

MEMO

Date: 30 May 2018

To: Keith MacDonald, CAO

CC: Tanya Tibbo, Director of Finance

From: Gerry Isenor, P.Eng.
Blaine Rooney, CPA/CA

Re: Inverness Water Utility Review Report

1. Introduction

The Municipality of the County of Inverness County owns and operates the Inverness County Water Utility which provides potable water and fire protection to approximately 1,450 customers. The Utility consists of independent systems in Port Hastings, Judique, Port Hood, Mabou, Inverness, Cheticamp, and Whycocomagh.

- The Community of Inverness has had a central water system since the early 1900's to serve the former coal mining town. The central water system is supplied by two (2) water production wells — Production Well No.1 established in 1973 and Production Well No.2 established in 2001. The water is treated for iron and manganese removal and then chlorinated before distribution.
- The Community of Judique has a central water system that is supplied by a surface water source that is fed by runoff from the River Denys Mountains. The surface water source consists of a dammed containment area and an intake. The water treatment train consists of chemical coagulation, clarification by Dissolved Air Flotation (DAF) and sand filtration. The treated water flows through a chlorine contact chamber before distribution.
- The Mabou water supply has a production well which pumps through a treatment system into a storage reservoir. Treatment consists of chlorine injection as well as an in-line UV disinfection unit which follows a series of 3 pressure filters.
- The central water system for the Community of Port Hood is supplied by two (2) water production wells — Production Well No.1 and Production Well No.2. Water is treated using a Greensand water treatment system which is manually operated

and discharges directly to the distribution system. The water is chlorinated before distribution.
- The Port Hastings system purchases treated water from the Town of Port Hawkesbury Water Utility. There is a water storage tower in the community which provides system operating volume, firefighting storage and emergency water storage.
- The Whycocomagh water system is supplied by a pair of production wells. The water is treated with chlorine before distribution to customers. The water, upon leaving the

treatment/chlorination building enters a 200,000 Imp gal water storage tower where chlorine contact time is provided.

- The Cheticamp water system is comprised of a wellfield and distribution system. Groundwater wells supply water to a chlorination and monitoring building where the water is disinfected.

2. Water Meter Status and Needs

Based on the information used in the recent water rate study the Utility has approximately 1,065 metered customers with the balance (385) being unmetered. The meter count by size is as follows:

Currently there is no centralized inventory of the meter type, age, and date of installation. Discussions with staff indicated that there are a significant number of non-registering meters and they feel there is a need to install at least 600 meters immediately to replace the malfunctioning meters and the unmetered customers. The non-registering meters are causing significant billing issues for these customers and excessive staff time to determine bills. Given the information available this report has been prepared based on assessing all the meters and replacing all of the meters that are of an age where the meter heads can be changed to allow for electronic reading. This should include the 3" and 4" meters which should be assessed by the manufacturer and calibrated for accuracy or replaced as required.

The objective of having meters in the system is to obtain accurate and timely individual customer meter readings indicating water consumption in a form and format suitable for calculating water bills as well as providing accurate consumption information for water loss control.

Meter Readout - There are a number of levels of sophistication available for this:

- **Direct Reading** – Meters can be read directly from a dial on the top of the meter. At one time this was the only way to read meters. In Canada, winter freezing conditions require that meters be installed inside a premise. This method is no longer practical due to limited indoor meter accessibility by meter readers. It is no longer considered practical to count on meter readers routinely being able to carry out direct reads off residential meters. Some form of remote reading device is essential for residential customers if regular actual meter readings are to be obtained.
- **Outside Remote** - This involves running wires from the meter to an outside wall, drilling a hole in the wall and mounting a meter readout device (or "puck") on the outside wall. Meter readers must attend each property in order to obtain meter readings directly from the puck.
- **Radio Frequency (RF)** – The meter transmits readings using radio frequency technology. The transmitter can be integrated with the meter or wall mounted beside the meter. The wall mounted option opens the supply of the equipment to second party vendors. This method allows readings to be taken remotely without having to enter private property. In all cases the receivers' record transmitted meter readings and their associated location identifiers. There are three methods of gathering of the meter readings:

- **RF Walk By** – Meter readers walk down the street gathering readings;
- **RF Mobile Drive By** – The receiver is mounted in a vehicle which follows a route. It interrogates meters as it goes; and,
- **RF Fixed Network** – Fixed networks can canvas meters over a wider area and receive readings on an ongoing basis. This method has the advantage of being able to receive spot readings (example final readings when a home is sold) and to monitor usage patterns (such as for leakage studies) but is more complex and costly to install.

