

Implementation of Automated Meter Infrastructure (AMI)

The City of Greater Sudbury provides drinking water services to over 48,000 customers. Funding to provide these services is primarily generated through user fees based largely on consumption through water meters measuring usage for each account. More than 50% of the City's water meter fleet is greater than 20 years old. The American Water Works Association (AWWA), which provides best practice guidance for water operators, recommends asset replacement for water meters that are greater than 20 years old.

The City's current metering technology is not only past its useful life, it is also outdated when comparing its features and capabilities to industry norms. For example, it relies on point-in-time, 'touch pad' technology requiring manual readings to determine consumption. It does not provide real-time information to either system operators or customers that facilitates a review of trends, system performance or options for changes that reduce either consumption or costs. The resolution of the consumption data generated using touch pad technology also limits the range of business processes and customer friendly options.

A contemporary water service provides real-time information to both system operators and customers about performance, consumption levels and trends. Such information informs choices about consumption, distribution and production that maximize the efficiency of the whole system and creates the potential for reduced costs.

In 2017 the Water/Wastewater Services Division procured Diameter Consulting through a Request for Proposal process to review the City's current inventory of water meters, analyze current meter reading and billing processes and identify opportunities for improvements in functionality and efficiencies through validation of associated costs and benefits that new technology offers. The analysis showed significant benefits available from investing in new water meter reading and billing technology.

In April, 2018 Council directed that City of Greater Sudbury staff to take the next steps required to implement a fixed base Automated Meter Reading ("AMR")/Automated Meter Infrastructure ("AMI") system for the City of Greater Sudbury as outlined in the report entitled "Automated Water Meter Reading Feasibility Study"

(See: <https://agendasonline.greatersudbury.ca/index.cfm?pg=feed&action=file&agenda=report&itemid=1&id=1271>) including the following steps:

- a) Issuing a Request for Proposals to select an implementation partner that will supply hardware, software and related expertise to establish an AMR/AMI solution;
- b) Establishing a municipally-owned Meter Data Management Software system; and
- c) Creating an on-line customer service portal to permit real-time access to personal consumption data, initiated or manage service requests and other features as may be determined following a review of the submitted proposals;

The report also directed staff to report to the Finance and Administration Committee with recommendations before the end of Q2, 2019 regarding a detailed implementation plan including:

- a) A financing plan covering estimated capital costs, operating costs;
- b) Changes in customer service levels and processes to achieve the expected benefits;
- c) Changes in terms with Greater Sudbury Utilities to address process changes related to water billing and customer service;
- d) Communication strategies for informing customers about pending changes; and
- e) An implementation schedule.

Currently, staff replaces 1,000 meters annually. Without undertaking the work recommended in this report, it would take more than 20 years to replace just the (more than) 20,000 meters that require immediate replacement. Essentially, this is unsustainable. The meters that are currently 10 to 15 years old would require replacement before staff completed the replacement of the meters that are already at the end of their useful life, so the water system would never have a meter fleet with an appropriate average age. Water meters become less accurate as they age, so the current replacement rate would never produce the expected system benefits that staff know can be realized.

ANALYSIS

Water meter reading and billing platforms based on available smart meter technology such as Automated Meter Reading (AMR), Advance Metering Infrastructure (AMI), Advanced Metering Analytics (AMA) are now widely used in communities across Canada including, but not limited to, North Bay, Sault Ste Marie, Orillia and Barrie.

To determine the costs and benefits of a project of this nature the City prepared four key RFP's that would evaluate/assist in evaluating the technical and financial merits of current market technologies. It enlisted the services of a Fairness Monitor to oversee the work. The following RFP's were issued as a part of this procurement phase:

- a) Issued a Request for Proposal to select a Fairness Monitor (ISD18-209)
- b) Issued a Request for Proposals to select a water meter supplier (ISD19-18)
- c) Issued a Request for Proposals to select an AMI and implementation partner (ISD19-2) which includes a Customer Portal that allows Customers to view and establish consumption alerts.
- d) Issued a Request for Proposal for Project Management Services for a City-Wide Water Meter and Advanced Metering Infrastructure (AMI) System and Installation Project (ISD19-3) for assistance in the management of AMI Program to ensure project scope, budget, schedule and quality are delivered accordingly.

As per Council's direction, staff have engaged GSU regarding a renewed service provider agreement to maximize the use of the information the AMI system will provide.

Project Scope

The project includes:

- the implementation of a City-wide Advanced Metering Infrastructure (AMI) system that includes the installation of water meters, the supply and installation of sufficient radio frequency transmitters on all residential and commercial accounts across the whole city
- Software and hardware to facilitate analytical review of both production and consumption data by both customers and water operators

- Asset renewal that will improve water meter accuracy, reduce inefficiencies related to the process of reading water meters enhance service to the City's customer base across the entire water system

The project will produce the following outcomes:

- a) Enhanced Customer Service through:
 - i. The elimination of estimated water bills, (approximately 300,000 per year),
 - ii. The introduction of a monthly billing cycle based on actual reads;
 - iii. Implementation of a Customer Portal that will provide water Customers the ability to view their consumption and better understand/manage their water use behavior;
 - iv. Ability to provide updated information to residents with frozen water issues through low water flow alarm on residences that have historical water issues; and
 - v. Allow customer to setup continuous and High-water consumption alerts and leak detection providing them an opportunity to avoid high water bills (\$1,080 / year) billing inquiries through GSU, and approximately 43 requests for bill adjustments in the last 18 months.
 - vi. Straightforward and timely move-in/move-out services to ensure billing accuracy
- b) Create operational efficiencies and operating savings of approximately \$684,000 by:
 - i. Eliminating costs associated with manual water meter reading
 - ii. Reducing meter reading exceptions & and increased reliability,
 - iii. Expediting same day special reads, and providing for same day final reads useful for closing on a sale of a property;
 - iv. Minimizing the high / low meter read field visits; and
 - v. Detecting Backflow events offering a measure of protection to the drinking water distribution system.
- c) Improved Accuracy and Completeness
 - i. Detecting water meter damage, water meter wiring damage and water meter register damage, by reporting zero consumption in a timely manner; and
 - ii. Increasing water meter accuracy and meter reading reliability.
 - iii. Improving financial reporting.
- d) Strengthened Distribution Management
 - i. Better understand water loss across the systems
 - ii. Utilizing district metering, prioritize infrastructure capital upgrades & improvements based on system water loss
 - iii. Improve consumption recognition for system-wide financial reporting
- e) Societal Benefits
 - i. Reduce energy costs through reduction of water production
 - ii. Supports water conservation initiatives.

