

# Redesigning a Stable City Water System with InduSoft Web Studio

With limited budgets, municipal water/wastewater facilities rely on system integrators like Lubbock Electric to design stable and cost efficient SCADA systems that can grow with their needs.



- InduSoft Web Studio was used to create a cost efficient and reliable water/wastewater SCADA solution for the city of Wolfforth, TX.
- The application gives operators access to remote sites in the city's water system, and makes it possible to control the system from a centralized location.
- The improved uptime has greatly reduced the city's need for overtime operators, and operators require less training, thanks to the intuitive interface of the application.

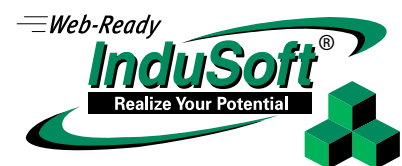
*Figure 1: The application was designed by Lubbock Electric Company for the City of Wolfforth, TX*

Municipal water and wastewater processing is a vital part of any community infrastructure. Access to clean water is considered a basic human right, but without efficient methods of processing water and wastewater, the costs of providing access to the community can be difficult to shoulder. This is especially true for small towns like Wolfforth, Texas, which was struggling under the cost of an expensive SCADA system that often required maintenance and overtime employees for manual operation of the water processing facilities. However, thanks to Lubbock Electric Co., Wolfforth was able to adapt their system to a secure, reliable SCADA architecture that offered cost efficiency, less manual involvement, and far greater reliability.

## Background

Wolfforth, TX is a city of fewer than 4,000 people, meaning that the municipal water treatment facilities serve the entire community. This system includes water wells, a ground storage tank, booster pumps and elevated water towers in different locations throughout the city.

The city's water distribution system utilizes three elevated water tanks to maintain water supply and pressures as usage increases throughout the day. A drop in the water levels causes wells and/or booster pumps to start, in order to maintain and restore levels to a full



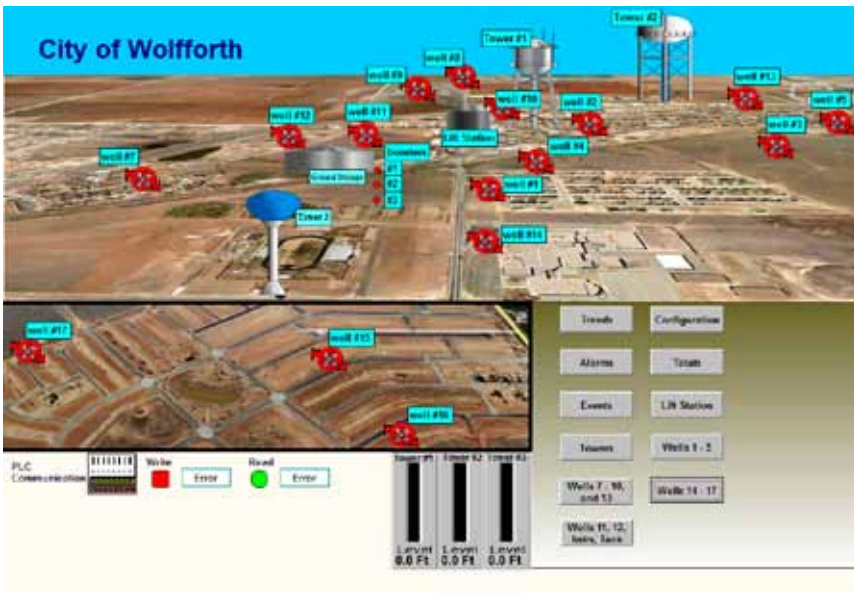


Figure 2: This screen offers a satellite view of the town, with an overview of well locations.

state. Maintaining system pressure is the most critical element of this application. The City of Wolfforth also keeps records, including pump run time hours and total gallons from flow meters installed at all pumps. These are recorded in the SCADA system and maintained by operators.

