

THE FULL SCADA DEAL

The benefits of adopting a complete SCADA system over a sophisticated RTU-based solution.

For over a decade, The Bahamas Water and Sewerage Company (BWSC) faced significant service challenges on the Island of New Providence. These included a lack of centralized monitoring and control for the island's primary water treatment and distribution system, as well as limited reporting, alarming and remote access

In phase one of this two phase project, the utility contracted Star Controls to expand their MOSCAD® Remote Telemetry Unit (RTU) network and install a fully-featured Supervisory Control and Data Acquisition (SCADA) application based on VTScada™ software from Trihedral. In this article Laurie Kusmaul and Tzvi Magril of Star Controls describe how SCADA is one component helping to save the utility millions each year in lost water.

Expanding the Legacy SCADA System

Commissioned in 2006, the Blue Hill Water Treatment Plant is the largest Seawater Reverse Osmosis plant in the Bahamas supplying 18,444 m3/day of water to 300,000 inhabitants of the Island of New Providence. Treated water from this plant fills the three tanks at the nearby Lower Blue Hill pump station which, in turn, supply two tanks at the Blue Hill High Level Tanks.

Previously, these tanks and pumps were monitored and controlled using a simple set of Motorola® MOSCAD RTUs. Water level readings were logged in RTUs installed in each tank tower. When the level at the high level tank site dropped below a predefined level, the local RTU sent a radio signal to the pump station RTU. This started one or two pumps using a control mechanism designed to maintain a balanced pump rotation. When the water reached the predefined high level, the tank RTU signaled the pump station RTU to stop the pumps.

Phase I, which began in January of 2012, consisted of Florida-based Star Controls significantly expanding the monitoring and controlling infrastructure at Blue Hill. Tzvi Magril, Managing Partner at Star Controls describes the upgrade. "They initially called us because we are considered MOSCAD experts. It turned out that eight years earlier Motorola had discontinued the RTU they were using, so we recommended they move to the ACE3600® RTU, for the original two sites," says Magril. The new RTUs, extended monitoring to new pumps and tanks at the pump station and improved pump utilization through advanced pump sequencing algorithms. The new design retained the original MOSCAD RTUs as redundant backup units.

Just Add SCADA

Laurie Kusmaul is a Sales and Project Engineer for Star Controls. She managed project resources and coordinated with multiple parties to successfully implement a SCADA software application that would meet everyone's needs. "BWSC O&M management had the vision to expand the system to add more control and monitoring," says Kusmaul. Star Controls recommended VTScada, a fully integrated SCADA software solution developed by Trihedral since 1987.

A server installed at the BWSC Control Room hosted the application. "The relationship between Trihedral and Star Controls is what ultimately lead us to choose the software," continues Kusmaul. "The continued support of the entire Trihedral team, specifically Bryan Sinkler, Victor Smeenk, and the support team, is the reason we continue to recommend and use this software. BWSC trusted our recommendation to use VTScada as the SCADA HMI application."

Another reason for the choice was the software's open-architecture design that allowed it to communicate with a wide variety of remote monitoring hardware using an extensive library of direct drivers. This meant the system could support the new ACE units as well as most any other brand the utility chooses to add in the future.

VTScada also includes sophisticated polling tools. "In Phase I, we had established a telecommunications and operational backbone for the corporate wide SCADA system that would eventually cover the entire infrastructure, water supply, sewage collection and treatment," says Kusmaul. "This included wireless radio coverage, allowing seamless add-ons of RTUs at other sites. The Motorola equipment and protocol allows direct and indirect RTU-central communications. Indirect communication is achieved by routing data via other RTUs in order to bypass line of sight obstacles."



