



INTERNAL AUDIT REPORT

Water, Wastewater and Stormwater Operations Audit

April 2019

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CONCLUSION AND SUMMARY

The audit of Water, Wastewater and Stormwater Operations identified numerous issues that have impacted Environmental Services' ability to deliver on several of their objectives, while increasing the risk of litigation and reputational damage to the City.

This conclusion is based on several factors, including:

- Ineffective project management and contract administration.
- Inadequate asset management planning processes and preventative maintenance programs.
- The absence of appropriate management oversight.
- Inefficient and ineffective procurement practices.
- Heavy reliance on manual processes.
- A lackadaisical approach to policy and procedural development and legislative compliance.

Due to the severity of these issues, there have been significant consequences, including but not limited to:

- Contracts expiring without anyone acting upon it, resulting in the failure to execute programs.
- Underspending on maintenance and installation.
- Hiring consultants and not developing plans to implement the recommendations.
- Going to market with non-compliant contract specifications.
- Inefficient and ineffective use of resources.
- Development of policies and procedures that are lacking detail and do not outline roles, responsibilities and accountability of all those involved in the process.

The following improvements are required:

- Establish a standardized project management governance framework that will be a driver to set predetermined goals, improve outcomes and strengthen project management governance.
- Develop risk based, long-term asset management plans and preventive maintenance programs to better inform the budgeting process and resource requirements.
- Provide greater oversight and scrutiny over non-competitive purchases to ensure appropriate procurement methods are used.
- Leverage advances in technology to improve business processes.
- Update the content of City policies, procedures and guidelines while providing more clarity on roles, responsibilities and expectations of stakeholders.

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Ineffective project management and contract administration is the root cause of many of the issues outlined in this report. The need for improved project management and contract administration has been a common theme in many of our recent audit reports.

In the Construction Audit of Fire Station #7-4: Phase 1 that was approved by Council in June 2018, we recommended that management formally adopt a city-wide project management framework that will be a driver to set predetermined goals, improve outcomes and strengthen project management governance. A standardized city-wide project management governance framework is essential for effectively managing projects and programs, including cost, schedule and performance risks. For projects and programs to be developed efficiently, stakeholders must understand their roles and responsibilities and that of the other stakeholders, so everyone's expectations, accountabilities, and probable courses of action are predictable and can be relied upon.

For Environmental Services, improvements should include the development of formal business cases to outline objectives, resource requirements and program/project deliverables, ensuring staff have the relevant skills and expertise required to draft specifications, providing oversight over third party vendors, monitoring and reporting on project/program status and the development of a management oversight framework to assess project deliverables from beginning to end. Having an effective project management governance structure and lines of authority prevents unnecessary conflict, clarifies roles and responsibilities and helps ensure that projects, programs and services are effectively delivered to residents.

Preventive maintenance is an important part of asset management. The goal of a successful preventive maintenance program is to establish consistent practices designed to improve the performance and safety of infrastructure. Long term asset management planning and preventative maintenance programs should be the driving factor behind a maintenance and installation budget.

When preventative maintenance activities are not performed when planned, there is an increased risk that the City's infrastructure will begin to fail before its expected life expectancy. The development of formalized, risk based, long-term asset management plans will better inform preventative maintenance programs, the budgeting process and resource requirements, identifying the areas where the reliability and maintenance needs drive the most improvement and the best return on the maintenance investment.

A direct result of ineffective project management and contract administration processes is the inability to procure goods and services in the most efficient and effective manner. Environmental Services relies heavily on Low Dollar Value (LDM) purchases for repeat purchases when establishing vendors of record or going to market would be more appropriate. For example, the City does not have a contract in place, outlining pricing and service levels with the lab that performs the microbiological analysis of the water samples. The absence of appropriate purchasing arrangements with external vendors increases the risk that the City may be overpaying for goods/services and/or receiving substandard quality.

Leveraging advances in technology to improve business processes is another common theme identified in many of our recent audit reports. For Environmental Services, this includes assessing

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the current state of the SCADA project and taking the necessary steps to ensure full implementation. Upon successful implementation, the SCADA system will allow the City to remotely monitor the status of pumping stations and other remote locations.

Other opportunities to leverage technology may include a more thorough assessment of the WaterTrax software, which provides features that can automate and improve the water sampling process. The software includes a mobile app, which could be used to enter water sampling results directly into the system by the servicepersons in the field. None of these reporting tools, including the mobile app, have been fully explored by management. Management, with Council support, should continue to explore how integrating technology with business processes can improve the way we deliver service and enhance our ability to obtain usable data for analysis, management reporting and informed decision making.

Many of Environmental Services' policies and procedures as required by the Ministry of the Environment and Climate Change (MOECC) Drinking Water Quality Management Standard (DWQMS) are lacking clarity on roles, responsibilities and expectations of stakeholders. We benchmarked the City's water sampling policies, procedures and practices to several other municipalities, including the Region of Peel, Hamilton, and Barrie. These entities' policies and procedures take a much more prescriptive approach to water sampling, setting the appropriate standards and expectations of all staff involved in the process. Management would benefit by reviewing the better practices of other municipalities to see where further enhancements can be made to their policies and procedures.

Internal Audit will follow up on the status of outstanding Management Action Plans related to this audit and will report the status to the Finance, Administration and Audit Committee.

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BACKGROUND

The Environmental Services department is responsible for providing water, wastewater and stormwater services to more than 335,000 residences and more than 11,900 businesses in the City of Vaughan.

The provincial government implemented the Municipal Drinking Water Licensing Program in 2007 as a result of the Walkerton Inquiry. The MOECC developed the DWQMS that applies to owners and operating authorities for municipal drinking water systems. The implementation of the DWQMS is mandated by the provincial government through the Safe Drinking Water Act.

The Corporation of the City of Vaughan is considered the owner of the City's water distribution system and works with York Region to ensure access to safe drinking water. The Water division of Environmental Services is responsible for providing assurances that the drinking water is properly sampled for safety and quality. Other responsibilities include the routine inspection and maintenance of hydrants, watermains and valves.

Applicable legislation and regulations, such as the Clean Water Act, Environmental Protection Act, and various local and regional by-laws impact the operation and maintenance of the City's sanitary wastewater collection system. The system is designed to collect wastewater from homes and businesses and bring it to wastewater treatment plants through pipes and pumping stations. The wastewater collection system consists of six wastewater lift stations, three wastewater force mains, 997 km of piping, and 12,905 maintenance holes. Programs, such as systematic flushing and remote camera viewing for blockages and damage, help to maintain the City's infrastructure.

Environmental Services also operates and maintains Vaughan's stormwater collection system. It is designed to collect runoff from rainfall and snowmelt, convey it to stormwater management facilities to enhance water quality, before the stormwater is released to outlets, rivers and streams. The stormwater system consists of 144 stormwater management ponds, which are inspected and cleaned on a prioritized basis. The City has approximately 1,100 km of stormwater piping and more than 18,000 catch basins. The Stormwater division have programs to periodically remove debris to ensure the stormwater system is functioning at optimal level.

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OBJECTIVES AND SCOPE

The objective of the audit was to evaluate the adequacy and effectiveness of the internal controls, processes and procedures in place to mitigate the business risks associated with managing of the water, wastewater and stormwater operations.

The audit approach included a review of the strategic goals, objectives and oversight of the department, review of relevant programs, legislation, policies and procedures, procurement processes, project management and contract administration practices, use of technology, and interviews with staff and management.

The audit scope included department related activities that occurred in January 2017 to December 2018.

The audit scope did not include a review of the water, wastewater and stormwater billing process, the water meter replacement program, backflow prevention program or the solid waste management division.

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MANAGEMENT RESPONSE - ACTION PLAN PRIORITIZATION

The management action plan section in the detailed report below includes a current status section, outlining the work carried out to date in addressing the audit recommendations as well as detailed management actions. For each recommendation, management has assigned a level of urgency, a timeline for action and a specific responsible party. The recommendations and actions are prioritized based upon the severity of the recommendation and its potential impact on the public or the system. The following is a description of the 3 priorities:

- 1) **URGENT:** Inaction could have a negative impact on the health and safety of the residents and businesses of Vaughan. The timeline for development and implementation of specific plans is 0-3 months.
- 2) **CRITICAL:** Inaction could have a negative impact on the system and result in service disruption to the residents and businesses of Vaughan. The timeline for development and implementation of specific plans is 0-6 months.
- 3) **IMPORTANT:** All of the remaining recommendations are important. Inaction could result in a reduction in service quality, efficiency, and effectiveness. The timeline for the development and implementation of specific plans will vary depending upon the specifics but no later than 36 months.