The RF technology offers enhanced ability for leak detection, tamper detection and backflow.

As the list progresses above, the methods are:

- increasingly more expensive to install;
- are cheaper to read; and,
- are more information granular (can obtain more information detail).

The American Water Works Association (AWWA) also has standards relating to meter reading technology. For example, AWWA C707-10 provides standards for encoder-type remote registration systems.

Although the touch read system of outside readers is described above, it is no longer commonly installed in new systems. It is more cumbersome to read and is vulnerable to inaccessibility, particularly in the winter. For Inverness County it is felt that RF Mobile drive-by technology would likely offer the best solution. This is generally accepted as the preferred approach for smaller geographic spaced utilities and is the approach recommended in this report.

The retail water meters used by United States and Canadian water utilities are virtually all (if not all) of American manufacture. There are six American manufactures which sell the majority of residential and commercial water meters in the US including Sensus, Neptune, Hersey, Badger, Master Meter and Elster/Kent.

The Canadian market is not so diverse. Neptune is the dominant supplier, providing meters in Canada since at least 1920. Sensus meters are also installed in many Canadian municipalities but the company does not appear to have a significant presence in the local market. Meters of other manufacture are potentially available as well through distributors though their use is not widespread.

The installation can be handled by either Municipal retained contractors or by contractors hired by the supplier. Given the normal demands on Municipal staff, it is recommended supplier retained contractors be used for the installation and meter change-out with support from the local utility. Most of municipalities that the study team is aware of have used supplier retained contractors. If the decision to proceed with metering is made it should start with the requirement that all new construction be metered. Details of the residential customer's installation will depend on the meter installation locations available as many unmetered and some metered properties requiring change-out may have fully finished basements while others may be unfinished. All new meters must be installed in an area not subject to freezing.

The Municipality of the County of Antigonish and the Municipality of the County of Cumberland have recently or are in the process of installing meters in their utilities. In the case of The County of Antigonish, the average cost for the installation of a 5/8" meter, when the meter location was accessible, was \$350 (plus hst) per location. Areas requiring some modifications to walls and plumbing were extra. In the case of Cumberland, the average cost for the installation of a 5/8" meter, when the meter location was accessible, was \$375 per location. Areas requiring some modifications to plumbing and walls were extra. All meters installed were new installs as neither Antigonish nor Cumberland had meters in their systems. For the purposes of this report we have prepared preliminary budgets based on the following average cost per meter.

Since no detailed inventory of the condition of the existing meters is available the following estimated cost is based on the anecdotal information provided by staff. The estimated cost table is based on the following assumptions:

- installing 300 new 5/8" meters in currently unmetered locations;
- changing-out 984 - 5/8" meters with new meters;
- upgrading 100 existing 5/8" meters with new RF heads Z(assumes the meter is up to date and accurate);
- changing-out 5 - 3/4" meters with new meters;
- changing-out 21 - 1" meters with new meters;
- changing-out 17 – 1.5" meters with new meters;
- changing-out 22 - 2" meters with new meters; and,
- Calibrating and upgrading the remaining 3" and 4" meters and replacing the head with an RF reader.

The tender document used by the Municipality of Antigonish County and the Municipality of Cumberland County have been provided under separate cover to the Municipality.