Pump Station Display Created by Star Controls within VTScada

Just Add More SCADA

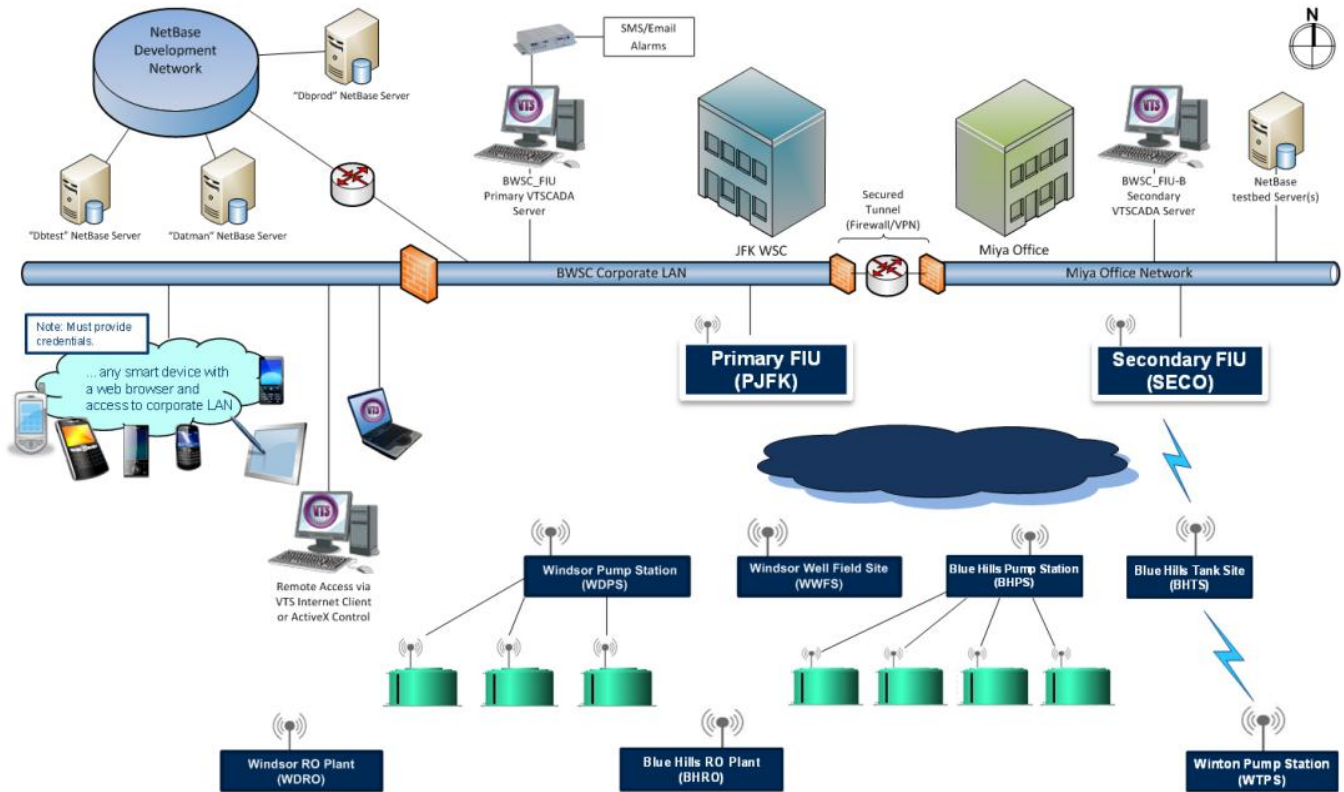
Following a needs assessment, BWSC contracted Star Controls to make additions and improvements to the Blue Hill SCADA system. During phase 3, the following objectives were accomplished.

- Expanded the radio communication network to include five additional sites.
- Added control functionality to the SCADA application and added security accounts to limit control as necessary.
- Ensured system availability through a second, redundant SCADA server.
- Provided remote SCADA access using VTScada Internet Clients and Mobile Internet Clients.
- Configured VTScada’s OPC and ODBC servers to share real-time and historical SCADA information with third-party water efficiency packages.
- This included setting up the SCADA application to accept requests from this package to carry out controls by remote RTUs.
- Star Controls ensured data integrity at the RTU level by keeping data history at the RTU as an audit source.
- Provided training for BWSC operators and managers on the hardware and software that makes up the system.

Kusmaul describes the process of designing and implementing the new system. “It involved initial requests of capabilities from the end user and efficiency recommendations from Star Controls. Constant communication between the general contractor, the end user project manager, and operations leaders was the only way to ensure that all parties would be satisfied with the scope and results of the project.”

