

STAFF REPORT: ENGINEERING AND PUBLIC WORKS DEPARTMENT

REPORT TO: Infrastructure and Recreation
 Committee
MEETING DATE: November 13, 2012
REPORT NO.: EPW.12.083
SUBJECT: Non-Revenue Water Reporting
PREPARED BY: John Caswell, Manager of Water &
 Wastewater Services/Asst. Director

A. Recommendations

THAT Council receive Staff Report EPW.12.083 entitled 'Non-Revenue Water Reporting' for their information.

B. BackgroundIntroduction

Recently Staff presented a verbal report to Committee on June 12th, 2012 Council indicating that a significant percentage of water was unaccounted for. It was decided that Staff would further prepare a report updating the findings related to 'non-revenue water' (water loss) in the Town.

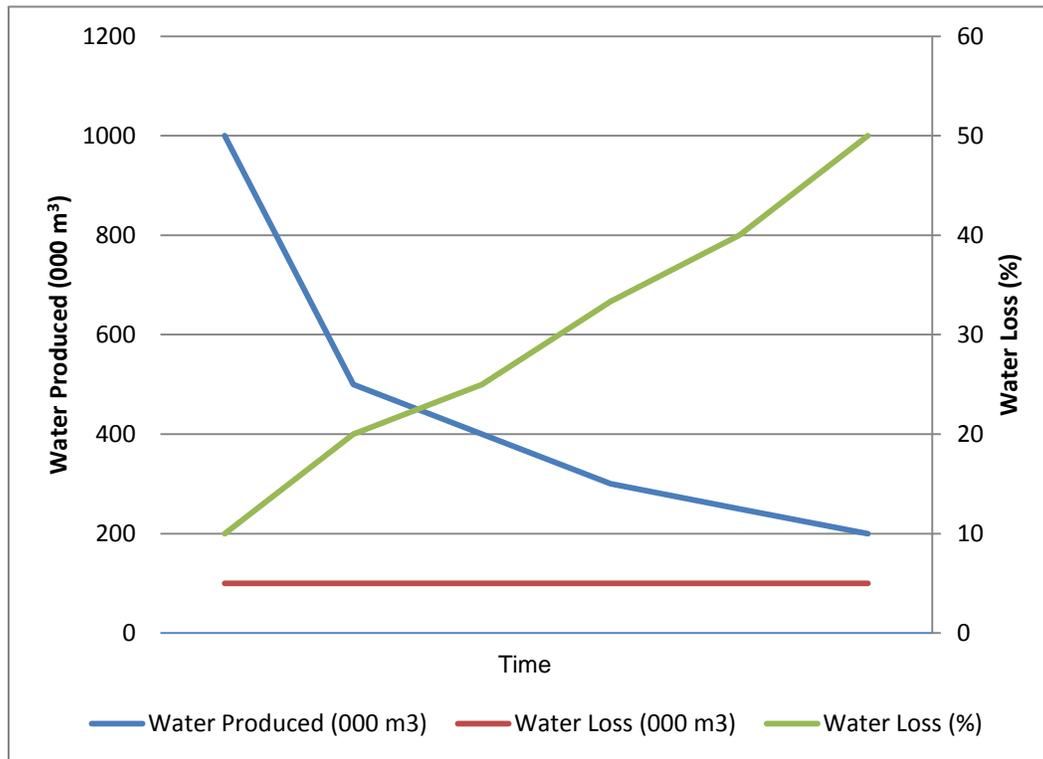
There are many factors such as financial constraints, infrastructure condition and technology limitations that influence the Town's ability to manage non-revenue water. Currently, Staff determines this amount by completing an extensive review of system components, including water lost during watermain breaks, hydrant flushing and watermain leaks. Staff is committed to continually improving the current practice of determining non-revenue water in order to achieve higher efficiency which, in turn, provides better service to the ratepayers by accounting for what is produced.

Non-Revenue Water

The American Water Works Association (AWWA) has recommended against the terms 'unaccounted-for' and 'unaccounted-for percentage' in favor of 'non-revenue' water which is defined to represent the distributed volume of water that is not reflected in customer billings. Non-revenue water is water that has been produced and is "lost" before it reaches the customer. Such losses may be caused through leaking and burst pipes, illegal connections and metering inaccuracies, for example.