The estimated cost of installing and upgrading the water meters in the Municipality follows:

Meter Size	Estimated No. of Meters	Estimated Cost per meter	Total
5/8" -- New Install	300	\$450	\$135,000
5/8" - Change-out	984	\$350	\$344,400
5/8" - Upgrade	100	\$225	\$22,500
3/4" - Change-out	5	\$400	\$2,000
1" - Cahnge out	21	\$450	\$9,450
1.5" - Change-out	17	\$600	\$10,200
2" - Change-out	22	\$800	\$17,600
3" - Rehab/upgrade	3	\$1,500	\$4,500
4" - Rehab/upgrade	1	\$1,500	\$1,500
Meter Reading System	1	\$20,000	\$20,000
		Sub-total	\$567,150
		10% Contingency	\$56,715
		HST	\$93,580
		TOTAL	\$660,730

It is recognized that this is a significant expenditure and that it could impact customer rates. However, the benefits far outweigh the costs as the installation/change-out of the meters. The upgraded meters will allow the Water Utility to fairly charge all customers for the service they are receiving, generate and deliver bills in a timely manner, reduce the time spent by staff obtaining readings and generating estimated bills, and give

Public Works a key component in initiating a water loss control program that being accurate and timely water consumption.

During discussions with staff it was identified that a planned on \$600,000 expenditure on a well exploration program in Port Hastings in the current year (2018/19) was being reconsidered. For the purposes of this report the study team has deleted the above Port Hastings expenditure and replaced it with a \$700,000 expenditure on meters. The team has included a \$200,000 contribution (Gas Tax, CWWF, ??) in the expenditure and taken the balance from the depreciation fund for the calculation. The impact of installing meters, with above assumptions, is minimal and will result in an increase in residential rates of approximately \$1.50 to \$2.00 per customer per quarterly bill.

If the Municipality were to proceed with the metering and meter change-out program it should consider starting with the community of Inverness as it is the study teams' understanding that there may be an impending shortage of water in this community this year. Accurate meter readings will assist the public works department in the identification of unaccounted for water in the system by giving accurate readings of what customers are using compared to the water produced at the water treatment plant. As well accurate timely meter readings will allow customers to more quickly identify leaks (faulty toilet flush mechanism, dripping faucets) and make repairs.

However, each system should be included so to bring all system meters into current technology and accuracy.

3. Billing System and Processes

Based on discussions with staff it appears that the biggest obstacle to timely and accurate billing is the lack of timely and accurate meter reading data. If the Municipality proceeds with the recommended meter installation/change-out program identified in Section 2 above this obstacle should be addressed providing timely and accurate billing, improved cash flow and more efficient use of staff

The use of drive by RF meters should allow all meters in the Municipality to be read in one or two days. If this is done at the end of each quarter as a priority item the data from the reads can be inputted for all customers into the billing and accounting program used by the Municipality. This will result in timely and accurate bills prepared and issued without delays. It is recommended that the vendors of both the meters and the accounting software be made aware of the software being used to ensure the two systems communicate without issues. Best practice would be that Utility should read all meters within the first calendar week of the end of the quarterly billing cycle.

4. Collection Process

It is our understanding that the Municipality is working to prepare a comprehensive collection policy. There is a need for timely collections of accounts for the Utility to operate efficiently.

During discussions with staff it was identified that many water accounts are not current with multiple bills outstanding. During the recent rate study process the team prepared and shared a paper “Components of a Good Collection Policy” with Staff. A copy of that is attached to this memo. The Utility has in its NSUARB approved rules and regulations the authority to enforce collection of its accounts within reasonable time limits or suspend service. The rules and regulations provide for the following for timely collection of accounts:

- 1) 1.5% interest per month on water bills outstanding after 30 days from the date issued; and,
- 2) The ability to suspend service to customers whose account is not paid within 40 days after the date issued,

The ability to suspend service is the most effective way a Utility has to enforce collection of a water account. The collection policy should be applied uniformly and consistently to all customers. It should be approved by and supported by Council in their role as the Board of Directors of the Utility.

