



Project Summary

Project:

Network Improvement Master Plan for the Metro Manila East Zone

Organization:

Manila Water Company

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category:

Innovation in Water, Wastewater, and Stormwater Networks

Project Objective:

To design a non-revenue water reduction program and network improvement master plan for the central distribution system of the east zone of Metro Manila.

Products used:

WaterGEMS

WaterGEMS® Plays Key Role in Reducing Non-Revenue Water for Metro Manila East Zone

Network Improvement Master Plans Benefit More Than 3 Million Households

To ensure the reliability and sustainability of the water network and expand the supply of water to the Rizal provinces, Manila Water Company, Inc. (MWCI) used Bentley's WaterGEMS to create a water network simulation model and reduce non-revenue water (NRW).

NRW and Community Trust Challenges

Manila Water's central distribution system is supplied by two primary network systems. In 2007, it was discovered that the east transmission line was already overloaded while the west transmission line was not fully utilized. Thus, one of the challenges facing Manila water was to solve the imbalance in the network system.

Although Manila Water Company had significantly reduced NRW from 63 percent in 1997 to 24 percent in 2007, NRW remained a primary challenge in ensuring the reliability of the water network. In fact, Manila Water still had to replace more than 1,000 kilometers of water mains. Some of the pipes being replaced were composed of asbestos cement (ACP) and fiberglass reinforced polyester (FRP), which were still susceptible to breakages.



Pipe breakages before the project

Thus, pipe bursts in major roadways still occurred, which disrupted water supplies and affected thousands of households in Metro Manila.



Illegal connections before the project

In addition, water theft and illegal connections continued to be major causes of NRW and water quality problems, especially in low-income communities.

The challenge for Manila Water was not only to design network efficiency projects in these areas but also to gain the cooperation of the community to implement NRW reduction and network improvement programs.

The 2007 master plan focused on these programs. It was designed by creating a hydraulic simulation model of the central distribution system using WaterGEMS. Through this model, network reliability projects were conceptualized on a per business area basis to ensure they were consistent with the development plans of the local governments. These projects included pipe replacements, DMZ/DMA formation, PRV installation, network reconfiguration, and Tubig Para SA Barangay (TPSB) or Water for the Villages.

Model Creation and Team Collaboration

Manila Water's concession area is subdivided into eight business areas based on political and hydraulic boundaries. To easily manage the creation

Fast Facts

- The challenge was not only to execute a system redesign but also to gain the cooperation of the community in the implementation of NRW reduction programs
- The project benefited more than 3 million households and that number is expected to increase upon its completion
- NRW was reduced from 24 percent to 18 percent, or 75 million liters per day of recovered losses, which is equivalent to U.S.\$1 million in lost revenues. Operational expenses were also reduced by U.S.\$0.9 million over the same period

The project has already benefited more than 3 million households and upon the project's completion that number will grow.

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and development of the hydraulic model, Manila Water's network planning team subdivided the model into eight submodels based on these business areas. Next, the network planning engineer assigned a design strategy for each business area, based on its specific development needs and plan. The models were then uploaded to the main server.

At the utility's main office, the network systems manager collated and checked the models to ensure that all of these submodels were aligned with the master plan for the whole concession area. The network systems manager also developed and updated the main hydraulic model of the whole master plan.

The data the network planning team needed to create the model, such as ground profiles and documentation of the existing water network, was provided by the GIS and GPS team, which gathered data from the field and uploaded it to the GIS database. Next, the network-planning team imported this data directly into WaterGEMS using the ModelBuilder and TRex tools within WaterGEMS. The project development group then developed the design of the projects based on the WaterGEMS model.



Master plan models in WaterGEMS

How the Population Benefits

The project has already benefited more than 3 million households, and that number is expected to increase upon completion of the project. Between 2007 and 2008, Manila Water has laid and replaced almost 800 kilometers of pipe, which has significantly reduced the number of pipe bursts and water supply interruptions. Ninety-nine percentage of the central distribution system is now enjoying a 24x7 supply of potable water.

Moreover, the average pressure was improved from 7 psi to 17 psi.

Aside from implementing technical solutions, Manila Water also built a strong relationship with local communities, especially in low-income areas. The goal was to develop a partnership with the local communities to stop illegal connections and water theft. Moreover, the TPSB scheme paved the way to authorize water service connections at an affordable cost.

As a consequence of these initiatives, the health of the people in the TPSB communities improved and water quality problems were reduced as illegal connections and water pilfering were eliminated. Statistics show that the improved water quality in the TPSB communities has significantly decreased the number of diarrhea and cholera outbreaks.

Financial Savings

Using Bentley products has saved Manila Water both time and money. For example, using the WaterGEMS interface to integrate GIS-based data with the hydraulic model is built in, where other products require the purchase of a separate product to gain this functionality.

Other advantages of WaterGEMS include:

- The ability to export data from the WaterGEMS model to Microsoft Excel and vice-versa,
- Easy computation of costs and preparation of bills of material for proposed projects based on the network model,
- Easy integration of the existing demand database with the model.

By creating Manila Water's network model using WaterGEMS, the utility was able to implement network improvement solutions that resulted in both capital and operational savings. From 2007 to the first quarter of 2009, Manila Water reduced NRW in the network from 24 percent to 18 percent, yielding 75 million liters per day in recovered losses. The value of these losses in terms of revenue would have totaled U.S.\$1 million. The utility also reduced operational expenses by U.S.\$0.9 million over the same period.