City of Markham

Report of the Auditor General
Water Revenue Audit

Presented to: General Committee of Council, City of Markham

Date: February 21, 2017

AGENDA

- Background
- Objectives
- Approach
- Scope
- Strengths
- Summary of Observations
- Benchmarking
- Acknowledgement

Water Revenue Audit

Background:

- Water revenue is one of the City's largest sources of revenue:
  - Involves several external organizations (City of Toronto, Region of York, PowerStream/Alectra Utilities, Neptune, and Olameter).
- Audit focused on four sub-categories of the water revenue process:
  - System Water Volume Reconciliation;
  - Customer Volume Accuracy;
  - Customer Billing and Metering; and,
  - Arrears Management.

Internal Audit Objectives

The objectives of the audit were to:

1) Evaluate the processes and controls in place over water revenue collection;
2) Assess the accuracy of the calculation of water revenue in comparison to actual invoices; and,
3) Benchmark the City's Infrastructure Leakage Index ("ILI") against other municipalities.

Internal Audit Approach

1. Project Planning Phase

- Define objectives and scope.
- Confirm project duration and schedule.
- Assign team members and develop team structure.
- Describe deliverables.
- Create Audit Planning Memo and distribute to City staff and Council.

2. Project Execution (Information Gathering & Analysis Phase)

- Obtain existing process descriptions and relevant documentation.
- Conduct interviews / discussions.
- Understand current state.
- Evaluate current state.

3. Project Reporting (Improvement Phase)

- Identify improvement opportunities.
- Prepare draft report with observations and recommendations.
- Validate draft report for factual accuracy around observations/evidence.
- Issue final report.

Scope

- The scope of the audit focused on the following:
  - Systems and tools used and procedures followed to monitor, invoice, collect, and account for water revenues, including reconciliations performed;
  - Sources and sets of data regarding water purchases from the Region, water consumed by properties within the City, and potential sources of apparent leakage; and,
  - Data related to the effectiveness of water revenue collections.

Outside of Scope

- The following areas were not within the scope of the audit:
  - Accuracy and completeness of data provided by entities outside of the City;
  - Real water loss (i.e. the potential for lost revenue from physical leakage in the City's water distribution system);
  - The information technology general controls ("ITGC") over databases and systems leveraged for water billing and collection, as they will be the subject of a future audit; and,
  - Arrears management, as this process was previously audited as part of the property tax revenue audit.

Audit Findings – Strengths:

System Volume Reconciliation

The City maintains a meter data lag analysis and calculates an ILI index on an annual basis, evaluates the amount of Non-Revenue Water (“NRW”) on a monthly basis, and has identified further potential improvements through District Metered Areas (“DMA”) and Advanced Meter Infrastructure (“AMI”).

Customer Volume

Metering follows International Water Association (“IWA”) and American Water Works Association (“AWWA”) best practices. A robust customer issue resolution process is followed for water volume disputes between customers and PowerStream/Alectra Utilities.

Strengths Cont'd:

Customer Billing

The City's uniform volumetric water rate inherently mitigates many of the typical risks that utilities face related to rate structure such as applying the wrong rate class to an account.

Continuous Improvement

The City maintains a robust QMS that is in line with leading practices for enabling continuous improvement.

CONCLUSION

Findings Rating Scale

Rating	Rating Description
L = Low	The observation is not critical but should be addressed in the longer term to either improve internal controls or efficiency of the process (i.e. 6 to 12 months).
M = Medium	The observation should be addressed in the short to intermediate term to either improve internal controls or efficiency of the process (i.e. 3 to 6 months).
H = High	The observation should be given immediate attention due to the existence of either a potentially significant internal control weakness or operational improvement opportunity (i.e. 0 to 3 months).

– Overall, 1 **Medium** and 8 **Low** priority observations were identified.

OBSERVATION #1:

Medium

Database Alignment with Alectra Utilities

The City's database has not been updated with the customer account numbers that PowerStream assigned after implementation of their new customer information system ("CIS"). While this does not directly result in a loss of water revenue, account numbers are an essential unique identifier that provides a linkage between the property/water meter and account holder.

Furthermore, the City has been unable to update their internal database with recent meter data from PowerStream, following the implementation of the new CIS; resulting in delays for ILI calculation and Meter Lag Analysis. The City is able to access this data through PowerStream's Customer Care and Billing System; however, this is manual and time consuming.