### The Challenge

The system in place for the city of Wolfforth was originally built by Lubbock Electric Co. While it originally met the needs of the processing facility, the cost of the development platform, and the inflexibility of the system began to cause some strain as the complexity of the system grew and changed. The SCADA software platform in place was not as stable or reliable as operators required it to be. As a result, the city often had to pay overtime hours to operators who had to manually operate the facilities when the application required changes or servicing. The cost of additional operator pay, plus the high cost of ownership for the platform itself sparked an interest in developing a retrofit that would offer better cost efficiency and more reliability.

Lubbock Electric Co. was called in to redesign the system developed in 2002. An additional challenge of this project was the fact that the end users wanted a system that would offer everything they required

in a run-time environment, due to lack of personnel required to modify or maintain a SCADA application.

The selection process consisted of shopping around for HMI touchscreens and discovering a link to InduSoft Web Studio's web site. A trial version was downloaded and tested, and Lubbock Electric Co. was pleased with the performance and intuitiveness of the system. InduSoft Web Studio was chosen as a robust, easy to develop platform, and was attractively priced.

### The Solution

Since many of the water system components are located in remote areas, InduSoft was installed in the centrally located maintenance building office. This central location was best suited for the radio system, which needed to communicate between master PLCs and the RTUs. There is only one computer needed in the system, but the application is installed on a redundant PC in case the primary computer fails.

The InduSoft Web Studio application communicates with a master PLC which is in turn connected via a radio network to the RTUs. These RTUs control the wells and booster station, and provide real-time data back to the SCADA system.

The application connects to the master PLC using Modbus TCP on the plant's office network. The Master PLC is a Modicon/Schneider Electric Momentum with Ethernet communications. The Master PLC connects to the RTU equipment, via Modbus RTU RS232 over MDS 9810 radios, and retrieves/writes data for the InduSoft Web Studio application to manipulate. Even though the InduSoft application contains all the control logic, the communication task is fairly simple. The application utilizes driver sheets to the single Master PLC.

The InduSoft application facilitates all the logic within the system. Operators have the ability to control the wells from any of the three water tower levels. The operators may also configure the wells to start/stop at many level priorities, which allows for complete system configuration from one screen. Some wells only pump to the ground storage tank, and then booster pumps fill the towers. Other wells have the ability to pump directly to the towers or to the ground storage tank. The water towers are at different elevations, so a motorized valve at the base of each tower will close at a configurable tower level (to eliminate tower over-fill) and not open again until system pressure drops to a configurable pressure. Each RTU will notify the master PLC any time an alarm condition exists and the InduSoft application sends email-to-text messages to phone numbers configured by the users. The RTU

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alarm conditions include door open, unauthorized intruder (determined by intruder not knowing how to cancel alarm upon entry), pump start/stop failure, valve malposition, power failure, PLC failure and communication error. The application utilizes historical trending for all water tower and tank levels. This very useful tool aids operators in determining the cause of system malfunctions. Total run time hours of pumps and totalized flow values are also stored for maintenance and reporting purposes.