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DETAILED REPORT

1. *Improve Management Oversight and Controls over the City's Water Sampling Process*

Regulation of the drinking water distribution system is enforced by MOECC. In accordance with the Safe Drinking Water Act, the City of Vaughan's (COV) Water division is required to be compliant to the DWQMS policy and develop an operational plan. Part of this plan requires an annual audit be performed by the Water division, an external audit performed every three years, meeting permit requirements and a MOECC inspection, at least once a year.

Although the City has passed these MOECC evaluations without incident, closer examination of the water sampling process has highlighted some significant concerns:

- COV Policy & Procedures related to Water Sampling Collections are lacking detail and do not outline roles, responsibilities and accountability of all those involved in the process. We benchmarked the City's water sampling policies, procedures and practices to several other municipalities, including the Region of Peel, Hamilton, and Barrie. These entities' policies and procedures take a much more prescriptive approach to water sampling, setting the appropriate standards and expectations of all staff involved in the process.
- There is an absence of management oversight over the process, such as implementing assurance controls to confirm that samples are being collected as per legislative and COV requirements and ensuring documentation on the chain of custody forms are complete and accurate.
- Rather than entering the chain of custody forms into the WaterTrax system daily, residual results were not entered into the system until management knew the MOECC inspection was imminent.
- The quantity of water samples collected by staff significantly exceeds the monthly statutory requirement by approximately 40%, without any apparent justification or added value.
- The City does not have a contract in place, outlining pricing and service levels with the lab that performs the microbiological analysis of the water samples.
- We benchmarked the City's water sampling sites against Richmond Hill, Newmarket, Markham and the Region of Peel. All four collect water samples at various locations within their municipalities using designated sample stations. This practice assures that samples are being drawn at locations which represent all points of the distribution system. Currently, the City of Vaughan does not have designated water sampling stations and many of the sampling sites are in close proximity to each other. 90% of the samples are collected from schools and private business' kitchens and bathrooms, which are susceptible to bacteria and other contaminants, which may increase the risk of a false reading.

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It is management's responsibility to ensure the implementation and continued use of best practices and accepted testing methods for the collection and analysis of drinking water samples. The quality of the data produced can only be as good as the poorest level of quality assurance in the entire process of sampling and analysis. Improved controls, processes and oversight can provide assurance that health and safety, regulatory and reputational risks are being mitigated.

Recommendations

We recommend that management:

- Implement a more prescriptive approach to developing water sampling policy, procedures and guidelines, setting the appropriate standards and expectations of all staff involved in the process.
- Develop a robust management oversight framework over the water sampling process to ensure the implementation and continued use of best practices and accepted testing methods for the collection and analysis of drinking water samples.
- Ensure that water sampling information from the chain of custody forms is entered into the WaterTrax system no later than the next business day.
- Develop appropriate criteria for when it may be suitable to exceed the statutory requirements for the quantity of water samples collected.
- Work with Procurement Services to determine the appropriate procurement method for establishing a service level agreement with an accredited lab to perform the City's microbiological testing.
- Investigate the feasibility of implementing a designated water sampling program.

Management Action Plan

Management agrees with the recommendations.

- 1.1 Implement a more prescriptive approach to developing water sampling policy, procedures and guidelines, setting the appropriate standards and expectations of all staff involved in the process.**

Priority: **Urgent**

Timeline: 0-3 Months

Responsible: Manager of Water Services

Current Status

A more detailed SOP (Standard Operating Procedure) was developed and training was provided by the Compliance team to water operations staff on July 26 and 31, 2018.

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Further refinements were made at a January 22, 2019 water operations meeting including the addition of Management/Supervisor Responsibilities. The final revised SOP was presented and signed off by all water operations staff on January 29th, 2019.

The SOP included flushing time components and utilized pictures to ensure a standardized and consistent approach for all staff.

Management Actions

Staff will continue to review the current water sampling policy, procedures and guidelines and benchmark with other municipalities in order to ensure that roles and responsibilities are clear. In addition, upon revising the policy, procedures and guidelines, all staff will be trained and their roles clearly indicated. Existing KPIs will be re-evaluated and refined for the purposes of performance measurement.

The outcome of the activities to date as well as any new procedural enhancements will be reported to the management team on a quarterly basis through the above developed KPI's.

1.2 Develop a robust management oversight framework over the water sampling process to ensure the implementation and continued use of best practices and accepted testing methods for the collection and analysis of drinking water samples.

Priority: **Urgent**

Timeline: 0-3 Months

Responsible: Manager of Water Services

Current Status

As stated above, the sampling SOP was enhanced and updated on January 29, 2019 including the addition of a category titled "Management/Supervisor Responsibilities". This SOP indicates general oversight responsibilities for water operations management staff.

The Water Supervisor's 2019 performance plans have included a requirement to improve management oversight in the field by conducting 20 surprise spot checks to ensure the revised SOPs are being followed.

The SOP now includes reference to the MECP's "Practice for the Collection and Handling of Drinking Water Samples" and the American Public Health Association/AWWA "Standard Methods for the Examination of Water and Wastewater".

Management Actions

In addition to the revised SOP's indicated above, all chain of custody forms will be reviewed by the Supervisor of Water for correctness relating to the completion of the custody forms and the Supervisor of Compliance and Business Services relating to system wide trends and issues effective immediately. Any chain of custody forms not completed correctly will be brought to the attention of the Water Operator taking the sample. Staff will augment existing sampling KPI's (Key Performance Indicators) and report to the

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management team on a monthly basis providing information on the sampling results, areas or issues and specific actions taken.

Supervisors of Water Services will implement opportunities to leverage the Fleet Services GPS vehicle reports that are being rolled out in Q2, 2019 to provide additional management oversight on the water sampling process.

1.3 Ensure that water sampling information from the chain of custody forms is entered into the WaterTrax system no later than the next business day.

Priority: **Critical**

Timeline: 0-6 Months

Responsible: Manager of Program and System Planning

Management Actions

Staff will review the current tracking and data entry process and determine with input from operating staff, ways to enhance the timeliness of data being entered into WaterTrax. This technology is currently available and has the potential to significantly enhance our reporting. Staff will research ways to utilize this technology and report back in 6 months. Currently, operations staff submit the data to the Compliance group for entry.

1.4 Develop appropriate criteria for when it may be suitable to exceed the statutory requirements for the quantity of water samples collected.

Priority: **Critical**

Timeline: 0-6 Months

Responsibility: Manager of Program and System Planning

Current Status

Based upon system size the MECP (Ministry of the Environment, Conservation and Parks) dictates a requirement that we are required to sample 130 times per month. Typically, staff should sample in the range of 140/month to ensure we are complying with Ministry requirements.

Management Actions

Staff will review the sampling program quantities and criteria of neighbouring municipalities for benchmarking purposes and develop a sampling frequency that ensures we comply with the Ministry and is not excessive. Staff will develop a list of exceptions when additional sampling may need to occur. Staff will finalize the criteria and adjust the group sampling program. Training will be provided for all staff involved in the program. A KPI will be developed for sampling frequency and be reported to the management team on a quarterly basis.

1.5 Work with Procurement Services to determine the appropriate procurement method for establishing a service level agreement with an accredited lab to perform the City's microbiological testing.

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Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Program and System Planning

Current Status

The water samples are currently being taken to the York-Durham Regional Environmental Laboratory. All other York Region Local municipalities take their samples to this facility as well. Pricing has been based upon a fee structure established by the laboratory.

Management Actions

Staff will carry out a review of the current sample testing program and compare pricing to other market opportunities.

Should the decision be that our sampling testing needs remain with this laboratory, staff will implement the appropriate process together with Procurement Services, and explore the possibility of a Service Level Agreement, or similar mechanism, to clearly outline the costing and expected service levels with York-Durham Regional Environmental Laboratory.

1.6 Investigate the feasibility of implementing a designated water sampling program.

Priority: **Critical**

Timeline: 0-6 Months

Responsible: Manager of Program and System Planning

Current Status

Staff have engaged a Consulting Engineering Firm to perform a sampling station feasibility study and the final report will be available by August 2019. This study will recommend sampling locations and provide an implementation strategy. Some funds are available in the 2019 Capital Budget for sampling station construction resulting from the feasibility study.