OBSERVATION #1 CONT'D:

Medium

Auditor General Recommendation
A validation exercise should be performed to ensure that all database tables match Alectra Utilities' tables going forward.
City of Markham Response
Management supports the Auditor General's Recommendation. Waterworks and ITS staff will work with Alectra Utilities to ensure the database tables match. ***Timeline to Implement: Q2 2017.***

OBSERVATION #2:

Low

Automate Extract, Transfer and Load ("ETL") Processes
The current processes for extracting, transferring, and loading data from PowerStream's database to the City's require manual intervention, which can be time consuming and prone to human error.
Auditor General Recommendation
Automating processes for extracting, transferring and loading data (e.g. web services or ETL software), could facilitate the accurate and timely transfer of data.
Management Response
Management supports the Auditor General's Recommendation. Expanding on the City's response to Recommendation # 1, Waterworks will work with ITS staff to develop and submit a business case to Senior Management for consideration to acquire and deploy an ETL software for implementing an automated, timely, and secure data transfer process between Alectra Utilities and the City. ***Timeline to Implement: Q4 2017.***

OBSERVATION #3:

Low

Enhanced Controls around Advanced Metering Infrastructure ("AMI") Roll-Out

The City has been ensuring that all new water meters are compatible with the AMI, which is an infrastructure allowing meters to communicate with one another and the utility's meter database.

The AMI would improve the timeliness and accuracy of meter data, providing quicker identification of stopped meters, and reduce the amount of time required in responding to high water complaints and leak detection.

However, implementing the AMI would introduce inherent risks during the development phase, such as missed or inaccurate meter readings.

OBSERVATION #3 CONT'D:

Low

Auditor General Recommendation

In order to effectively manage the inherent risks associated with the potential AMI rollout:

- A phased approach should be taken by the City in order to assess the functionality of communication infrastructure before proceeding to subsequent phases;
- A user acceptance testing ("UAT") period should be followed where manual readings are used to verify accuracy of data communicated over the AMI;
- Processes should be established and documented for monitoring and resolving zero reads, missed reads, and spikes in consumption, including dashboard reports and alerts;
- Data processing issues and resolutions should be documented and communicated as they occur to facilitate quicker identification and resolution of issues; and,
- Customer education campaigns should be augmented with information about the AMI rollout.

Finally, internal controls should be in place to ensure that there is adequate monitoring over multiple estimated reads and consecutive zero reads.

OBSERVATION #3 CONT'D:

Low

Management Response

Management supports the Auditor General's Recommendation.

City staff will undertake a business case evaluation prior to seeking ELT recommendations on AMI implementation.

Timeline to Implement: Q4 2017.

OBSERVATION #4:

Low

Data Timeliness, Accuracy, and Granularity

The City is evaluating the business case for implementing District Metered Areas ("DMA"), with the objective of improving the geographic granularity of water volume reconciliations to facilitate the proactive identification and mitigation of physical infrastructure water leakage. DMA implementation will, along with improved ETL processes and AMI implementation, provide the City with more timely, accurate, and granular water volume data. ILI calculations and meter lag analysis are currently performed annually.

Observation #4 Cont'd:

Low

Auditor General Recommendation

Implementation of DMA would improve the City's ability to detect and resolve issues causing water volume imbalances. The City should weigh these benefits against the cost of implementation.

Furthermore, DMA in tandem with AMI implementation, would enable the City to perform Infrastructure Loss Index ("ILI") calculations and meter lag analysis on a rolling-twelve month basis.

DMA could also provide certain asset management benefits; however, the extent was not assessed due to this aspect of DMA being outside the scope of the audit.

Utilizing web services or Extract Transfer Load software (Observation #2), and Advanced Meter Infrastructure (Observation #3) to provide dashboard reporting on water volume reconciliation data, ILI trends, date since last meter reading, consecutive zero reads, and other important metrics, would enable more proactive monitoring of water volume.

OBSERVATION #4 CONT'D:

Low

Management Response

Management supports the Auditor General's Recommendation.

City staff will complete a DMA business case for evaluation with Senior Management prior to the 2018 budget process to assess the benefits of using technology to provide enhanced analysis and more accurate and timely water billing (volume) reconciliations.

Timeline to Implement: Q4 2017.