When a policy is initiated all new bills issued must be paid under terms of the policy or face suspension of service and outstanding bills brought up to date. If there are historic balances with some accounts, that may be large enough that immediate payment in full is likely not achievable, then a payment arrangement should be made with the customer. Such an arrangement usually means that the current bill is paid within the due date and a portion of the arrears is also retired so that the arrears are paid within a reasonable time depending on the amount. During this time the interest provision should apply. If at any time the terms of the arrangement are not kept then service must be suspended. It is recommended that the terms of any payment arrangement be confirmed in writing to avoid any misunderstanding.

The implementation of this change will likely require additional staff resources both from an administrative perspective to manage the policy and an operational perspective to perform the suspension of service and manage any non-functioning curb stops at least in the short term until customers become used to it and the outstanding amounts are retired.

5. Operational Practices and Procedures

Every Water Utility requires documented practices and procedures to ensure works are completed to the level required on a timely basis to ensure a safe and reliable system.

To ensure the Municipality/Utility has up to date and comprehensive procedures and practices in place it is recommended that they utilize the resources and lessons learned by other Municipalities/Utilities in the Province to assemble a comprehensive set of documents for Municipal use. These procedures should address safety, preventive maintenance and operations. One possible avenue to achieve this would be to gather documented procedures from other Municipalities/Utilities in the Province and then select the ones that best meet the needs of the Inverness County Water Utility. Two readily accessible sources that can be accessed immediately involve requesting information from the municipal list servers. The Association of Municipal Administrators (AMA) has one of these list servers which could be accessed by the CAO. The Municipal Public Works Association of Nova Scotia (MPWANS) also has a list server that can be accessed by the Director of Public Works. By utilizing these sources the Municipality/Utility could gather procedures and practices from others and then customize them to meet the needs of Inverness County. If this route is selected there will need to be a “Utility Champion” assigned to ensure the documents are gathered and customized in a timely manner. Once done the new procedures/practices need to be adopted by the Utility and implemented as soon as possible.

As an alternative, the study team contacted Halifax Water who have a comprehensive set of procedures for all aspects of both water and wastewater operations including small systems that include safe work practices to determine if they could provide those and work with the Municipality to customize them for use in the Inverness County Water Utility. Halifax Water has indicated they would be willing to discuss doing this on a “fee for service” basis. They noted that the fee charged would be directly related to the time required by their staff and could involve a review of practices and procedures if the utility was interested.

Once the Municipality/Utility has a comprehensive documented set of Procedures and Practices in place they should set up a time schedule for regular audits to ensure they are being followed and for reviews to ensure they stay current.

6. Staffing Requirements and Inter-Municipal Staff Sharing

It is recommended that the Municipality undertake a review of staffing assigned to the water utility to ensure they have adequate resources and to allow for succession planning. This should be done as a priority to ensure the long term needs of the operating systems are met without the need for excessive overtime and ultimately “staff burnout”. The Utility should transition to operating in an effective and efficient manner in accordance with the documented processes and procedures and move to being proactive from reactive.

Inverness County borders Victoria County, Richmond County, and the Town of Port Hawkesbury, all of which operate water and wastewater systems. It is recommended that the Municipality approach their neighbouring units to see if there is a possibility to share resources, provide better resources and save everyone some costs. The

following areas have been identified as a starting point for these discussions. It is anticipated others will be identified once discussions get underway.

- Water System Leak Detection – the units may be able to share the cost of training one operator in leak detection and purchasing the required equipment for undertaking leak detection surveys. Once trained the units could then share the cost of having this individual undertake regular leak monitoring and surveys to ensure non-revenue water is kept to a minimum.
- Staff Sharing – the need for both water and wastewater treatment plant operators is a significant cost on smaller municipal units at any time but it becomes even more of an issue when trying to schedule vacations. It is recommended that the Municipality hold discussions with the adjoining units to see there is a way to share trained operators for short term scheduled needs such as vacations
- Repair Parts Inventory Sharing – The Municipal units should look into sharing repairs parts such that each unit could reduce their inventory of parts. It is recognized that some parts for treatment plants and pump stations are unique to each unit, however, some parts such as water valves, repair joints and hydrants are relatively common and are interchangeable.
- ODRC Services – Nova Scotia Environment requires that each treatment facility to have a designated “Overall Direct Responsible Charge” ODRC operator available at all times. This classification requires advanced level of training. While it may be possible for Inverness to have someone trained at this level there is always a need for someone to be available for vacations and extended periods of absenteeism due to illness. The sharing of these designated ODRC Operators may be an opportunity for each of the Municipal units to meet this need in the short term as the need arises.