Management Actions

Staff will carry out a detailed review of the sampling strategies of other municipalities in order to benchmark our current program. Based upon the outcome of the Engineering review, staff will ensure that sampling stations are available for all areas of the water system to ensure that water quality meets the Ministry standards. Based upon the sampling station feasibility study and the review of other municipalities, staff will refine the water sampling program.

Training will be provided to all staff involved in the water sampling program. Staff will develop a water sampling KPI and report to the management team on a quarterly basis.

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2. Ensure that the Catch Basin Inspection and Cleaning Program Complies with the City's and York Region's Sewer By-Law

Environmental Services has developed a catch basin inspection and cleaning program to ensure the City's 18,000+ catch basins are functioning effectively by periodically removing the waste, such as dissolved metals, heavy oils and gasoline, that is collected.

In 2016, Environmental Services issued a tender to procure a contractor to perform the catch basin inspection and cleaning program. Internal Audit reviewed this tender and management's contract administration practices over this program, and noted the following:

- One of the specifications of the tender states that *"The Contractor shall ensure proper handling of decanted water from their equipment unit into the Owner's designated sanitary sewer by using a straining basket in the presence of an on-site Wastewater City staff. This method will prevent any heavy excessive granular material from being deposited into the Owner's sewer system."* The City provided maps as to where the contractor could decant the waste. However, this specification is non-compliant to the Sanitary Sewer provision under the City of Vaughan's By-Law 087-2016 and York Region's By-Law 2011-56, as it is forbidden to decant these materials into sewer system.
- The purchase order for this tender was not set up appropriately in the City's financial system, as it did not correctly list the quantity of catch basins to be inspected and cleaned and the correct unit cost. The overall dollar value of the purchase order was correct.
- Currently, Accounts Payable cannot detect when a unit price on an invoice does not match the unit price per the purchase order.
- On September 21, 2018, Environmental Services received a letter from the contractor stating that they would no longer be able to decant into the sanitary sewer locations as specified by the City. According to the contractor's letter, we have *"been aware that decanting in York Region's sanitary sewers is not allowed, when we clean their catch basins we haul all material, including decant water back to our facility for disposal. The current contract has us decanting into Vaughan's sanitary sewers which flow into York Region's sanitary sewers. We have brought this issue to Vaughan's attention each year of the contract during the prestart meeting. We were informed each time that this doesn't affect the City of Vaughan's catch basin cleaning program."*
- Upon receipt of the letter, Environmental Services did not inform Legal Services of the issue.
- Further communication occurred between the contractor, Environmental Services and Procurement Services between September 21 through mid-October 2018, where staff agreed to increase the unit price by nearly 4 times the original unit price (from approximately \$20 a basin to \$80) to accommodate the appropriate disposal of the materials. This also impacted the service levels, as only 3,105 instead of 10,000

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basins were inspected and cleaned in 2018 within the existing budget. The plan was to continue this arrangement through 2019 before Internal Audit discovered the issue and intervened.

- Non-compliance to the City's Procurement Policy was also noted, as a change order was not processed to reflect the pricing and service level changes made to this contract.
- There is no evidence to suggest that Environmental Service management notified the appropriate stakeholders within the organization of this issue.

It is management's responsibility to ensure that at minimum, contract specifications are compliant to regulatory requirements. Whether the deficiencies in the catch basin inspection and cleaning program are a result of a lack of understanding or disregard for legislative compliance, improved program design, controls, processes and oversight are required to provide assurance that health and safety, regulatory, environmental and reputational risks that are inherent to this program are being mitigated.

Recommendations:

We recommend that management:

- Re-evaluate the strategic goals of the catch basin inspection and cleaning program by developing appropriate service levels based on risk.
- Work with Procurement Services to determine the appropriate procurement method for re-establishing the catch basin inspection and cleaning program, ensuring full compliance to regulatory requirements, including the the City of Vaughan's By-Law 087-2016 and York Region's By-Law 2011-56.

Management Action Plan

Management agrees with the recommendations.

2.1 Re-evaluate the strategic goals of the catch basin inspection and cleaning program by developing appropriate service levels based on risk.

Priority: **Important**

Timelines: 0-12 Months

Responsible: Manager of Program and System Planning and Manager of Wastewater/Stormwater Services

Current Status

A pilot study is underway evaluating sediment and cleaning requirements in catch basins in a residential and industrial area. The purpose of the study is to provide detailed information on sediment buildup in catch basins based upon location and provide valuable input into the development of the catch basin cleaning program.

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Management Actions

Management will review policies, procedures and practices with comparable municipalities in order to benchmark our current catch basin cleaning program. Based upon the input from York Region regarding the Region's By-Law 2011-56, staff will reassess our cleaning and disposal practices.

Staff will review and update our current catch basin program regarding frequency of cleaning. This program will incorporate appropriate criteria such as geography, catch basin location, catch basin type, road type, vegetation, winter maintenance standards, data from the pilot study and potential risks. A new program will be developed and implemented for the 2020 budget cycle.

2.2 Work with Procurement Services to determine the appropriate procurement method for re-establishing the catch basin inspection and cleaning program, ensuring full compliance to regulatory requirements, including the City of Vaughan's By-Law 087-2016 and York Region's By-Law 2011-56.

Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Program and System Planning and Manager of WW/Stormwater Services

Management Actions

Upon completion of the revised strategic goals of the catch basin inspection and cleaning program, staff will work with Procurement Services to develop and issue a contract for services. This is expected for the spring/summer of 2020.

Staff will prioritize catch basins that require immediate cleaning based upon past experience and implement a one-year program in the summer of 2019. Staff propose to issue a short-term contract with the assistance of Procurement Services to address these areas.

A new multi-year contract will be prepared based upon the newly refined program described in 2.1 above. This contract will be prepared in conjunction with Procurement Services.

Procurement Services staff is also working with client departments and OCIO to make certain purchase requisitions correctly reflect itemized quantities and corresponding unit prices, ensuring purchase orders accurately reflect the contract agreement.

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3. *Ensure the Hydrant Inspection and Maintenance Program Complies with the Ontario Fire Code*

Environmental Service's Water division is responsible for the testing and inspection of the City's hydrants. The Water division's operational plan outlines the requirements for hydrant inspection and maintenance as part of their preventive maintenance system procedure. Hydrant inspection and maintenance is outsourced to a third party through a competitive procurement process.

Reg 213/07 – The Ontario Fire Code also requires hydrants to be inspected annually and after each use, and a record of the inspection is to be documented and retained. For the City, the inspection, documentation and record keeping falls under the responsibility of the Water division. Subsection 6.6.5 – Inspection of Hydrants states:

Hydrants

6.6.5.1. Hydrants shall be inspected annually and after each use in accordance with Articles 6.6.5.2. to 6.6.5.5.

Hydrant water flow

6.6.5.6. Hydrant water flow shall be inspected annually in accordance with Article 6.6.5.7.

6.6.5.7. The main valve of the hydrant shall be fully opened, and the hydrant operated with one port open and the water flow checked.

6.6.5.8. A record of the hydrant operation as described in Article 6.6.5.7. shall be kept in conformance with Article 1.1.2.1.

Records to be prepared

1.1.2.1. (1) If a test, corrective measure or operational procedure required by this Code is conducted, a written record shall be prepared noting what was done and the date and time it was done.

The following was noted:

- Management allowed the hydrant inspection contract to expire after 2017 and never took steps to renew it. As a result, hydrant inspections and maintenance were not performed in 2018. As a result, the City was in non-compliance to the hydrant inspection provisions per Reg 213/07 in 2018.
- Environmental Services did not report this disruption to the key stakeholder of the program – Vaughan Fire and Rescue Service (VFRS).
- According to the Fire Chief, there was a budget approval for a Flow Disk program. During the inspection cycle, a reflective disk was to be attached to the hydrant to indicate to the firefighters the flow of the hydrant. VFRS noticed in September 2018

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that the flow disks were not appearing on any of the hydrants and sought clarification from Environmental Services.

- There are no formal protocols in place between VFRS and Environmental Services to communicate when a hydrant has been used to ensure Environmental Services adds the hydrant to the inspection list. According to the VFRS Communications Supervisor, VFRS was not notifying Environmental Services when a hydrant had been used. They only communicated hydrants that they discovered that had issues, such as leaks, etc.