The Completed System

The Blue Hill SCADA system now consists of seven remote sites with Motorola ACE3600 RTUs transmitting process data to two control centers each running a VTScada development server and workstation.



Blue Hills Distribution SCADA System Network Diagram

- Blue Hills RO output monitoring flow, water quality, and conductivity.
- Windsor pump station and storage tanks monitoring and controlling three pumps (two with ABB VFD controller and two with Schneider® soft starters) and monitoring three tank levels via wireless I/O extenders.
- Windsor Well-field transfer pumps - monitoring and controlling two pumps that are controlled by the level in the settlement tanks.
- Windsor RO output monitoring flow, water quality, and conductivity.
- Winton pump, tank and booster station monitoring and controlling pumps (via Danfoss® VFD controller), boosters (via relays), and monitoring tank level.

To improve radio communication coverage and reliability, the RTU at Blue Hills Tank Site now acts as a data repeater between some sites and the control center. “As shown in the network diagram above, the ACE units completely automate the pumping system process, while VTScada allows the monitoring and control from virtually anywhere. Any ‘smart’ device with a web browser (and of course proper credentials) can monitor the SCADA system”

Bahamas – On Top of Water Supply

She also claims “VTScada Internet Connectivity is an integral part of BWSC SCADA daily operation. Managers have a higher level of privileges to control the pumping system, but everyone, including operators with the lowest privileges can use VTScada from Internet Explorer or the ActiveX® control from a remote machine on the Corporation’s network. They very much appreciate being able to VPN into their network from home in the evenings to monitor and make adjustments to the system as necessary. They have expressed interest in the mobile feature too, but the Internet Explorer method is by far the team’s favorite way to view information when they can’t be physically present in the control room.”

“We have done internal testing of the software and hardware integration, the customer acceptance testing is on the horizon but we can already hear the enthusiasm the operation and maintenance team leaders express in the overall appearance and functionality of the system.”

“One major point that they have made is that they can put the system in manual and remotely stop or start a pump when rarely necessary. The capability to do this without having to send someone to the station is an important function from the operator’s perspective, to the manager’s perspective, all the way to the perspectives of top government officials,” says Kusmaul.

The Future

The expanded SCADA system is now in production. They are escalating their use of it. They are receiving email and texts. They can control all pumps. They now have a small but very complete and very sophisticated SCADA system.” says Magril.

“Star Controls provides annual maintenance services, provide general upkeep of the Water Distribution SCADA system, and provide training when necessary. The Wastewater group has roughly 100 lift stations that we are going to propose to put onto a SCADA system similar to the one we implemented on the Water side” concludes Kusmaul. “It is an impressive project, not by its size, but rather being part of a very sophisticated solution that will save the utility millions of dollars.”

“Based on the great experience with the water supply, BWSC is evaluating a SCADA system to monitor and control its Sewage Collection system, with 42 Lift Stations” says Magril.

More Information

Trihedral and VTScada - Trihedral is a world-class developer and integrator of HMI / SCADA software for industries such as water & wastewater, manufacturing, power, oil & gas, chemical, food & beverage, air traffic control, and broadcasting. VTScada is all-in-one monitoring & control software for telemetry and plant applications of any size.

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Star Controls - Star Controls, Inc. is a leading provider of comprehensive SCADA, remote monitoring and control, and communications system solutions for water and electric utilities, oil & gas, network fault management, public safety systems and other markets. Star Controls is recognized as a Trihedral Advanced Systems Integrator.

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The Bahamas Water and Sewerage Corporation (WSC) - Under the jurisdiction of the Minister of Works & Urban Development, the Corporation is a wholly owned Government organization, entrusted with managing, maintaining, distributing and developing the water resources of The Bahamas.

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Trihedral

Trihedral Engineering Limited, Bedford, Canada
Trihedral, Inc., Orlando, Florida
Trihedral UK Limited, Aberdeen, Scotland

1.902.835.1575
1.407.888.8203
+44 (0) 1224 258910

info@trihedral.com / www.trihedral.com
1.800.463.2783 (North America)
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