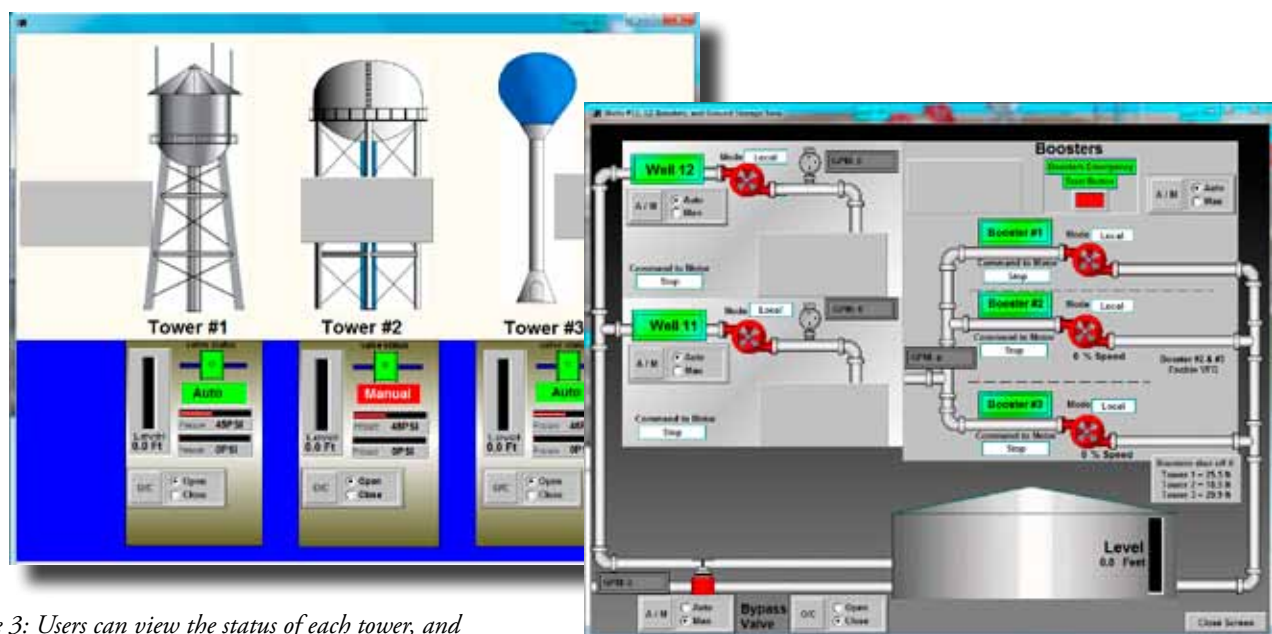


Figure 3: Users can view the status of each tower, and manually or automatically control valves.

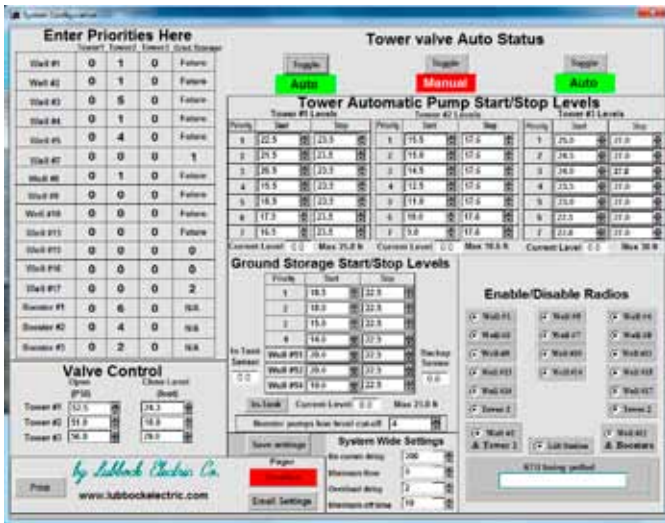


Figure 4: The application allows users to manually or automatically toggle tower valves.

InduSoft Web Studio utilizes user name and password security features to limit access to those users who have permission to view these values. Users log off when they are not using the application, and must log in to enable any feature other than viewing. The web thin client requires login to access any part of the system.

### The Result

Since the retrofit, all system functions have been operating smoothly. One of the main benefits of the new system is the improved uptime. When the old system would crash after normal business hours due to memory leaks, an operator would have to operate the system manually until the SCADA system could be restarted or repaired. This would cause the city to pay more overtime than desired. According to Gordon Hillock, of Lubbock Electric Co., “The InduSoft system is much more reliable and consistent. The City

of Wolfforth would choose InduSoft for any new projects that arise. Lubbock Electric Co. has used this app as a pattern for developing other city water and wastewater projects as well as other industries such as salt water disposal for the oil industry and food warehousing.” The City of Wolfforth InduSoft application has been expanded and modified several times since installation.

Gordon adds, “The City of Wolfforth, has been very pleased with the SCADA system installation since the old system was retrofitted with InduSoft Web Studio. System up-time and less paid overtime/comp-time have been a great benefit. New operators have been able to learn the system quickly due to the intuitive design and ease of navigation throughout the screens. The reliable alarm notifications have given the operators confidence in the system and have since been utilizing all the features designed into the application.”

For more information contact your local distributor or InduSoft directly at [info@indusoft.com](mailto:info@indusoft.com).