The absence of executing this program in 2018 could have potentially exposed the City to unnecessary public safety and liability risks.

Recommendations

We recommend that management ensure:

- The Hydrant Inspection and Maintenance Program is restarted immediately, ensuring full compliance with Reg 213/07 subsection 6.6.5 – Inspection of Hydrants.
- Protocols are developed between Environmental Services and VFRS to ensure hydrant usage is communicated and the timing of when inspections should occur after each use.

Management Action Plan

Management agrees with the recommendations.

3.1 The Hydrant Inspection and Maintenance Program is restarted immediately, ensuring full compliance with Reg 213/07 subsection 6.6.5 – Inspection of Hydrants.

Priority: **Urgent**

Timelines: 0-3 Months

Responsible: Manager of Water services

Current Status

A 2018-2020 inspection contract was prepared in Q3-2018 however it was too late in the season before it was approved in November 2018 for any appreciable work to be carried out. A procedure was in place to winterize all hydrants that were operated by VFRS.

A pre-construction meeting was held with the contractor on January 30, 2019 to initiate the contract for hydrant inspection and painting, with inspections to start in mid-May 2019.

The hydrant inspection contractor will begin the process of tagging all 8,500 hydrants in the City in mid-May 2019. Hydrant colour coded tags will be installed in accordance with N.F.P.A. 291 “Fire Flow Testing & Marking of Fire Hydrants” which will provide the flow capacity of the hydrant and ensure VFRS has important information to base firefighting decisions.

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Management Actions

Staff will ensure that the contractor fully complies with its implementation and will report to the management team on a quarterly basis.

3.2 Protocols are developed between Environmental Services and VFRS to ensure hydrant usage is communicated and the timing of when inspections should occur after each use.

Priority: **Urgent**

Timeline: 0-3 Months

Responsibility: Manager of Water Services

Current Status

Staff have been involved in discussions with VFRS in order to improve the inter municipal communications regarding fire hydrant condition and maintenance requirements. Staff met with VFRS and Internal Audit on February 21, 2019 to discuss the hydrant inspection requirements.

Staff provided a draft of a checklist to the Deputy Chief on February 28th, 2019 that VFRS could use each time a hydrant has been operated. Environmental Services staff received confirmation on Apr 24, 2019 that VFRS had implemented the checklist inspection within their Firehouse software program.

Management Actions

Staff will continue discussions with VFRS staff to ensure that the hydrant condition information utilizing electronic reporting is functioning as proposed and that actions are being taken by Environmental Services staff as needed. An email will be sent to the Manager of Water Services, Supervisors, Team Lead, Water Operations Coordinator and Administration Support from the software program when VFRS identifies a hydrant that needs repair or service.

KPI's will be developed and reporting performance and metrics will be brought to the Management Team of Environmental Services and VFRS on a quarterly basis.

Training and communication to all staff in the hydrant maintenance program will be provided.

The Hydrant inspection and repair SOPs will include more enhanced timing requirements for notification of when a hydrant is taken out and put back into service.

Staff will work with the VFRS to develop a RASCI chart to document roles and responsibilities. VFRS will provide a quarterly update on a number of KPIs including the number of hydrants used that did not require service.

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4. Re-establish the Valve Turning Program

Environmental Services has established a valve turning program in accordance with the AWWA (American Water Works Association) recommended procedure. The procedure requires that all valves, such as distribution and transmission valves, air valves, and blow-offs, be inspected and operated on a regular basis. A vendor performs the work on behalf of the City and is responsible for tracking the valve-turning activity in a City provided spreadsheet and submitting it to Environmental Services for review on an annual basis.

According to the AWWA definition, each valve should be operated through a full cycle and returned to its normal position on a schedule that is designed to prevent a buildup of tuberculation¹ or other deposits that could render the valve inoperable or prevent a tight shut off. Valve-turning programs offer several benefits, including:

- Improve customer service
- Ensure mission capability
- Ensure distribution system reliability
- Develop predictive maintenance programs
- Determine capital improvement budgeting
- Develop loss trend analysis
- Ensure system isolation capability
- Ensure water quality control

In reviewing the program deliverables, it was observed that management allowed the contract with the valve turning program vendor to expire after 2017 and never took steps to renew it. As a result, the valve turning program was not executed in 2018.

Improved controls, processes and oversight are required to provide assurance that operational, environmental and reputational risks that are inherent to this program are being mitigated.

Recommendations:

We recommend that management:

- Re-establish the valve turning program.
- Work with Procurement Services to determine the appropriate procurement method for selecting a vendor to execute the valve turning program.

Management Action Plan

Management agrees with the recommendations.

¹ Tuberculation: *The development or formation of small mounds of corrosion products (rust) on the inside of iron pipe. These mounds (tubercles) increase the roughness of the inside of the pipe thus increasing resistance to water flow.*

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4.1 Re-establish the valve turning program.

Priority: **Important**

Timeline: 0-12 Months

Responsibility: Manager of Water Services

Current Status

The procurement process for annual valve turning program commenced late in the 2018 calendar year and was not executed until the fall of 2018. This is a three (3) year, \$166,000 contract.

Staff hosted the pre-construction meeting with the contractor on December 12, 2018 to initiate the contract for valve turning with work to start for a 10-week program in late May 2019.

A pilot project is being implemented in order to review our in-house capabilities for valve turning. The two newly acquired truck mounted valve turning devices are to be installed on two new pick-up trucks in May-June 2019. Various valves will be exercised and the effectiveness of the operation evaluated. Based upon the outcome of the pilot, a business case will be prepared and presented for consideration.

Management Actions

Staff will review the current valve maintenance program including the valve exercising protocol and benchmark against other municipalities. A detailed rationale will be developed to risk assess and prioritize the valves in the system. Staff will then prepare performance standards and develop the valve exercising program.

Staff will continue to work with Office of the Chief Information Officer to implement an electronic valve inspection on GeoCortex which allow staff/contractor to document inspections on Vaughan Maps while in the field.

A business case will be developed based upon the outcomes of the pilot valve turning program described above.

4.2 Work with Procurement Services to determine the appropriate procurement method for selecting a vendor to execute the valve turning program.

Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Water Services

Management Actions

Staff will work with Procurement Services to prepare a valve exercising program considering the revised/updated program developed above in 4.1.

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5. Implement a Risk Based Preventative Maintenance Program

Preventive maintenance is an important part of asset management. The goal of a successful preventive maintenance program is to establish consistent practices designed to improve the performance and safety of infrastructure.

Successful implementation of a preventative maintenance program can provide the following benefits:

- Increased life expectancy of assets.
- Fewer equipment breakdowns.
- Routine repairs can potentially mitigate the risk of unexpected, major breakdowns.

Internal Audit reviewed Environmental Services' budget to actual information for 2017 and 2018 and found that significantly less money than budgeted had been spent on maintenance and installation.

In 2018, Environmental Services spent \$4.1 million (or 28%) less than budgeted on maintenance and installation and \$2.0 million (or 17%) less than budgeted in 2017.

Summary of Maintenance and Installation budget to Actual:

2018 - Division	Budget	Actual	Variance
Water	6,755,704	4,455,918	2,299,786
Stormwater	3,971,810	2,468,985	1,502,825
Wastewater	3,991,658	3,675,912	315,746
Total	14,719,172	10,600,815	\$4,118,357
2017 - Division	Budget	Actual	Variance
Water	5,631,592	4,510,787	1,120,805
Stormwater	2,733,034	2,158,366	574,668
Wastewater	3,791,713	3,441,201	350,512
Total	12,156,339	10,110,354	\$2,045,985

Long term asset management planning and preventative maintenance programs should be the driving factor behind a maintenance and installation budget. When preventative maintenance activities are not performed when planned, there is an increased risk that the City's infrastructure will begin to fail before its expected life expectancy.

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Recommendation

We recommend that management develop formalized, risk based, long-term asset management plans to better inform preventative maintenance programs, the budgeting process and resource requirements. It should identify the areas where the reliability and maintenance needs drive the most improvement and the best return on the maintenance investment.

Management Action Plan

Management agrees with the recommendations.

- 5.1 We recommend that management develop formalized, risk based, long-term asset management plans to better inform preventative maintenance programs, the budgeting process and resource requirements. It should identify the areas where the reliability and maintenance needs drive the most improvement and the best return on the maintenance investment.**

Priority: **Important**

Timeline: 0-36 Months

Responsibility: Manager of Program and System Planning, Manager of Water Services, Manager of Wastewater/Stormwater Services.

