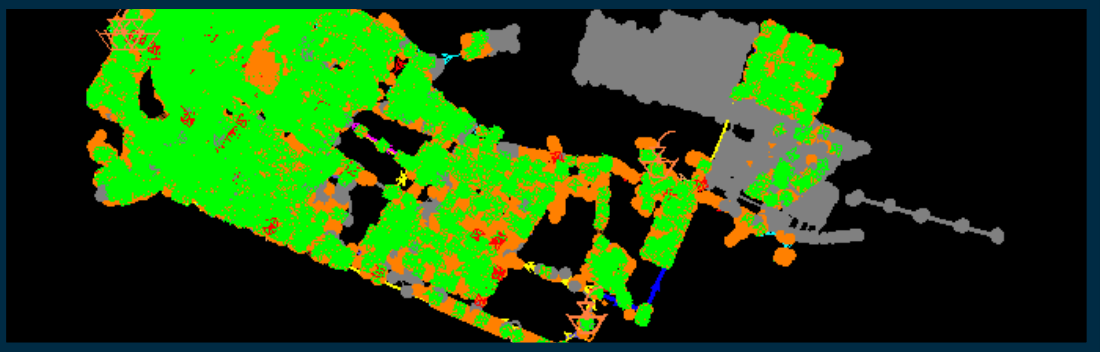


WaterGEMS® Helps Sharjah Electricity & Water Authority Deliver a Sustainable Water Supply

Achieves Reduced Water Loss and a Dramatically Improved Customer Rating of 98 Percent

Project Summary

Project:
Sustainable Water Supply in Arid Region

Project Location:
Sharjah, Sharjah, United Arab Emirates

Organization:
Sharjah Electricity & Water Authority

Be Inspired Awards Category:
Innovation in Water, Wastewater, and Stormwater Networks

Project Objective:
Improving the water distribution system's efficiency to enable the supply of water continuously and in a sustainable manner

Product Used:
WaterGEMS

Fast Facts

- The construction growth in the region resulted in a large increase of the demand, adding a lot of strain on the water network of Sharjah City.
- WaterGEMS was used to conduct the criticality analysis of the water system and helped SEWA develop an improvement network program.
- SEWA's project provided the ability to supply water at 22% below the calculated water demand with a very high customer satisfaction rating of 98%.

Rapid Development Strains Water Resources

The Emirate of Sharjah in the United Arab Emirates (U.A.E.) continues to experience rapid development that's evidenced in its many new major industrial, commercial, construction, and agricultural projects. This growth has resulted in a huge demand for water in a region where surface water resources are nearly nonexistent. To help manage this demand, as well as model water supply patterns, plan maintenance projects, and reduce water leakage in its 2800 km water distribution network, the emirate needed efficient and integrated water network management software. Sharjah Electricity & Water Authority (SEWA) engineers chose WaterGEMS, Bentley's water distribution analysis and modeling software product, to successfully address each of these challenges and is currently using it to effectively manage its water network.

Improved Workflows

SEWA's geospatial and water professionals work with a variety of data, including data from a geographic information system (GIS), digital elevation models (DEMs), parcel information, billing data for node demand calculation, and CAD data for infrastructure information. When SEWA's engineers receive GIS or CAD data from outside contractors, they can easily import it into their new WaterGEMS model using Shapefile import or polyline-to-pipe conversion tools. These improved workflows enable other Sharjah government departments to easily access the same data, accelerating information sharing and communication across project teams.

WaterGEMS was used for criticality analysis in each of the zones to identify not only the impact of outages, but also critical segments and pressure zones.

WaterGEMS Analysis and Engineering

The following five land-use-designation zones had been identified: industrial areas, low-density residential areas, the old Sharjah City network, high-density residential areas, and the new Sharjah City network. WaterGEMS was used for criticality analysis in each of the zones to identify not only the impact of outages, but also critical segments and pressure zones. Next, the hydraulic properties of network elements were calculated and the results were visualized in longitudinal profiles for easier graphical visualization of calculated properties such as pressure or hydraulic grade line, and element characteristics such as elevations.

This enabled SEWA to create a network improvement and development program for its engineering teams. These engineering teams used it to help plan and execute projects ranging from the replacement of critical segments and valves to changes in the direction of flow to a reduction in pipes. The latter project enabled SEWA to redistribute water from areas of the city in which water flowed adequately to areas in which water flow was insufficient to meet demand.