OBSERVATION #5:

Low

Process Documentation

The following processes related to water revenue collection are not documented:

- Monthly financial reporting and purchase and sale reconciliation;
- Meter lag analysis;
- American Water Works Association (“AWWA”) Infrastructure Loss Indext (“ILI”) calculation;
- Information Management Systems (“IMS”), such as extracting data from PowerStream, transferring data to the City, uploading data to the City’s database, and generating reports;
- Adjustments made by PowerStream; and,
- Residential Occupancy Monitoring.

The City has implemented a Quality Management System based on ISO 9001 principles, albeit not officially certified. This provides a structured framework for the City to conduct a consistent evaluation and update of documents governing key controls.

OBSERVATION #5 CONT'D:

Low

Auditor General Recommendation

All processes should be documented to a standard similar to the Drinking Water Quality Management System ("QMS") and in sufficient detail to facilitate staff training and provide guidance over standard operating procedures ("SOP") including swim lanes to outline roles and responsibilities around key tasks.

The documentation should reflect the key controls in place to ensure the effective operation of the process, especially in the event of staff attrition (i.e. departures or absences).

As a best practice, process documentation should be reviewed and updated on a periodic basis (at least annually) by City staff and the executive leadership team, in order to ensure continued accuracy, relevance and completeness of procedures performed by City staff.

OBSERVATION #5 CONT'D:

Low

Management Response

Management supports the Auditor General's Recommendation.

City staff will identify the processes to be documented and follow the same framework currently in place with our QMS.

Timeline to Implement: Q4 2017.

OBSERVATION #6:

Low

Third Party Vendor Risk Management

PowerStream is contracted by the City for meter reading (which is further subcontracted to Olameter), billing, collections, and front-line customer service operations. Since PowerStream remits payments to the City equal to the amount of revenue billed (less adjustments, arrears, and PowerStream's fee), much of the responsibility for billing and collections resides with PowerStream. While the City maintains processes to verify the remittance amount, there remains an inherent risk relating to the accuracy and completeness of information provided to the City by PowerStream.

The Shared Services Agreement ("SSA") between the City and PowerStream/Alectra Utilities) contains a clause allowing the City to establish, incorporate and maintain operating procedures to satisfy the City's requirements for accuracy and auditing. However, the SSA does not provide "right to audit" or "service audit" clauses related to the internal controls at PowerStream/Alectra Utilities.

OBSERVATION #6 CONT'D:

Low

Auditor General Recommendation

To ensure the internal controls at Alectra Utilities are designed and operating effectively with respect to the billing, collection and remittance of water revenue to the City, consideration should be given to including a "right to audit" and/or "service audit" clause in future SSAs that would allow the City to either conduct independent evaluations of the internal controls at Alectra Utilities or require Alectra Utilities to provide the City with an independent audit report (i.e. service audit report) in accordance with the Canadian Standards on Assurance Engagements ("CSAE") 3416.

OBSERVATION #6 CONT'D:

Low

Management Response

Management supports the Auditor General's Recommendation.

Timeline to Implement:

The current contract expires December 31, 2018 with a possible extension for a further two years. Prior to expiry of the current contract, City staff will pursue the inclusion of a "right to audit" and/or "service audit" clause in the future contract.

OBSERVATION #7:

Low

Merger Integration Controls

As of February 1, 2017, PowerStream has merged with two other utilities (Enersource and Horizon) to form Alectra Utilities, which will acquire Hydro One Brampton on February 28, 2017. The merging utilities will be required to utilize one CIS, which could increase the inherent risk for missed or inaccurate bills or data integrity issues around customer information. For example, PowerStream had not been able to provide the City with data for performing their meter lag analysis and ILI Water Index procedures for 2015 as a result of their transition to a new CIS, which demonstrates the heightened inherent risk around not being able to access data in an acceptable format.

OBSERVATION #7 CONT'D:

Low

Auditor General Recommendation

While planning for the transition of the meter reading, billing, and collection function to Alectra Utilities, the City must ensure adequate controls are in place to minimize potential for missed or inaccurate bills or data accessibility and integrity. These could include:

- Importing meter data to the City's database directly from AMI;
- Playing an active role in the planning of the CIS integration to minimize the impact on water billing;
- Meter data web-services for more timely exchange of data between the City and the service provider (see Observation #4);
- Additional monitoring and proactive resolution of meter reading exceptions after the CIS integration; and,
- Regular updates from Alectra Utilities on progress with merger integration activities that impact the City and services rendered.

OBSERVATION #7 CONT'D:

Low

Management Response

Management supports the Auditor General's Recommendation.