Management Actions

A reassessment of the development of the annual operating budgets for water, wastewater and storm water will be undertaken. To do this all current operations and preventative maintenance performance indicators will be reviewed and benchmarked against other municipalities through the National Water and Wastewater Benchmarking Initiative. The base budget review will consider; service risk, infrastructure integrity, life cycle of the infrastructure, potential for service disruption, asset management practices and plans to ensure the infrastructure integrity and funding envelopes.

Environmental Services will review the existing asset management plan to ensure that the above performance indicators are not influenced by specific condition ratings found in the plan.

A detailed workplan will be developed with actions, timelines, and an implementation strategy. This will be carried out in conjunction with Finance and Infrastructure Planning and Corporate Asset Management staff. It is proposed that the detailed workplan will be provided in 0-12 months.

Staff will review and refine/revise the existing budget development process based upon any changes to the performance indicators, rational for low budget actuals and detailed costing calculations for the specific operations and preventative maintenance activities. This work will be applied to the 2021 current budget.

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Management oversight of the current budget will be enhanced. Supervisors will review the activity performance indicators and actual costing on a quarterly basis. KPI's will be revised to identify; improvements, projected and actual activities completed to date, budget implications and an explanation for any significant variance. This information will be reported to the management team on a semi-annual basis.

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6. *Implement the Recommendations for Improving the Maintenance Conditions of Water and Wastewater Facilities*

Environmental Services hired a consultant in 2017 to perform condition and performance assessments of six wastewater lift stations, three wastewater force mains, two water booster stations and one diesel generator station. This was completed with the end goal of developing recommendations to support the City in the development of capital and maintenance plans. The assessments were completed through visual observations of the infrastructure, review of background information, and performance tests of the pumps.

The consultant's report provided a summary of the observations from the assessment activities and a series of facility specific recommendations (more than 40) to address the issues identified with the assets at each facility. Fifteen of the recommendations included a timeframe of five years or less to complete.

In addition to these recommendations, the consultant supplied a water and wastewater facilities spreadsheet to provide Environmental Services staff with a dynamic tool to help with the ongoing management of the facilities and to support the development of future capital and maintenance plans.

Based on discussions with Environmental Services staff, the tool provided by the consultant is not being used. In addition, management advised that the recommendations deemed "immediate" had been completed with the help of Clean Water and Wastewater Fund. Although it was evident that some of the recommendations were actioned, a formal project tracking and reporting plan was not being utilized. According to Environmental Services staff, the individual tasked with maintaining the tracking tool was new to the role and was being trained on it. There is currently no project tracking and reporting plan in place.

The timely implementation of these recommendations can provide assurance that health and safety, operational, environmental and reputational risks are being mitigated.

In addition, during process walkthroughs, it was discovered that Environmental Services staff are responsible for performing minor maintenance activities at these facilities, including repairs, changing lights and installing locks. Although the City has a Facility Services department, the management of these facilities are not currently part of their responsibility and Facility Services' staff are not aware of their current state of repair.

Recommendations:

We recommend that management:

- Determine how the consultant's recommendations may assist in the development of a more comprehensive long-term asset management plan, as highlighted in observation #5.
- Develop an implementation plan with appropriate oversight and status reporting to ensure the consultant's recommendations are implemented.

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- Determine whether the responsibility and accountability of maintenance and repair activities that are currently being performed by Environmental Staff be reassigned to the Facility Services department.

Management Action Plan

Management agrees with the recommendations.

6.1 Determine how the consultant's recommendations may assist in the development of a more comprehensive long-term asset management plan, as highlighted in observation #5.

Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Water Services and Manager of Wastewater and Stormwater Services

Current Status

The consultant's report lays out a 10-year plan with projects identified in the "immediate" category, "1-5 year" category and a "6-10 year" category. Corporate Asset Management (CAM) was formerly involved in reviewing the recommendations from the Consultant and participated in the final presentation.

CAM staff were introduced to the dynamic tool for tracking implementation progress. The information from this document directly impacts the Asset Management plan and when the information regarding project completion is entered into the data base, the asset management plan can be impacted.

Implementation of the 102 actions identified in the Consultant condition assessment of Sewage Pumping Stations and Water Pumping Stations continue with 31 actions completed, 13 in the RFQ/RFT stage and another 20 being addressed through the Maplewood Booster station upgrade. Of the remaining 38 actions, 22 had timelines of 5-10 years and the other 16 actions had timelines of 1-5 years. Capital budget dollars have been earmarked in the 2020 capital budget for the remaining 38 actions.

Management Actions

Staff will ensure that the 10-year facility plan is integrated with the exiting Asset Management Plan to ensure that all specific repair/replacement activities are incorporated as they may influence the operating and reserve funding requirements of the department. In addition, all project status reporting will be completed in a timely manner.

The Manager of Wastewater and Storm Water Services as well as the Manager of Water Services will provide the Manager of Corporate Asset Management a summary of actions completed semi-annually in order to facilitate updating of the Corporate Asset Management Plan.

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6.2 Develop an implementation plan with appropriate oversight and status reporting to ensure the consultant's recommendations are implemented.

Priority: **Important**

Timelines: 0-3 Months

Responsible: Manager of Water Services and Manager of Wastewater and Stormwater Services

Management Actions

The detailed project implementation plan is in place and staff are carrying out the projects in accordance with the plan. Staff will immediately update the status data base for those projects already completed and will continue to update the reporting when work is completed. Staff will provide a project update to the management team on a quarterly basis.

6.3 Determine whether the responsibility and accountability of maintenance and repair activities that are currently being performed by Environmental Staff be reassigned to the Facility Services department.

Priority: **Important**

Timelines: 0-12 Months

Responsibility: Manager of Water Services and Manager of Wastewater and Stormwater Services

Management Actions

Staff will review and benchmark with other municipalities to determine how facility maintenance and repair is managed and report back with their findings. Staff will meet with facilities and evaluate best practices and report to Senior Management.

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7. Ensure the Recommendations for Improving the City's Emergency Response Plan are Implemented

The statutory requirements of the DWQMS includes a section on emergency preparedness (Element 18 - Emergency Preparedness and Response). The purpose of this element is to ensure the City is prepared for emergency situations that could compromise the ability to maintain the supply of safe drinking water.

In 2017, Environmental Services hired a consultant to evaluate the City's plan. The consultant delivered the final report in July 2017. In total, the consultant had 18 recommendations for improvement.

The following is an excerpt from the report:

The existing ERP (Emergency Response Plan) for the Water Distribution was last revised in October 2011. The ERP is missing key sections that are typical of the ERP.

The ERP identifies "Emergency levels" that need to be reviewed to determine if the event/incident is a routine operational activity or an actual emergency. Level 1 emergencies currently include operational activities such as a single adverse water quality incident, operational alarm and localized water main break that for the most part can be handled by staff following standard operational procedures.

The Emergency Plan should consider additional key sections to align with the DWQMS such as,

- 1. Identifying Potential Emergencies*
- 2. Document and Review the Emergency Procedures*
- 3. Emergency Contacts*
- 4. Owner and Operating Authority Responsibilities During Emergency Situations*
- 5. Emergency Response Training and Testing*

The consultant also noted that the ERP did not include wastewater or stormwater operations. It should be noted that there are currently no statutory requirements to have a wastewater or stormwater emergency plan, but there have been discussions in the past to do so.

According to Environmental Services staff, only one of the recommendations have been implemented to date, as they wanted to hire a person who would be responsible for coordinating the implementation. There is currently no implementation plan in place.

The timely implementation of these recommendations can provide assurance that health and safety, regulatory and reputational risks are being mitigated.

Recommendations:

We recommend that management develop an implementation plan with appropriate oversight and status reporting to ensure the consultant's recommendations are implemented.

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Management Action Plan

Management agrees with the recommendations.

- 7.1 We recommend that Management develop an implementation plan with appropriate oversight and status reporting to ensure the Consultant's recommendations are implemented.**

Priority: **Important**

Timeline: 0-24 Months

Responsible: Manager of Water Services, Manager of Wastewater/Storm Water Services, Manager of Program and System Planning

Current Status

Staff have completed 3 of the 18 recommendations including GPS for Environmental Services vehicles, integrating water/wastewater/storm water emergencies into Corporate Emergency exercise (November 2018) and defining emergency levels as part of the Public Works Portfolio response escalation plan.