Additionally, it enabled the engineering teams to address issues with a particularly troublesome segment of the network that's about 40 years old. In this segment, water loss from underground leakage was an ongoing concern, while high pressures in the system also caused occasional breaks in the transmission lines – particularly in portions close to pumping stations where the pressure is necessarily high. Regular replacement programs as well as the criticality study done in WaterGEMS enabled SEWA to reduce water loss, ultimately conserving more of the potable water pumped into the network.

By deploying WaterGEMS for this network improvement and management program, SEWA was able to achieve continuous water supply without complaints from residents about water shortages, even with water production below the estimated demand of 105 MIGD.

Benefits Gained by Using WaterGEMS

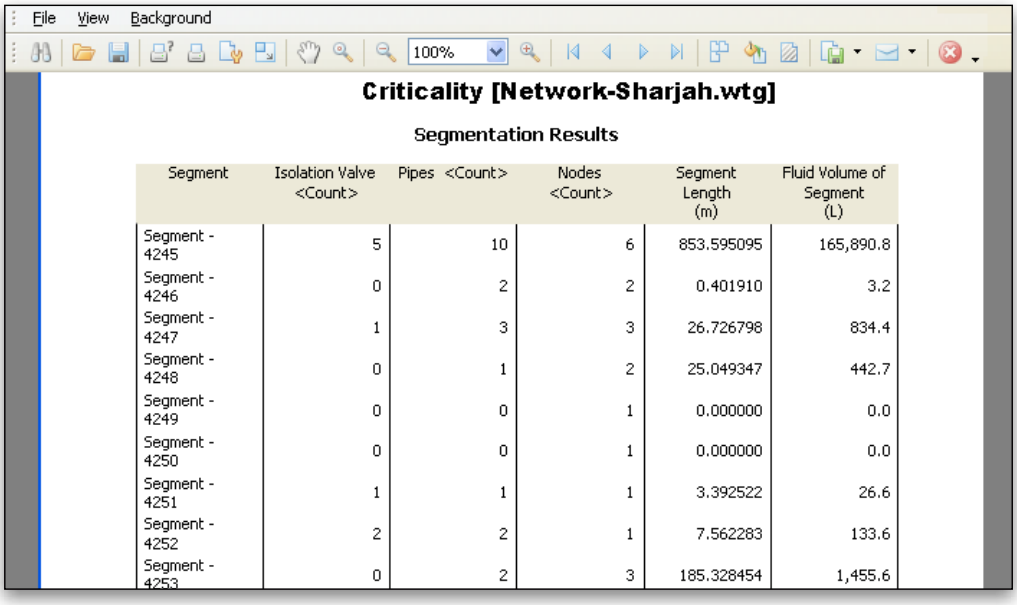
Among the many benefits SEWA achieved through its use of WaterGEMS are:

- A dramatic reduction in the number of complaints it receives – from 343 in 2007 to just 13 in 2009, which translates to a 98 percent customer satisfaction rating;
- The ability to supply water at 22 percent below the calculated water demand without customer complaints;

"By deploying WaterGEMS for this network improvement and management program, SEWA was able to achieve continuous water supply without complaints from residents about water shortages,"

- A steady reduction in water leakage – from 18.7 percent to 11.6 percent to 8.9 percent of the supply;
- Substantial savings in man-hours required for maintenance processes;
- Improved engineering workflows empowered by the ability to locate the critical segments in the network, which facilitated rapid execution of projects by the engineering teams (for example, teams would know in advance what valves to close for each broken pipe);
- The ability to maintain stable pressure in the supply network for the five zones of Sharjah City.

In short, WaterGEMS helped Sharjah City engineers optimize the use of natural resources, supplying water in a safe and sustainable manner for future generations of the U.A.E.



Segment	Isolation Valve <Count>	Pipes <Count>	Nodes <Count>	Segment Length (m)	Fluid Volume of Segment (L)
Segment - 4245	5	10	6	853.595095	165,890.8
Segment - 4246	0	2	2	0.401910	3.2
Segment - 4247	1	3	3	26.726798	834.4
Segment - 4248	0	1	2	25.049347	442.7
Segment - 4249	0	0	1	0.000000	0.0
Segment - 4250	0	0	1	0.000000	0.0
Segment - 4251	1	1	1	3.392522	26.6
Segment - 4252	2	2	1	7.562283	133.6
Segment - 4253	0	2	3	185.328454	1,455.6

Extract of the criticality report for the Sharjah City network

Pressure analysis through profiling node by node

Bentley
Sustaining Infrastructure