City staff will negotiate QA/QC with Alectra Utilities to ensure continuity of current PowerStream and Markham data transfer, meter reading and billing protocol; to request quarterly updates on merger integration; and, to ensure other provisions specified in the Shared Services Agreement between Alectra Utilities and the City of Markham are addressed and handled appropriately.

Timeline to Implement: Q4 2017.

OBSERVATION #8:

Low

Workflow Automation
The City's metering services provider has implemented an electronic work order system. Currently, the communication of meter installations or replacements between the City and PowerStream involves a number of time-consuming manual steps that increase the potential for meter serial number and customer information inaccuracies.
Auditor General Recommendation
Continuing to work with Alectra Utilities on investigating options to leverage Neptune's automated work order system could streamline meter installation and testing processes.
Management Response
Management supports the Auditor General's Recommendation. City staff will formalize a project agreement between the City, Alectra Utilities, and Neptune to optimize meter installation, testing and maintenance through data integration and automated work order processes. ***Timeline to Implement: Q2 2017.***

OBSERVATION #9:

Low

Resource Model
As the City's Environmental Services evolves, and with the implementation of the above recommendations, additional skills and experience may be required to implement and leverage increasingly sophisticated information systems.
Auditor General Recommendation
The City should regularly assess whether staff have the necessary training, expertise, and experience to implement new technologies and supporting processes to ensure any gaps are filled in a timely manner.
Management Response
Management supports the Auditor General's Recommendation. The Business Compliance Section has created an environment of continuous learning and upgrading within Waterworks to ensure staff competencies are upgraded and relevant to their work. This process will continue. ***Timeline to Implement: Ongoing.***

Benchmarking

Infrastructure Leakage Index ("ILI")

ILI is a performance indicator of water system leakage. ILI is calculated by estimating physical leakage through reconciling water purchases, metered consumption, and assumptions for apparent losses and unmetered consumption. A high ILI could indicate:

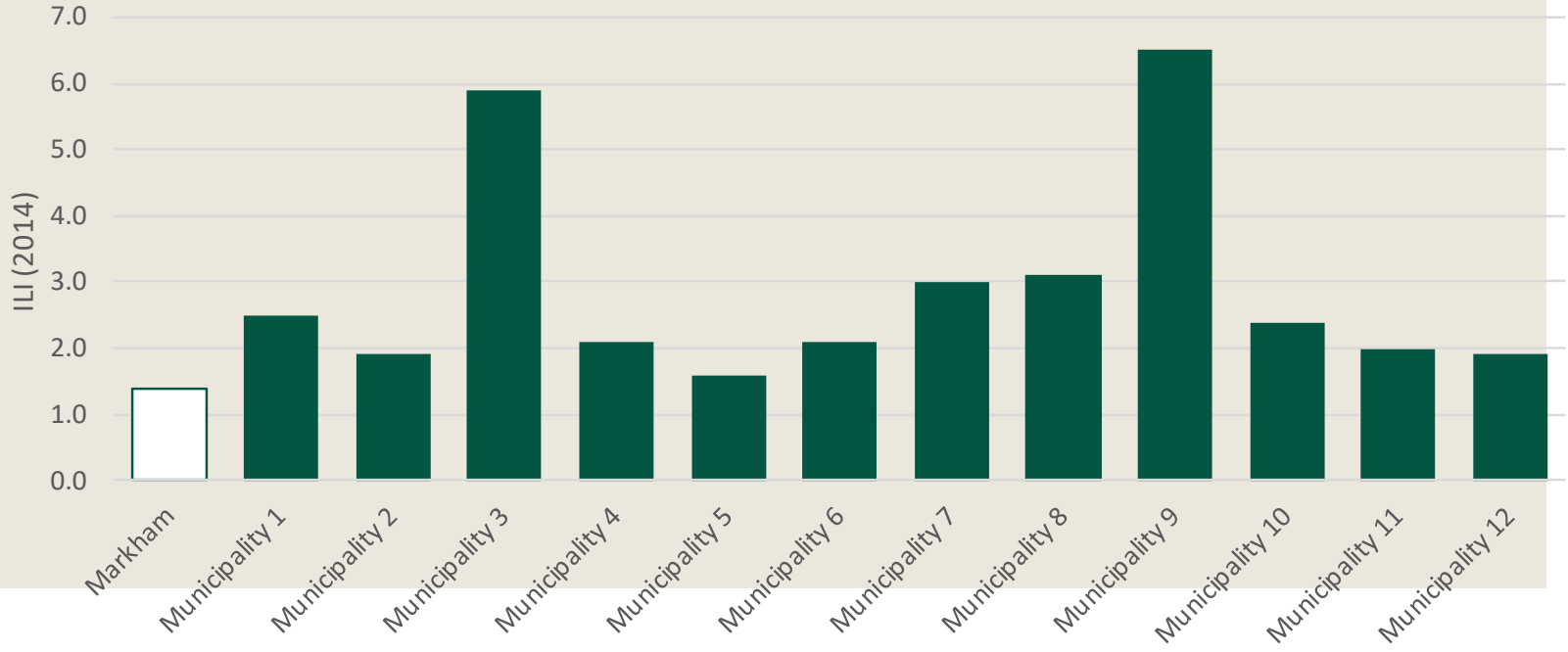
- High physical leakage;
- Water theft or un-metered consumption higher than industry standards; and,
- High imbalances between water purchases and sales.