Management Actions

Staff will complete four additional recommendations before the end of Q2- 2019 including: working alone re-fresher, tabletop exercise for water emergency, risk assessment and integrating York Region into an emergency exercise.

Staff will develop a plan to provide the management team the necessary oversight including; status reporting, communication, frequency/timeline to review ERP and identify any requirements to address training and testing on a quarterly basis.

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8. *Improve Asset Management Planning, Project Management, Contract Administration and Procurement Practices*

One of the underlying themes in this report is the need for improved asset management planning, project management, contract administration and management oversight. A direct result of not having adequate long-term asset management planning, project management and contract administration processes in place is the inability to develop appropriate preventative maintenance strategies and service levels or procure goods and services in the most efficient and effective manner.

In addition to the issues previously identified in this report, the audit noted several other issues, including:

- The inability of Environmental Services staff to appropriately estimate the costs of goods and services. Examples include the electrical contractor support for sewage and water pumping stations and supply and delivery of water, wastewater and stormwater infrastructure parts and materials. In both cases, the actual bid results were substantially higher than staff estimates.
- The inability to draft market ready specifications to execute their programs. For example, Environmental Services purchased nine vehicles in 2016 without the appropriate shelving, lighting and other needed equipment. As of June 2018, these vehicles were still not in active service. Between July and December 2018, eight of these vehicles have been appropriately retrofitted and put into service.
- A high dependency on Low Dollar Value (LDM) purchases for repeat purchases when establishing vendors of record or going to market would be more appropriate. In 2018, Environmental Services spent \$831.3K on Low Value Purchases (LDMs) or a monthly average of \$69.3K. This represents the third highest spend for any City department (10.3% of overall LDM spend at the City).
- Several examples where LDMs and Purchasing cards continue to be used as methods of payment when existing agreements/purchase orders (POs) are in place.

The absence of appropriate purchasing arrangements with external vendors increases the risk that the City may be overpaying for goods/services and/or receiving substandard quality. In addition, a perception of improper purchasing practices can harm the City's reputation.

Recommendations:

In the Construction Audit of Fire Station #7-4: Phase 1 that was approved by Council in 2018, we recommended that management formally adopt a city-wide project management framework that will be a driver to set predetermined goals, improve outcomes and strengthen project management governance. Management is currently in the process of actioning this recommendation.

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In addition to this, we recommend that management:

- Identify the appropriate skills and expertise required in the department to better support the execution of their programs.
- Determine whether some of the responsibilities that Environmental Services is currently responsible for, such as capital delivery of water, wastewater and stormwater infrastructure, be moved under the responsibility of Infrastructure Delivery and asset management planning be moved to Infrastructure Planning & Corporate Asset Management.
- Ensure an open, fair and transparent process is implemented to source vendors, whenever possible.
- Ensure vendors are not paid through any other means when purchase orders are present.

Management Action Plan

Management agrees with the recommendations.

8.1 Identify the appropriate skills and expertise required in the department to better support the execution of their programs.

Priority: **Important**

Timeline: 0-36 Months

Responsible: Manager of Water Services, Manager of Wastewater and Stormwater Services, Manager of Program and System Planning

Current Status

Procurement services provided information/update for the requirement of market ready specifications on January 25, 2019 to Environmental Services management and project management staff.

Job descriptions for wastewater operators, wastewater team lead, water operators, water team lead, water operations coordinator, water/wastewater administrative coordinator, backflow prevention coordinator, SCADA technician have been updated within the last eighteen months.

Management Actions

Management will provide a refresher on market ready specification training to Supervisors in Water Services and Wastewater/Stormwater Services by Q4, 2019.

In order to complete a rigorous review of appropriate skills and expertise a process will need to be undertaken.

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In conjunction with Human Resources, staff will begin by reviewing and refining position roles, responsibilities and accountabilities for project management and management will continue to review positions to ensure that descriptions are clear.

A full review of the competencies necessary to complete the tasks in the various positions will be carried out.

Environmental Services management will prioritize positions that are critical and that need initial attention. Staff will work with incumbents to assess skill sets and competency gaps to determine areas where additional training is required.

Following this model, a long term (36 months) assessment and training plan/program will be developed for individuals in order to fill the expertise gaps described above.

Staff will be assessed through regular reporting and through their annual performance review.

- 8.2 Determine whether some of the responsibilities that Environmental Services is currently responsible for, such as capital delivery of water, wastewater and storm water infrastructure, be moved under the responsibility of Infrastructure Delivery and asset management planning be moved to Infrastructure Planning & Corporate Asset Management.**

Priority: **Important**

Timeline: 1-24 Months

Responsible: Manager of Water Services and Manager of Wastewater/Storm Water Services

Current Status

Currently facilitating quarterly meetings with Environmental Services and Infrastructure Delivery management staff to review common issues including work priorities to improve efficiencies in operational infrastructure.

Management Actions

Environmental Services staff will continue to meet together with Infrastructure Delivery staff to review the rationale for some minor capital work being carried out by the Environmental Services Department. When reviewing the appropriate split there are a number of considerations such as financial thresholds, urgency of implementation for service continuity and the design complexity of the work.

- 8.3 Ensure an open, fair and transparent process is implemented to source vendors, whenever possible.**

Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Water Services, Manager of Wastewater/Stormwater Services and Manager of Program and System Planning

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Management Action

Environmental Services staff will continue to use tools such as our annual Procurement Plan and commit to review it monthly with Procurement Services staff. Staff will immediately involve Procurement Services in any purchasing processes and ensure that all transactions are clear and transparent. Any variations to process must be identified and brought to management's attention. Environmental Services staff will strive to reduce the amount of LDMS by 30% from 2018 levels by implementing contracts.

8.4 Ensure vendors are not paid through any other means when purchase orders are present.

Priority: **Important**

Timeline: 0-3 Months

Responsible: Manager of Water Services, Manager of Wastewater/Stormwater Services and Manager of Program and System Planning

Management Actions

Staff, together with Accounts Payable, will review and develop a system where Low Dollar value purchases are tracked against open Purchase Orders. Any purchases where there are existing POs shall not be made with Purchase Cards unless there is an emergency situation that necessitates the delivery of the product immediately.

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9. Perform an Operational Health and Safety and Public Hazard Risk Assessment

The City has a Corporate Occupational Health and Safety policies and procedures manual that covers several topics including personal protective equipment, safe work practices and health & safety training. Human Resources also provide regular safety training sessions of general interest, such as Competent Supervisor Training, Traffic Protection and General WHMIS Training.

According to the City's Employee Health & Safety Training procedure, each department is responsible for developing and implementing their own initial and specific hands-on operational and technical training programs. This involves identifying risks or hazards associated with the work to be performed, making sure risks are minimized by SOPs, proper equipment and training, and monitoring to ensure health and safety measures are in place and working effectively.

Based on conversations with Environmental Services staff, not all the risks and hazards pertaining to Environmental Services' operations have been identified and assessed. There are inherent risks associated with their operations including, but not limited to working alone, around water and electrical, and at heights. Some of these risks and hazards may apply to the public as well when visiting the City's parks and facilities.

We noted several examples of hazards during our process walkthroughs that either had not been properly identified or staff had not been appropriately trained to mitigate the risk, including:

- An electrical contractor advised Servicepersons that they were dangerously testing a generator.
- An operator applied a lock to a sewer main gate without checking to see if anyone was inside.
- A pumping station's wet well was not equipped with safety railings.

Without proper identification of specific operational and public risks and hazards, educational programs, training and SOPs cannot be fully developed to address relevant health and safety concerns.

Further, Environmental Services develops annual budgets for compliance and training. These funds are used for the licensing and training requirements of staff. In 2018, Environmental Services spent approximately \$342K (or 47%) less than budgeted on Compliance and Training and approximately \$215K (or 34%) less than budgeted in 2017.

Although a Supervisor of Compliance and Training position exists, new staff are often trained by a supervisor, foreperson or other staff prior to being allowed to participate in activities on their own. However, criteria have not been established to determine the appropriate amount and type of training required per activity and there is no formal testing of employees' level of readiness. An employee's readiness is based on the judgment of the individual conducting the training. In one instance, Internal Audit observed that a Serviceperson was not demonstrating a task as per procedure when training a new employee.