7. Communications Strategy/Plan

With the operation of any public service there is a need for a documented communication strategy/plan. Such a plan would lay out the steps to be taken to inform the public any interruption/change in service as well as significant projects such as the meter installation and upgrade program and other capital initiatives. Such a plan will assist in community engagement before there is an occurrence such as a service disruption and this should assist in garnering community support and understanding in times of need. Some resources that might be used include bill inserts, radio, community TV, websites, and social media.

It is suggested that, at a minimum, the list serve services noted above in Section 5 be contacted to gather what other units have in place. Halifax Water has a designated communication program with a staffed professional and may also be of some assistance

As an alternative, the Municipality should consider retaining an individual or firm experienced in the communications field to assist in the development of a comprehensive plan for the municipality/utility.

8. Water and Wastewater Condition Assessments

Discussions with staff indicated that both the water and wastewater systems should have an up to date assessment of the collection and pumping systems, process equipment and overall condition. The source of Supply should be included in the water treatment plant condition assessment review. These surveys should be carried out in a comprehensive manner to clearly identify and document the current systems and their overall condition and to identify deficiencies. The reports should provide cost estimates for any identified deficiencies and should rank the work from needed immediately, needed within 2 years, and needed within 5 years. The report should form the framework for a five year capital plan for each treatment plant.

It is understood that the Municipality has applied for PCAP money and intends to undertake these surveys as soon as there is a response to their request for funding.

9. Water Utility Staffing

The water utility is providing water to some 1,450 customers and has a total operating budget including depreciation and debt servicing of over \$950,000 per year. The system includes the operation of 7 independent water treatment and distribution systems.

Given the size and nature of the operation, the Municipality should review its staffing allocations with the aim of dedicating staff full time to the Water Utility. In making this recommendation it is recognized that some of the assigned staff may have to be “loaned” to other works in times of unique need such as a significant failure in one or more of the other municipal operations. At the same time it is anticipated that staff from Public Works will be temporarily “loaned” to the water utility if an emergency situation arose.

The assigned staff should be trained for work in the water distribution and treatment field and involved in the communications planning for the water utility such that they can better address concerns in the field.

10. Summary

In summary, the review of the water utility concluded that:

- a) Meters should be installed for all unmetered customers;
- b) Meters for the existing customers should be reviewed and either converted to radio frequency read units or replaced with new meters if conversion is not possible or if the meter is more than 10 years old;
- c) Larger diameter meters should be calibrated and upgraded to radio frequency read or replaced with new radio frequency read units;
- d) The metering program should concentrate on the community of Inverness as a priority to assist in reducing usage and leakage given the limitations on the existing supply system;

- e) The meter upgrade program can be accomplished within the existing rate structure if the Port Hastings well drilling program is not undertaken;
- f) Billing system requires timely and accurate consumption data to issue accurate bills on time;
- g) Meter reading should be done by drive-by reads once the new meters are installed and should be completed within one week of the end of the quarterly billing cycle;
- h) A collection policy should be developed and documented and adopted by the Utility;
- i) The Utility should develop and adopt a comprehensive set of Practices and Procedures for the operation of all aspects of the water system;
- j) Practices and procedures can be acquired from other operating utilities in the Province and adapted for use in Inverness County by an in-house staff champion or they can be acquired from Halifax Water who can be retained to assist in the necessary training and modifications to meet the needs of Inverness County;
- k) Inverness County should open dialogue with adjoining Municipal Units to investigate the potential to share more services to the benefit of all units.
- l) Inverness County should develop (either on its own or with outside assistance) and adopt a communications Strategy/Plan to assist it and the residents when emergency situations occur as well as other public related utility matters;
- m) Inverness County should undertake a water and wastewater systems condition assessment for all facilities. The assessment should look at treatment as well as infrastructure in the streets for both water and wastewater systems;
- n) The Condition assessment review should provide capital cost estimates for all works required in the next five years by year; and,
- o) Staffing assignment should be reviewed in the Municipality with required full time staff assigned to the Water Utility and procedures and costing for other staff needs from the Municipality as required.