Sources: Canadian National Water and Wastewater Benchmarking Initiative (2014)

Benchmarking

Infrastructure Leakage Index ("ILI"), Canadian Municipalities

Markham has the lowest (i.e. best) ILI among Canadian municipalities reporting in 2014.

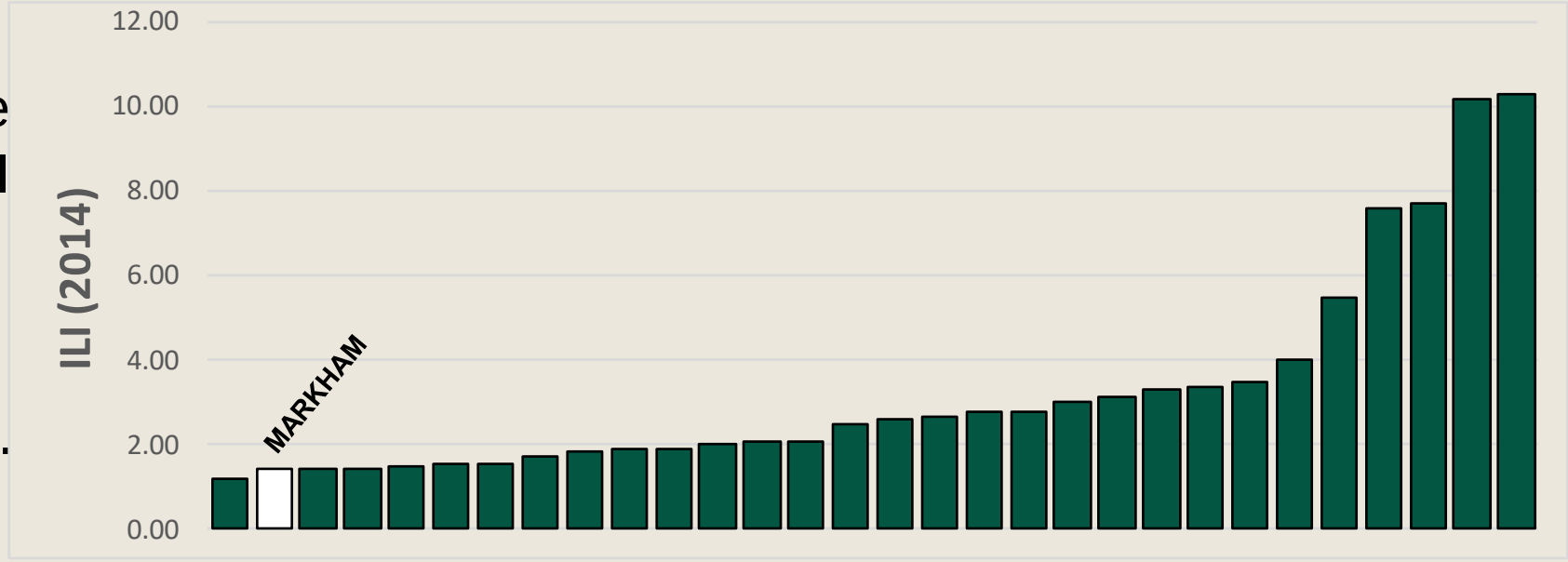


Sources: Canadian National Water and Wastewater Benchmarking Initiative (2014)

Benchmarking

Infrastructure Leakage Index, North American Municipalities

Markham has the second lowest ILI among North American municipalities reporting in 2014.



Source: American Water Works Association (“AWWA”) Water Loss Control Committee (2014)

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