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As a result, there is increased risk that the delivery of training may be inconsistent, and staff may be allowed to perform an activity before sufficient training has been completed. This may increase the risk of workplace injuries or errors, which may compromise the health & safety of staff and the public.

Recommendation

We recommend that management:

- Perform an operational health and safety and public hazard risk assessment to ensure relevant risks and hazards have been identified and mitigation strategies developed.
- Ensure the compliance and training budget adequately reflects the funds required to meet objectives and are monitored to ensure that the training program is effectively executed.
- Enhance the training and testing program to ensure trainers are utilizing a consistent curriculum and approach, while developing a more objective approach to assess employee readiness to perform new tasks.

Management Action Plan

Management agrees with the recommendations.

9.1 Perform an operational health and safety and public hazard risk assessment to ensure relevant risks and hazards have been identified and mitigation strategies developed.

Priority: **Critical**

Timeline: 0-6 Months

Responsible: Manager of Water Services and Manager of Wastewater/Stormwater Services

Current Status

In July 2012, job hazard analysis reports were completed for the Public Works department and recommended controls were implemented.

More recently staff performed arc flash assessments on three lift stations in February 2018 and implemented recommendations for required arc flash PPE. Through the implementation of recommendations from the consultant's facility study, the fall arrest systems at four Sewage Pump stations and two Water Pumping stations were improved. The work was completed in Q1, 2018.

Management Action

There is a need to update the 2012 job hazard analysis. Staff will carry out an operational health and safety and public hazard risk assessment and provide details regarding areas

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of concern. This assessment may need to be carried by an external resource. This assessment shall be carried out in 6 months and implemented by Q1, 2020.

9.2 Ensure the compliance and training budget adequately reflects the funds required to meet objectives and are monitored to ensure that the training program is effectively executed.

Priority: **Important**

Timeline: 0-12 Months

Manager of Program and System Planning

Current Status

Existing training budgets were historically developed based upon staff numbers and the number of hours required to meet MECP approved CEU training. It is mandatory that staff be provided with both OTJ (on the job) training and training provided by external sources to ensure that all water and wastewater operators remain fully certified. The budgeting process involved conservative estimates to ensure all staff are compliant. The development of the budget for OTJ and mandatory training was revised for 2019 to be in accordance with specific costing details for each course and comparison to the actual expenditures in 2018.

Management Action

The Supervisor of Compliance and Training will monitor and ensure that the levels of certification for all operators meet the regulatory requirements.

A staff training strategy with a mission statement, clear goals and objectives will be developed. This strategy will apply to operator certification and licensing. This strategy will establish the long-term vision for the program and ensure that expenditures are effectively committed.

Staff will monitor the training expenditures and ensure that the training program is effective and meets the above described objectives and report to the Management Team on a quarterly basis.

9.3 Enhance the training and testing program to ensure trainers are utilizing a consistent curriculum and approach, while developing a more objective approach to assess employee readiness to perform new tasks.

Priority: **Important**

Timeline: 0-24 Months

Responsible: Manager of Program and System Planning, Manager of Water Services and Manager of Wastewater/ Stormwater Services

Management Action

Staff will utilize the staff training strategy developed above to ensure that the curriculum meets the needs of staff and the regulatory authority. Staff will also look for opportunities to enhance the program.

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10. Fully Operationalize the SCADA System

Supervisory control and data acquisition (SCADA) is a system of software and hardware elements that allows the City to remotely monitor the status of pumping stations and other remote locations. The SCADA system receives data from various inputs at the pumping stations, processes it and reports the information so that it can be acted upon. The SCADA communication and remote monitoring capabilities are crucial since they help to maintain efficiency, process data for smarter decisions, and communicate system issues to help mitigate downtime.

The following is an excerpt from a report entitled, “Wastewater Collection System and Storm Water Management Report”, that was presented by Environmental Services management on March 7, 2018 at Committee of the Whole Working Session:

“...A SCADA system provides the ability to remotely monitor and control critical infrastructure related to wastewater and water operations.

The City of Vaughan previously had a basic SCADA system comprised of an alarm dialer system which had the capability to provide notification when pump or generator failures occurred at these critical locations so that on-call staff can respond immediately.

The upgrade to the SCADA system was completed over a thirteen (13) month timeframe and concluded in January 2018. Environmental Services worked in partnership with the Office of the Chief Information Officer and an external consultant to install new hardware and software improving the capacity for centralized data collection/recording/trending and alarm response times. The project delivered a series of standards that will ensure consistency as new pump stations are added.”

During process walk-throughs in March 2018, Internal Audit observed that Environmental Services had not started using SCADA’s full capabilities, as per the report. The critical communication component was still not fully implemented. In November 2018, it was confirmed that the pumping stations equipment still had to be calibrated before SCADA’s monitoring information could be validated as reliable and reports generated.

Based on these observations, we conclude that at minimum, Environmental Services provided incomplete information in their March 2018 report regarding the status of SCADA. A number of components of the system were still not fully implemented.

The inability to remotely monitor and control water and wastewater infrastructure can expose the City to significant liability and environmental risk.

Recommendations

We recommend that management assess the current state of the SCADA system and develop a formal implementation plan to fully optimize the system.

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Management Action Plan

Management agrees with the recommendations.

- 10.1 We recommend that management assess the current state of the SCADA system and develop a formal implementation plan to fully optimize the system.**

Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Wastewater/Stormwater Services

Current Status

Much work has been done on the SCADA system and staff continue to add to its capabilities. Alarms have been prioritized and are being responded to in reduced time with online monitored assistance and direction. A dedicated SCADA Technician has been hired to help provide solutions, train staff, monitor and oversee improvements and repairs.

Operators have been trained on the system and its use. The system robustness is improved and server failure issues resolved.

Trending data is now available for use and can be accessed through iFix software.

Management Actions

Staff will provide detailed reports on the status of the implementation and operation of the SCADA system to the management team on a quarterly basis. These reports will include information on the operational activities, alarms, and actions as well system enhancements, issues and their resolution.

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11. Leverage Advances in Technology to Improve Business Processes

Environmental Services is a report-driven operation where documentation is required to support compliance to legislation and City policies and procedures.

Many of Environmental Service's reporting processes are manual in nature. For example:

- Water sampling results are recorded manually on chain of custody forms. However, the existing WaterTrax Data Management software provides features that are key to providing an effective business tool to automate and improve daily activities related to acquisition and storage of system monitoring information, compliance verification and reporting. None of these reporting tools, including a mobile app, which could be used to enter water sampling results directly into the system by the servicepersons in the field, have yet to be fully explored by management. As a result, the system is currently underutilized, which increases the risk that business objectives will not be achieved.
- Servicepersons are required by the MOECC to maintain a personal logbook and ensure pumping station inspections and maintenance are recorded in pumping station logbooks. The MOECC have been satisfied with the logbooks in the pumping station, but Internal Audit reviewed the log books and observed:
 - There is no consistency about what information is captured among the different pumping stations.
 - Entries into the pumping station logbooks do not always support the required maintenance schedule.
 - Neither the servicepersons' or pumping station's logbooks are reviewed by management for accuracy, completeness or monitored for operational performance.

The underutilization of WaterTrax, combined with inconsistencies in data recording and absence of management oversight can significantly impact performance management, cost effectiveness, efficiency and service delivery.

Recommendations:

We recommend that management:

- Investigate the feasibility of using the WaterTrax mobile app instead of manual forms for recording water sampling results.
- Examine the reporting tools that are available in the WaterTrax system and determine the information required so that processes related to data analytics, monitoring and reporting can be developed to help management assess whether business objectives related to water sampling activities are being met.
- Provide greater management oversight over both the servicepersons personal logbooks and the pumping station logbooks.

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Management Action Plan

Management agrees with the recommendations.

11.1 Investigate the feasibility of using the WaterTrax mobile app instead of manual forms for recording water sampling results.

Priority: **Important**

Timeline: 0-24 Months

Responsible: Manager of Program and System Planning

Management Action

Staff will review and standardize the entries into the station log books and the personal log books. In addition, staff will review the capabilities of WaterTrax, or a suitable equivalent tracking application, to determine suitability for recording sample data with a view to integrating the log process recognizing that the MECP requires completed log books at all facilities at all times and report back to the management team.