The International Water Association (IWA) method advances the concept that all water should be quantified, via measurement or estimate, as either authorized consumption or losses. Hence, no water is 'unaccounted-for', a term previously employed with a loss/supplied percentage calculation to gauge water loss. The use of percentages as an indicator of water loss within a system has been recognized as misleading as a performance indicator, especially as per unit consumption drops due to conservation and efficiency initiatives.

The graph below illustrates the inverse water loss percentage relationship- as water production decreases, the 'unaccounted-for' percentage increases, even if the actual water loss amount is constant (red line below). This effect is becoming more pronounced as general consumption per person is dropping. The system has the same water loss but is compared against lower consumption thus increasing the calculated percentage of water loss.



Note: these numbers are hypothetical used to illustrate the inverse relationship between water production and 'unaccounted-for' percentage

Water Balance

Water system input volume goes two places: i) authorized consumption or ii) losses. The water balance process is an effective tool available to utilities to quantify consumption and losses that occur in the distribution system and the management processes of the water utility.

The International Water Association (IWA)/ American Water Works Association (AWWA) Water Balance is a standard method recognized by the National Research Council of Canada and the Federation of Canadian Municipalities for undertaking a water balance. The purpose of a water balance is to accurately determine the utility's water consumption and losses, and to provide a clear understanding of where water is being used and in what quantities. Additionally a water balance reveals the amount of water that has not been accounted for as a result of losses such as leakage, theft, accounting errors, etc.

The methodology used for completing an IWA water balance requires more information than a traditional water audit. The water balance summarizes the components and provides accountability, as all of the water placed into a distribution system should, in theory, equal all of the water taken out of the system. Attachment #1 provides some definitions regarding the IWA Water Audit Method. Attachments #2 and #3 are the Town's Water Balance Spreadsheets for 2010 and 2011 respectively.

The IWA and AWWA advocate that the best practice performance measure designed for benchmarking of leakage is the Infrastructure Leakage Index (ILI). The ILI is a ratio of current annual real losses to the unavoidable annual real losses, and measures how well the system is being managed for the control of real losses.

The ILI is considered a highly effective performance measure because it is:

- Based on a calculation that has been tested globally
- Unit- less and based on real water loss
- System specific (takes into account operating pressure, service connection length, pipe condition and meter location)
- A measure that can be compared to an international data set

The chart below indicates the ILI values for the Town as calculated in 2010 and 2011.

YEAR	ILI VALUE
2010	2.62
2011	2.86

While the ILI values in 2010 and 2011 indicate that the Town is within the IWA's 'Good' range, though there is still much work required to be done in order to achieve 'Excellent' status.

Leak Detection Status Update

In September 2011, Council received Report EPW.11.079 regarding the Leak Detection Survey done of the Town's Water Distribution System. Results of the report indicated that there were no recoverable leaks found by the consultants. Staff continues to monitor the water system in the following ways:

- ongoing calibration of water meters
- diligently repairing any leaks brought to the Town's attention
- ongoing monitoring of water consumption that is identified by municipal water bills.

A comprehensive leak detection study could be undertaken in order to gather more information on how the system is functioning and what needs to be improved. This type of study is very expensive, however and is not considered justified at the present time given the amount of losses experienced versus the expected corrective costs.

C. The Blue Mountains' Strategic Plan

The generation of this report furthers the Town's Strategic Goal #2 "Addressing the Town's municipal infrastructure needs" as well as Strategic Goal #3 "Preserving and enhancing natural and environmental features, and cultural heritage of the community".

D. Environmental Impacts

None

E. Financial Impact

None

F. In Consultation With

None

G. Attached

Attachment #1- Additional Information Regarding the International Water Association Water Audit Method

Attachment #2- Water Balance Spreadsheet 2010

Attachment #3- Water Balance Spreadsheet 2011

Respectfully submitted,

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Attachment #1- Definitions Regarding the International Water Association Water Audit Method

The International Water Association (IWA)/ American Water Works Association (AWWA) Water Audit Method is considered effective because it features rational performance indicators that evaluate utilities on system-specific attributes. The table below provides definitions for the performance indicators used to provide a meaningful assessment of water loss standing. The key concept around this method is that all water is quantified as either a form of beneficial consumption or as wasteful loss.

