



Meeting Date: March 1, 2023

Submitted by: Eric Joudrey, Manager of Water and

Report No: PWE 08-2023

Subject: Water and Wastewater SCADA Road Map

Recommendation:

THAT Report PWE-08-2023, re: Water and Wastewater SCADA Road Map be received for information.

Purpose:

This report is providing Council with information regarding the on-going upgrades and maintenance over the next ten (10) years to the Supervisory Control and Data Acquisition (SCADA) system that is currently used at the Water and Wastewater Facilities. A SCADA system is used to control, monitor and analyze water and wastewater devices and processes from the water and wastewater plants. The system consists of computer software and computer hardware components that enable remote and onsite gathering and control of data from equipment and instruments.

Background:

In 2022 the Water and Wastewater Division of the Public Works and Engineering Department proactively identified a need to complete a SCADA Road Map to identify long-term plans and goals for their SCADA systems. This Road Map is intended to define the process to upgrade existing systems and deploy technology that provides operations and management with control and monitoring capabilities over their Water and Wastewater SCADA Systems.

Eramosa Engineering Inc. (Eramosa) was retained by the Municipality to complete the review of the current SCADA system and develop the SCADA Road Map. Four key areas were identified for a successful Road Map they included: Understanding the Current State, the Desired State – End User Experience Focus, Standardized approach to hardware, software & networks, and Implementation Plan. Throughout 2022 the Municipality and Eramosa worked to develop an in-depth understanding of the SCADA System by conducting site visits and operator workshops which resulted in three (3) Technical Memos.

Technical Memo 1

Defined the current state including the identification of initial area of improvement. Information and photos were collected on each programmable logical control (PLC) panel, operator interface terminals (OITs), network equipment, and network connectivity for each facility. Additionally, servers and workstations including software installed on each was collected as part of these site visits. Lastly, the site visits were also used as an opportunity to generate the current state SCADA architecture diagram for each of the Komoka and Ilderton SCADA systems.

Technical Memo 2

Workshops were conducted with members of the operations team to identify and document the future vision of the SCADA and network / communication system.

Technical Memo 3

Creation of the Road Map that ties all the information from Technical Memo #1 & #2 together to define the process to upgrade existing systems. It provides a summary of all recommendations along with timelines and cash flow considerations over the next ten (10) years.

Analysis:

The Municipality owns and operates twenty-one (21) locations in various centers that have some degree of SCADA in place. The Water & Wastewater Department currently has several key facilities that form part of the SCADA system. These can generally be further identified with respect to the specific process that is monitored and/or controlled through the SCADA system. Combined, these facilities through the hardware found installed onsite comprise the SCADA systems. These facilities are generally defined as:

1. Water Distribution and Supply Systems
2. Water Treatment facilities
3. Wastewater Treatment Facilities (WWTF)
4. Wastewater Sewage Pumping Stations (SPS).

The Wastewater Treatment Facilities and Water Booster Pumping Stations are monitored by SCADA. Not all sites are monitored by SCADA but have the ability to send information back to the Ilderton WWTF. For the remote sites connected to SCADA, most facilities utilize a Router and modem for connectivity to the SCADA network. Other remote facilities were also found to be connected with fibre optic cabling owned by the Municipality and other facilities have network hardware in place however connections for network cabling were incomplete thus resulting in no connectivity to SCADA.

The SCADA system has two main hubs that are located at the Komoka WWTF and Ilderton WWTF. The SCADA systems at Komoka WWTF and Ilderton WWTF use the same software systems and aged operating systems. This software provides monitoring and control of the processes as well as historical data collection. All other facilities have standalone SCADA systems that send information back to either the Komoka WWTF or the Ilderton WWTF. Ultimately with each SCADA system configured as stand alone, accessing the Ilderton SCADA system through the Komoka SCADA system (and vice versa) is not currently possible. Remote access to the SCADA system is not currently available for either operations or third-party SCADA support.

Each of the Komoka and Ilderton WWTFs contain administrative network access to the Municipality's corporate network. The Wide Area Network (WAN) connection and local networks appear to be physically separate from the SCADA network.

It is recommended Council accept the recommendations outlined in the Technical Memos regarding on-going upgrades over the next ten (10) years. The upgrades and commitment to SCADA improvements will provide consistent standardization resulting in the overall operation of the utility. The Municipality will see improved efficiency through:

Improved efficiency: the roadmap identifies a systematic approach for implementing new technologies, processes, and best practices. This can help to optimize operations and increase efficiency, reducing costs and improving productivity.

Enhanced system reliability: a well understood and maintained SCADA operates smoothly and with minimum downtime. This is achieved by identifying potential system failures or bottlenecks, and developing contingency plans that can quickly address any issues that may arise.

Better decision-making and improved regulatory compliance: improved digital data collection, making it easier to identify trends and patterns. This can help operators to make informed decisions based on real-time data and respond quickly to changes in the system including monitoring and reporting on key performance indicators (KPIs), ensuring compliance with environmental standards, and adhering to cybersecurity regulations.

Long-term cost savings: A strategic approach to SCADA system design and maintenance will reduce costs associated with equipment downtime, emergency repairs, and system upgrades. This can lead to long-term cost savings and improved return on investment (ROI).

Financial Implications:

The Road Map defined the current state and the required process, technology to provide operations and management with the proper technology to provide safe reliable drinking water to the Municipality and clean wastewater effluent being discharge to the natural environment. Cash flow projections over a ten (10) year period was taken under consideration for capital costs.

The total capital budgetary estimate for the overall SCADA Upgrade program is estimated at \$ 3,848,438.26 (HST extra, -10% to +30% accuracy with a recommended 10%-20% contingency extra, in 2022 dollars).

Ongoing Operational & Maintenance costs for hardware, software, network fees and annual maintenance for system integration services to address emergency support and maintenance activities are estimated at \$30,000 to \$35,000 per year.

Strategic Plan:

This matter aligns with following strategic priorities:

- Sustainable Infrastructure and Services
- Responsive Municipal Government

This proactive approach will assist for capital forecasting and planning as system upgrades are planned over the long-term. Staff will use these findings to upgrade systems as required for efficiency and reliability purposes.

Attachments:

N/A