11.2 Examine the reporting tools that are available in the WaterTrax system and determine the information required so that processes related to data analytics, monitoring and reporting can be developed to help management assess whether business objectives related to water sampling activities are being met.

Priority: **Important**

Timeline: 0-24 Months

Responsible: Manager of Program and System Planning

Current Status

Environmental Services has adapted technological advancements as part of their 2018-2020 operational plan and achievements in this area include: working with Office of the Chief Information Officer to develop and implement five electronic inspections forms on the Geocortex/Vaughan Maps platform, rolling out Tough books/Tough pads to all front-line operators to have direct access in the field.

Staff have put forward a business request to the Office of the Chief Information Officer to pilot electronic log books and have a 2019 approved capital project to support this initiative.

Management Actions

As indicated above, staff will review the capabilities of WaterTrax, or a suitable equivalent tracking application, for managing information regarding water sampling activities and providing management reporting. Should it be recommended that we proceed with enhanced use of WaterTrax, or a suitable equivalent tracking application, staff will prepare a detailed business case together with a workplan and timelines for implementation.

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11.3 Provide greater management oversight over both the servicepersons personal logbooks and the pumping station logbooks.

Priority: **Critical**

Timeline: 0-3 Months

Responsible: Manager of Water Services, Manager of Wastewater and Stormwater Services

Management Actions

Personal and station logs will be randomly spot checked and reviewed for consistency and signed off by the Supervisor of Water and Supervisor of Wastewater and Storm Water on a weekly basis effective immediately. Any issues regarding completeness or accuracy will be addressed immediately.

As stated above in recommendation 11.2, Staff have put forward a business request to the Office of the Chief Information Officer to pilot electronic log books and have a 2019 approved capital project to support this initiative. Other opportunities to ensure accurate station logs are being reviewed such as SCADA electronic access and GPS.

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12. Update Development Agreements to Clarify Timing of Payment Requirements for New Watermain Connections

Development Agreements with the City require developers to flush the water system and sample for chlorine residuals prior to commissioning. This process ensures that connection to the potable municipal water system is done safely and without a negative impact to the City's water quality.

The Development Agreement provides that the owner shall pay for the water used for testing and flushing the water distribution system. However, our review of the agreement found that there are no provisions outlining when the City will invoice the developer for these costs and no provisions for when the developer must pay the City. As of May 31, 2018, the outstanding balance for these fees totaled approximately \$437,000. Some of these fees dated back to December of 2014.

We noted that many of the outstanding invoices were issued by the City in late December. This typically implies the year end billing reconciliation. Invoicing should be done as close as possible to service delivery. Financial Services has indicated that billing is now being done on a timely basis.

Developers are not always willing to pay in a timely manner or not at all. This causes delays with the City assuming the development. The City collects an irrevocable Letter of Credit (LC) from the developer to secure the construction of municipal services. The LC stipulates that it could be drawn to fulfill obligations under the agreement, however it has not been used in the past for costs associated with flush the water system.

Although the City will not assume the project until all liabilities are paid, the likelihood of collecting these funds in a timely manner decreases the older they get. In addition to the financial risk, delays in assuming developments can result in a reputational risk to the City.

Recommendation

We recommend that management:

- Update the development agreement to clarify the timing of the billing and the specific terms of payment related to the testing and flushing of water.
- Ensure that invoicing is done promptly based on delivery of services and in compliance to the provisions in the development agreements.

Management Action Plan

Management agrees with the recommendations.

12.1 Update the development agreement to clarify the timing of the billing and the specific terms of payment related to the testing and flushing of water.

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Priority: **Important**

Timeline: 0-24 Months

Responsible: Manager of Program and System Planning

Current Status

Pre-watermain commissioning charges are included in the current development agreements and are paid in advance by the developer. The Development agreements state that developers will be required to pay for post commissioning water used for flushing upon receipt of an invoice. Post commissioning flushing water volumes are summarized by Environmental Services and are sent to Finance for invoice issuance on a quarterly basis.

Management Action

Staff will work with Finance and Development Engineering to review the agreement requirements and make revisions as necessary to ensure prompt payment of invoices. If there are changes proposed in the agreements staff will also meet with the Development industry.

Consideration may be given to the need to withhold preliminary acceptance of the infrastructure until post commissioning water use payments are made. This should follow discussions with the development industry.

12.2 Ensure that invoicing is done promptly based on delivery of services and in compliance to the provisions in the development agreements.

Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Program and System Planning

Management Actions

Staff will work with Finance to ensure invoicing is sent to the developers in a timely manner.

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13. Provide Greater Oversight of the Main Flushing and Close Circuit Television (CCTV) Programs

Environmental Services developed a Close Circuit Television (CCTV) Program and Main Flushing Program to address sewer system issues such as deterioration, blockages and collapses.

The CCTV Program consists of sending remote controlled cameras throughout the City's pipes and tunnels to view the condition of the infrastructure. It also updates the Geographic Information System (GIS) used by Infrastructure and Delivery. The map of the City of Vaughan is divided into 10 sections for the CCTV program. The target is to access and record 10% of the City each year.

The City has been divided into four sections for the Main Flushing Program with 250,000 metres of sanitary and storm water pipes flushed annually. The flushing system provides preventative management by identifying areas that may be experiencing a blockage before damage becomes costly to repair. The target is to flush all of Vaughan's pipe infrastructure in four years.

Both programs are carried out by contractors.

There is evidence these programs are being executed. However, when Internal Audit requested to see documentation of the status of these programs, the documentation was not readily available. When Internal Audit received the project status information, it appeared to have been gathered from several different sources.

Environmental Services does not have a centralized tracking tool and do not regularly report up to management the progress of the programs. Without adequate monitoring and program oversight, targets may not be reached which could impact the City financially and reputationally.

Recommendations:

We recommend that management enhance program oversight by developing a centralized tracking tool that provides monitoring of progress and reporting capabilities.

Management Action Plan

Management agrees with the recommendations.

- 13.1 We recommend that management enhance program oversight by developing a centralized tracking tool that provides monitoring of progress and reporting capabilities.**

Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Wastewater/Stormwater Systems

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Current Status

A detailed program development and tracking tool was implemented in 2016 and is currently on the network drive for staff access. This system includes mapping, project name, type of work and who issued the work.

Management Action

Staff will review the existing sewer flushing and CCTV tracking system to ensure that it meets the needs of the organization. Staff will ensure that sufficient management oversight and reporting is provided in order to update the management team on a quarterly basis.

We are adding a tab to the tracking system summarizing a monthly report shared to the management team on the status of work completed within the month vs. work projected as well as a comment column explaining the variance.

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14. Analyze Insurance Claims Information

The Insurance and Risk Management Section of the Office of the City Clerk is responsible for three main areas: risk financing, risk control and claims administration. Managing risk requires the assistance and cooperation of all City departments, and it is for this reason section works with all departments to understand operations and provide support through risk mitigating strategies.

In 2017, Risk Management acquired a claims management system. This system became operational in a test environment in June 2017, at which time there was a change in management. ClearRisk is intended to provide data that can be used for analysis and tracking trends across the organization and to process claims. Currently, formal processes are not in place to share this information with client groups. However, reports are available to departments on an ad hoc basis at the request of the department as Risk Management continues to customize the system.

For Environmental Services, claims information could provide insight into the current condition of the infrastructure, identify the areas most prone to flooding and become aware of problems of aging equipment. Monitoring and tracking claims could help create programs, develop maintenance schedules and be used to help plan budgets.

Recommendations:

We recommend that Environmental Services and Risk Management evaluate the type of claims information the department requires and develop protocols to analyze and share information to assist in informed decision making.

Management Action Plan

Management agrees with the recommendations.

- 14.1 We recommend that Environmental Services and Risk Management evaluate the type of claims information the department requires and develop protocols to analyze and share information to assist in informed decision making.**

Priority: **Important**

Timeline: 0-12 Months

Responsible: Manager of Water Services and Manager of Wastewater/Stormwater Services

Management Action Plan

Risk Management staff are currently working to build modules within ClearRisk which will improve efficiencies in the claims administration process while adding reporting capabilities for each department. Test reports have already been processed and several departments have been contacted regarding the types of reports they would like to see. Once Risk Management staff have this feedback, have coded each claim and the

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operation modules are built, the risk team will work with each department to produce reports as per their requirements.

Environmental Services staff will work with Risk Management staff to discuss the types of reports that would be appropriate and will work with the Risk team to produce the required reports.