System Input Volume	The annual volume input to the water supply system
Authorized Consumption	The annual volume of metered and /or unmetered water taken by registered customers, the water supplier and others who are authorized to do so
Water Losses	The difference between System Input Volume and Authorized Consumption, consisting of Apparent Losses plus Real Losses
Apparent Losses	Unauthorized Consumption, all types of metering inaccuracies and systematic data handling errors
Real Losses	The annual volumes through all types of leaks, breaks and overflows on mains, service reservoirs and service connections, up to the point of customer metering
Revenue Water	Those components of System Input Volume which are billed and produce revenue
Non-Revenue Water	The difference between System Input Volume and Billed Authorized Consumption

There are four technical performance categories utilized for ILI values by the IWA Water Loss Task Force:

ILI 1 to 2	Excellent	Further loss reduction may be uneconomic unless there are shortages
ILI 2 to 4	Good	Potential for marked improvements, consider pressure management, better active leakage control practices and improved network maintenance
ILI 4 to 8	Poor	Poor leakage record, tolerable only if water is plentiful and cheap, analyze level and nature of leakage and intensify leakage reduction efforts
ILI >8	Very Bad	Very inefficient use of resources; leakage reduction programs imperative and high priority

Water Balance Spreadsheet 2010
Town of The Blue Mountains

AWWA WLCC Free Water Audit Software: <u>Water Balance</u>		Water Audit Report For:		Report Yr:	
Copyright © 2010, American Water Works Association. All Rights Reserved. WAS v4.2		TOWN OF THE BLUE MOUNTAINS		2010	
Own Sources (Adjusted for known errors) 646.900	Water Exported 0.000	Billed Water Exported			Revenue Water 1,069.300
	Water Supplied 1,524.700	Authorized Consumption 1,157.681	Billed Authorized Consumption 1,069.300	Billed Metered Consumption (inc. water exported) 1,059.000	
			Unbilled Authorized Consumption 88.381	Billed Unmetered Consumption 10.300	
		Water Losses 367.019		Apparent Losses 100.812	Unbilled Metered Consumption 64.181
	Unbilled Unmetered Consumption 24.200				
	Unauthorized Consumption 3.812				
	Real Losses 266.207		Customer Metering Inaccuracies 96.000		
			Systematic Data Handling Errors 1.000		
			Leakage on Transmission and/or Distribution Mains Not broken down		
	Water Imported 877.800		Leakage and Overflows at Utility's Storage Tanks Not broken down		
Leakage on Service Connections Not broken down					

Units measured in Megalitres
(thousand cubic metres)

Water Balance Spreadsheet 2011
Town of The Blue Mountains

AWWA WLCC Free Water Audit Software: <u>Water Balance</u>		Water Audit Report For:		Report Yr:	
Copyright © 2010, American Water Works Association. All Rights Reserved.		TOWN OF THE BLUE MOUNTAINS		2011	
		WAS v4.2			
Own Sources (Adjusted for known errors) 609.000	Water Exported 0.000	Billed Water Exported			
	Water Supplied 1,523.000	Authorized Consumption 1,130.784	Billed Authorized Consumption 1,046.400	Billed Metered Consumption (inc. water exported) 1,039.200	Revenue Water 1,046.400
				Billed Unmetered Consumption 7.200	
			Unbilled Authorized Consumption 84.384	Unbilled Metered Consumption 69.595	Non-Revenue Water (NRW) 476.600
		Unbilled Unmetered Consumption 14.789			
	Water Losses 392.216	Apparent Losses 100.808	Unauthorized Consumption 3.808		
			Customer Metering Inaccuracies 96.000		
			Systematic Data Handling Errors 1.000		
	Water Imported 914.000	Real Losses 291.409	Leakage on Transmission and/or Distribution Mains Not broken down		
			Leakage and Overflows at Utility's Storage Tanks Not broken down		
Leakage on Service Connections Not broken down					

Units measured in Megalitres
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