Appendix A

Components of a Good Collection Policy

A collection policy that is followed is important to a utility to maintain cash flow, protect the revenue stream and avoid letting customer accounts get too much in arrears.

Water bills are usually issued quarterly for domestic customers and either quarterly or monthly for industrial, commercial or institutional customers. A quarterly billing for metered customers is for service that delivered for the previous three months.

The Schedule of Rates and Rules and Regulations usually support good collection procedures for the Utility.

In Schedule A of the Rules and Regulations that are approved by the Nova Scotia Utility and Review Board (NSUARB) it states that the rates apply for water and water service when payment is made within 30 days from the date rendered as shown on the bill. When payment is made after 30 days from the date rendered as shown on the bill, the rates include interest charges of 1.5% per month or part thereof.

Schedule D of the Rules and Regulations include two clauses related to collection.

In the Municipality of Inverness case its clause 5 and clause 9

Clause 5, Payment of Bills:

Bills shall be rendered to each customer at intervals of approximately three months and are due and payable when rendered. Bills not paid within 30 days of the date rendered, shall incur an interest charge at the prescribed monthly rate or part thereof.

Clause 9, Suspension of Service for Non Payment of Bills:

The utility shall have the right to enter onto customers premises within reasonable hours to suspend service to customers whose bills remain unpaid for more than 40 calendar days after the date rendered.

The Utility has the approval to charge interest at a rate of 1.5% per month on accounts 30 days after the bills are issued and suspend service if the account is not paid within 40 days.

The components of a good collection policy would include:

- 1) Interest should be applied and collection enforced for each account that is in arrears as this itself will promote the payment of bills on a timely basis.
- 2) A single combined reminder and final mail notice could be system generated and sent or delivered to accounts after the 30 day due date with an effective service suspension date perhaps a week or 10 days allowing for mail turnaround. If the system cannot generate a final mail notice then a phone call to the customer indicating the same information can be done or a door tag could be delivered to the customer with a suspension date indicated.
- 3) It is important to follow-up the notice with the service suspension if the bill remains unpaid past the suspension date. This could be reinforced by a phone call prior to the suspension at least for the first suspension but also indicate that this is a onetime courtesy call and further suspensions will be made according to the notice. It is very important to follow up the notice with the service suspension if the account is not paid. There may be upset customers the first time but it is likely that they will pay the bills before suspension if they know the Utility will suspend service.
- 4) Payment arrangements can be considered if there is a large outstanding balance when a collection policy is implemented. A reasonable arrangement would be to get as large a down payment as you can on the balance which at a minimum should be 10% with the current bill paid on time each quarter with another installment on the arrears so that it is cleared up in a year (4 billings) or 2 years for larger balances. Once these arrangements are made they should be confirmed by email or letter and the enforced. If a current bill or arrears payment is missed then suspension is enforced.

- 5) Schedule A includes a \$60 charge for re-establishing service if service has been suspended for violating the rules and regulations and this would include non-payment of bills. This also should be charged as it costs to suspend service and if the cost causer does not pay then all other customers will.
- 6) If the arrears are for a customer that has moved and is no longer a customer of the Utility then a collection agency may be helpful in securing any unpaid balance.
- 7) The Utility may be able to transfer the balance to the municipality and have the municipality place a lien of the property for the balance but this could be costly and may require a bylaw.

By far the best method is to enforce collection of Utility accounts is the suspension of service