Fairness Monitor Comments

P1 Consulting Inc ("P1") was hired to provide professional fairness monitoring services to ensure that the procurement of the City Wide Water Meter AMI System and Installation Project is conducted in accordance with the procedures for fairness and objectivity established in the competitive procurement documents.

P1 acted as the Fairness Advisor to review and monitor the communications, evaluations and decision-making processes that were associated with the City of Sudbury's AMI's proposals.

In P1's written opinion, the City has followed the principles of fairness, openness and transparency. Further, it maintained these principles throughout the procurement process. P1 noted that no issues emerged during the process, of which they were aware, that would impair the fairness of this initiative. Appendix A provides two letters from P1 describing its findings, which was provided in contemplation of the conclusion of the procurement process. At the conclusion of the procurement process, P1 will provide a full, final report.

Comparison of Expected and Actual Bid Results

Actual bid costs are in line with expected amounts, as the following table shows:

Component	Contract Reference	Feasibility Study Budget	Actual Bid Result	Comments
Water Meter Supply	ISD19-18 Pending Award	\$3,694,848	\$4,053,694.05	This difference in cost is associated with the inflation for tariff costs and staff are satisfied that this is a satisfactory procurement
Installation AMI System	ISD19-2 Pending Award	Installation \$4,696,167 AMI: \$5,224,593 Total: \$9,920,760	Installation \$4,678,021.08 AMI: \$5,525,899.32 Total: \$10,203,920.40	The actual bid is within 3% of the projected amount in the Feasibility Study
Consulting	ISD19-3 Pending Award	\$ 785,000	\$ 1,155,878.57	Staff requested a change in scope to include in-depth inspection services that was addressed in the actual bid result but not included in the Feasibility Study
Project Support	None	\$759,273	\$395,273.00	This reflects a change in scope to remove inspections services from internal staff and included in the actual bid result

Component	Contract Reference	Feasibility Study Budget	Actual Bid Result	Comments
Non-Refundable HST	None	\$ 275,087	\$277,586.46	
Inflation	None	\$280,000	\$0.00	Pricing is fixed for the term of contract
Encoder Register Supply (increased scope)	ISD19-18 Pending Award	\$ 425,000	\$358,465.00	Bid was 15.65% under the estimate on realization that this portion was excluded from the Feasibility Study
Contingency	None	\$ 744,704	\$ 744,704	
Total (Revised)		\$16,884,672	\$17,189,521.48	Within 1.8% of original estimate given to Council..

Net Present Value Calculations

The feasibility study also estimated ongoing operating costs for the AMI system's projected 20-year life that were incorporated into the financial evaluation of RFP ISD19-2. The table below compares the expected annual costs estimated in the feasibility study and the actual costs proposed by KTI Limited.

Component	Contract Reference	Feasibility Study Budget	Actual Bid Cost	Comments
Annual Costs	ISD19-2 Pending Award	\$260,803 / year	\$152,806.28	Actual was 41.4% less than estimated.

As part of the net present value calculation the recommended proposal allowed for the first 15 years of warranty to be covered at 100%, and the remaining years pro-rated based on the product price of the AMI radio transmitter.

The table below shows Total solution cost inclusive Life Cycle and Supplied Equipment costs.

ISD19-2 RFP for a City-Wide Water Meter and AMI Install Project	
Component	Extended
Total Initial Capital Costs	\$ 10,062,725.40
Total Life Cycle Cost	\$ 2,408,209.10

Total Supplied Equipment	\$ 141,195.00
Total Solution Cost	\$ 12,208,616.00
HST	\$ 1,587,120.08
Total Solution Cost (After HST)	\$ 13,795,736.08

CONCLUSION

Based on actual bid results, the benefits anticipated and described in the feasibility study will be realized at costs that are in line with expected levels. As this report describes, the benefits address several elements of Council's strategic priorities and represent a transformational improvement in the City's water and wastewater services. Both residential and commercial customers will realize benefits from this project.

The City is currently utilizing water meters that have reached their useful life expectancy and should be replaced at an estimated cost of \$10.2 M. The net increase in capital costs to obtain an automated water meter system is \$ 7 M, thanks in part to the opportunity to take advantage of existing investments in GSU's existing infrastructure. The project has a payback of 10.2 years, so over the expected asset life, the benefits of this project exceed financial costs by a significant amount and are also greater than simply maintaining the status quo.

Next Steps

Subject to Council's approval of the recommendations in this report, contracts will be executed with successful vendors. A revised service agreement with GSU will be negotiated and presented to Council for approval. A comprehensive communications plan will be implemented and managed throughout the project. Collaboration will occur with GSU and the successful vendors to begin the project, starting with a "proof of concept". This phase will assess and confirm specific project steps and inform plans to fully implement the AMI network, meter replacement and AMI radio transmitters across the remaining 48,000 water customers. The new infrastructure will be fully implemented and operational by March 2022.